

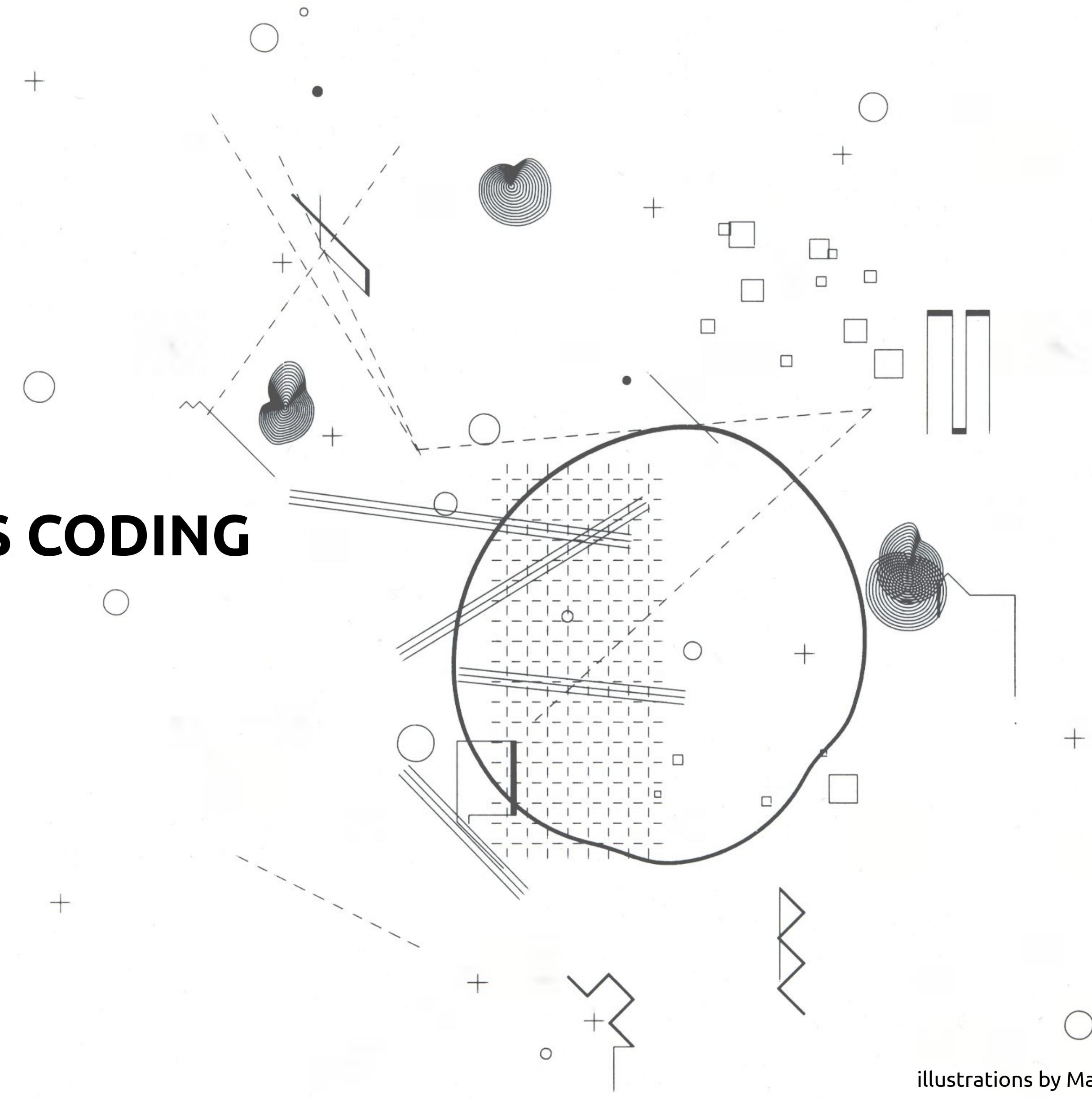
# INTRODUCTION TO GRAPHICS CODING

Term 1

November 2019

**Lior Ben-Gai**

<https://soogbet.github.io/ShenkarCC/>



illustrations by Manfred Mohr

## GOALS

- 1. Improve our visual communication skills through computer programming.**
- 2. Improve our computer programming skills through visual communication.**

## COURSE TOPICS

1. Language, abstraction and procedural drawing
2. Variables, Functions, Conditions and Loops
3. Interaction and animation
4. Generative design methods
5. Data structures and visualization
6. Introduction to 3D structures, image processing and HTML

## ADMIN

### Schedule:

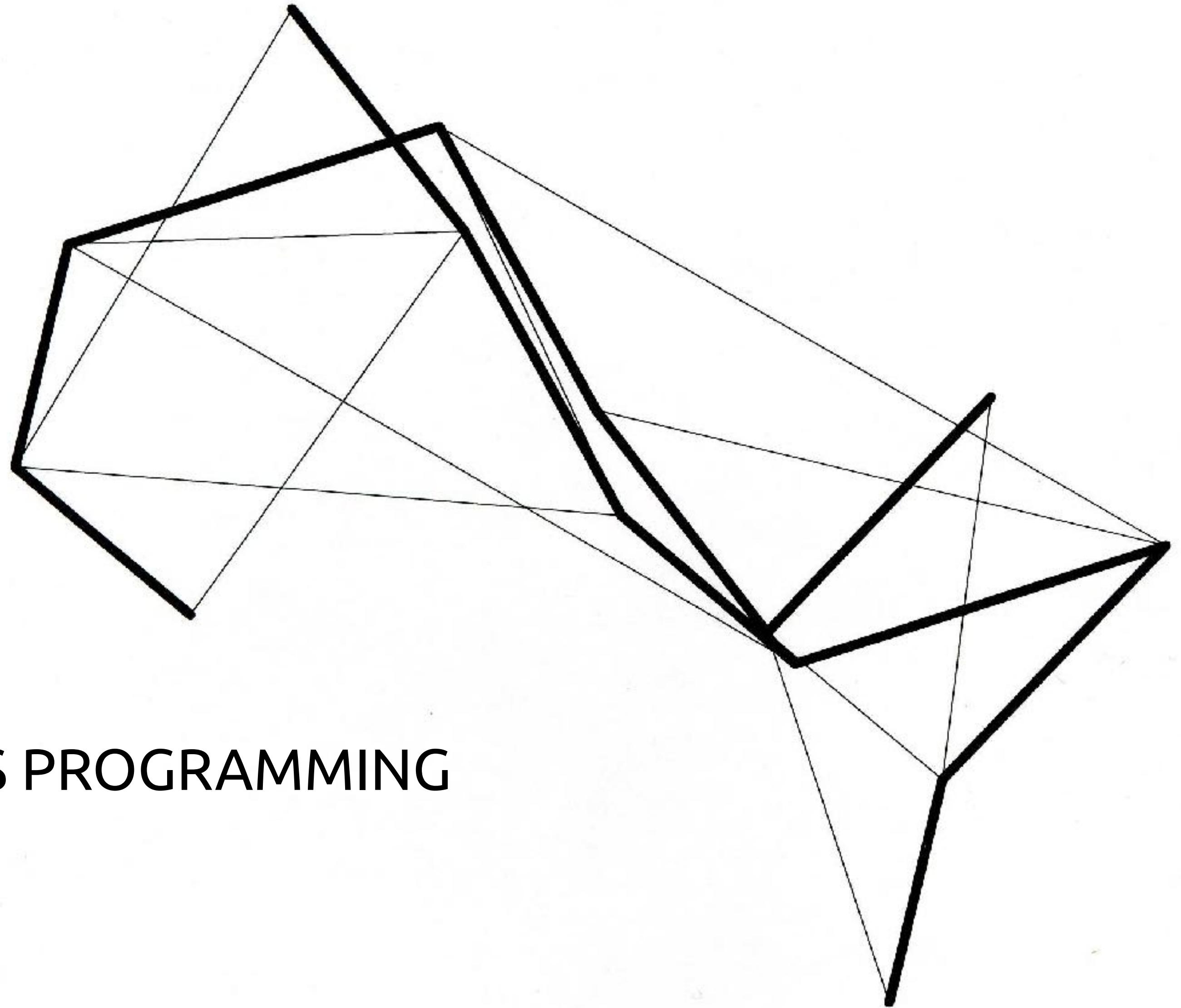
Thursdays 13:00 - 16:00 ( Mandatory )

30.10.19 >> 30.01.20

### Marking:

13 weekly assignments: 55% ( 4 pt each + 3 pt bonus )

1 final project - 45% ( topic and date TBD )



# INTRODUCTION TO GRAPHICS PROGRAMMING

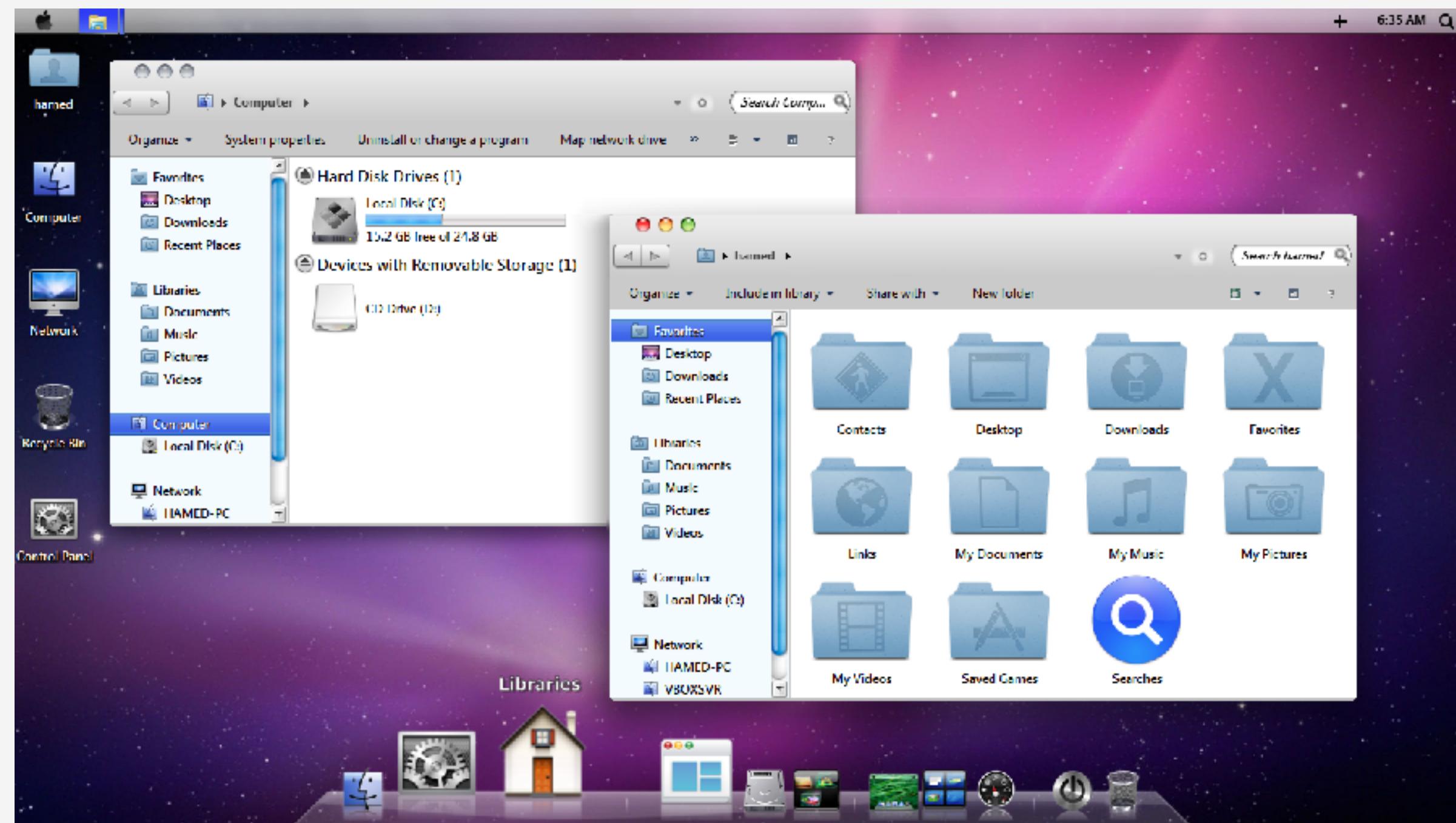
Language / Abstraction / Procedural drawing

WHAT IS COMPUTER PROGRAMMING ANYWAY?

# IS THIS COMPUTER PROGRAMMING?



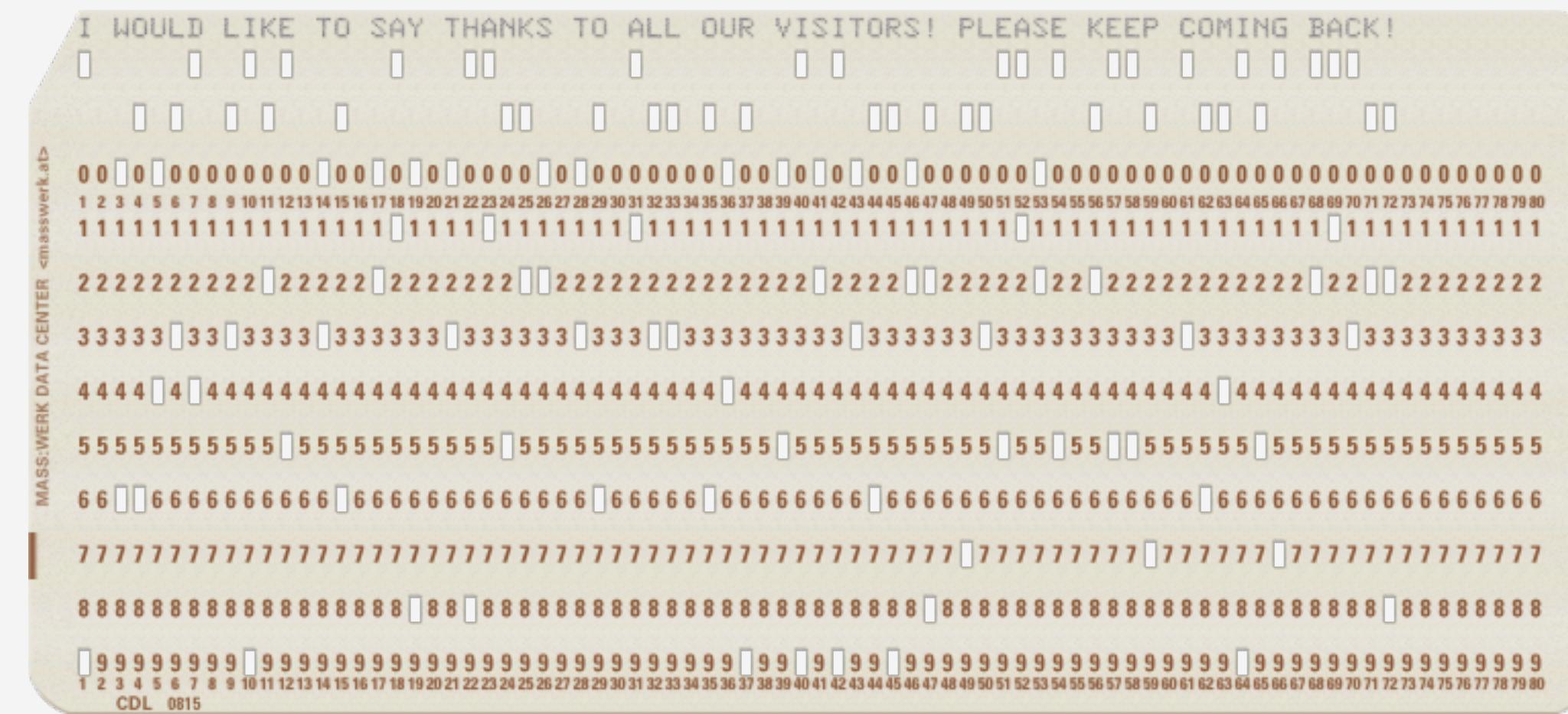
# IS THIS COMPUTER PROGRAMMING?



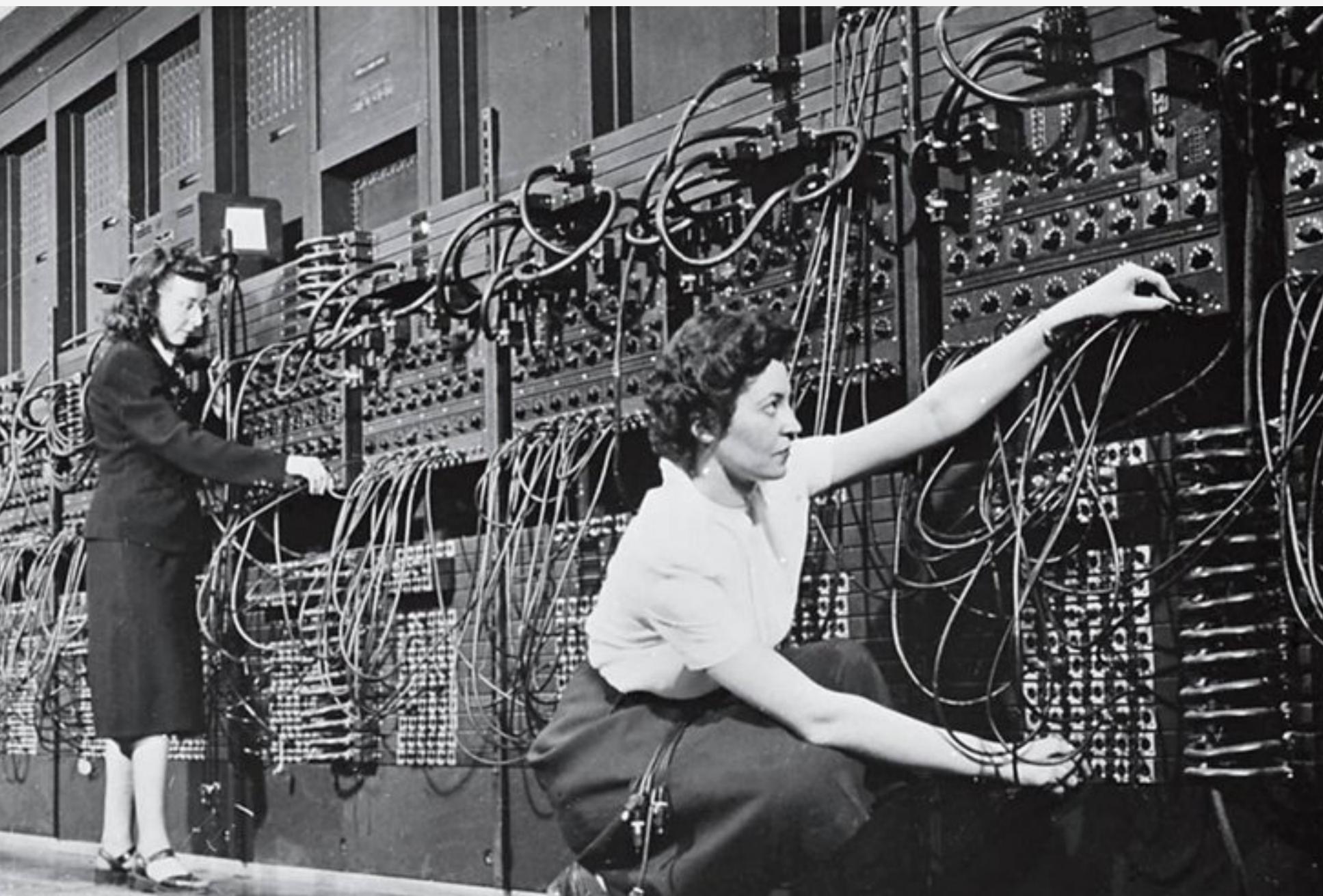
# IS THIS COMPUTER PROGRAMMING?

```
99
100 function GPUComputationRenderer( sizeX, sizeY, renderer ) {
101
102     this.variables = [];
103
104     this.currentTextureIndex = 0;
105
106     var scene = new THREE.Scene();
107
108     var camera = new THREE.Camera();
109     camera.position.z = 1;
110
111     var passThruUniforms = {
112         texture: { value: null }
113     };
114
115     var passThruShader = createShaderMaterial( getPassThroughFragmentShader(), passThruUniforms );
116
117     var mesh = new THREE.Mesh( new THREE.PlaneBufferGeometry( 2, 2 ), passThruShader );
118     scene.add( mesh );
119
120
121     this.addVariable = function( variableName, computeFragmentShader, initialValueTexture ) {
122
123         var material = this.createShaderMaterial( computeFragmentShader );
124
125         var variable = {
126             name: variableName,
127             initialValueTexture: initialValueTexture,
128             material: material,
129             dependencies: null,
130             renderTargets: [],
131             wrapS: null,
132             wrapT: null,
133             minFilter: THREE.NearestFilter,
134             magFilter: THREE.NearestFilter
135         };
136
137         this.variables.push( variable );
138
139     };
140
141     this.render = function() {
142
143         renderer.render( scene, camera );
144
145         if ( this.currentTextureIndex < this.variables.length ) {
146
147             var variable = this.variables[ this.currentTextureIndex ];
148
149             variable.material.uniforms[ "tex" ].value = variable.initialValueTexture;
150
151             renderer.setRenderTarget( variable.renderTargets[ 0 ] );
152             renderer.render( scene, camera );
153
154             variable.material.uniforms[ "tex" ].value = variable.texture;
155
156             renderer.setRenderTarget( null );
157             renderer.render( scene, camera );
158
159             this.currentTextureIndex++;
160
161         }
162
163     };
164
165     this.createShaderMaterial = function( fragmentShader ) {
166
167         var uniforms = fragmentShader.uniforms;
168
169         uniforms[ "tex" ] = { value: null };
170
171         return new THREE.ShaderMaterial( {
172             uniforms: uniforms,
173             fragmentShader: fragmentShader.fragmentShader
174         } );
175
176     };
177
178     this.getPassThroughFragmentShader = function() {
179
180         return "#ifdef GL_ES\nprecision mediump float;\n#endif\n\nvoid main() {\n    gl_FragColor = texture2D( tex, uv );\n}\n";
181
182     };
183
184     this.getPassThroughVertexShader = function() {
185
186         return "#ifdef GL_ES\nprecision mediump float;\n#endif\n\nvoid main() {\n    gl_Position = projectionMatrix * modelViewMatrix * vec4( position, 1.0 );\n}\n";
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188     };
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# IS THIS COMPUTER PROGRAMMING?



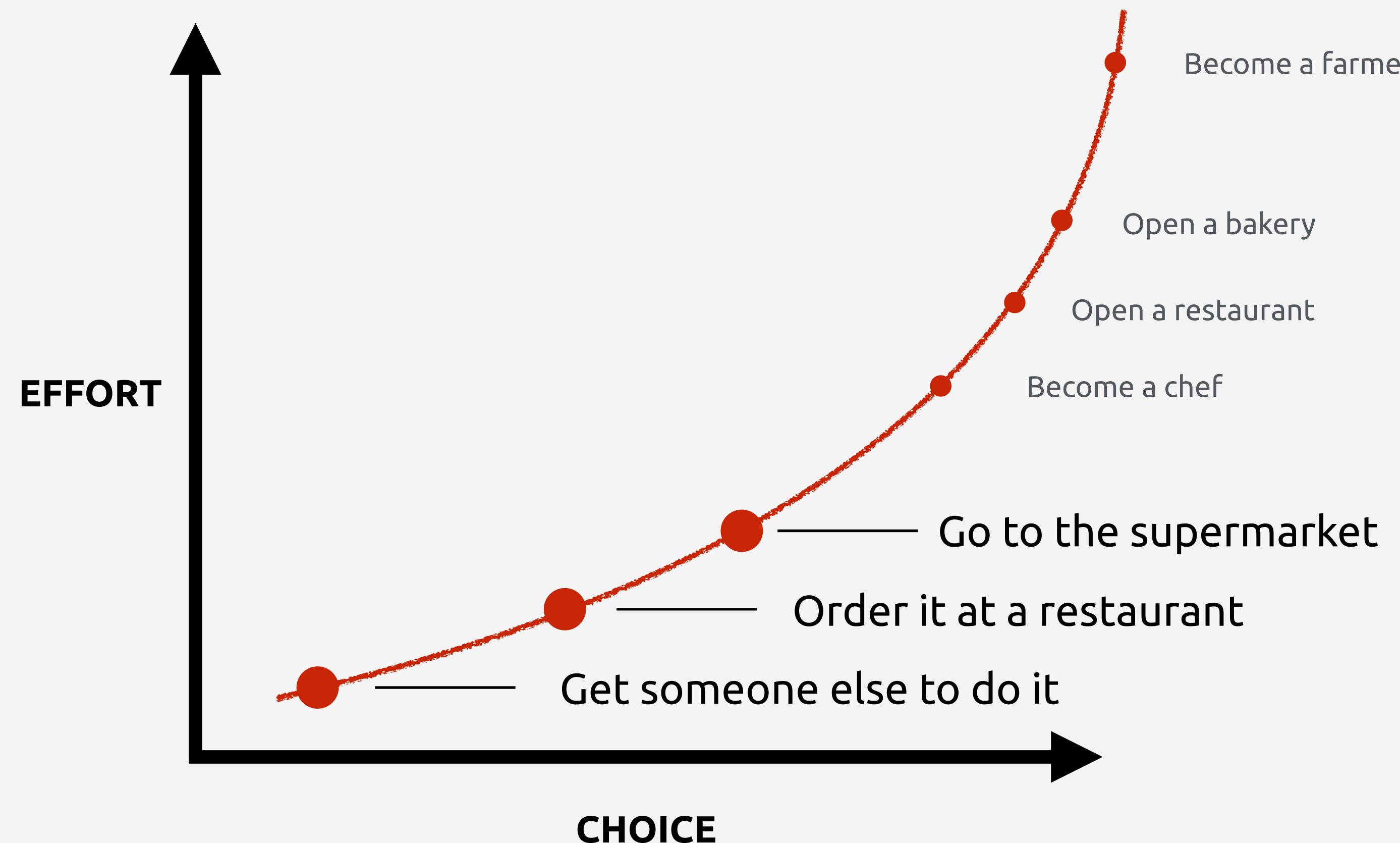
# IS THIS COMPUTER PROGRAMMING?



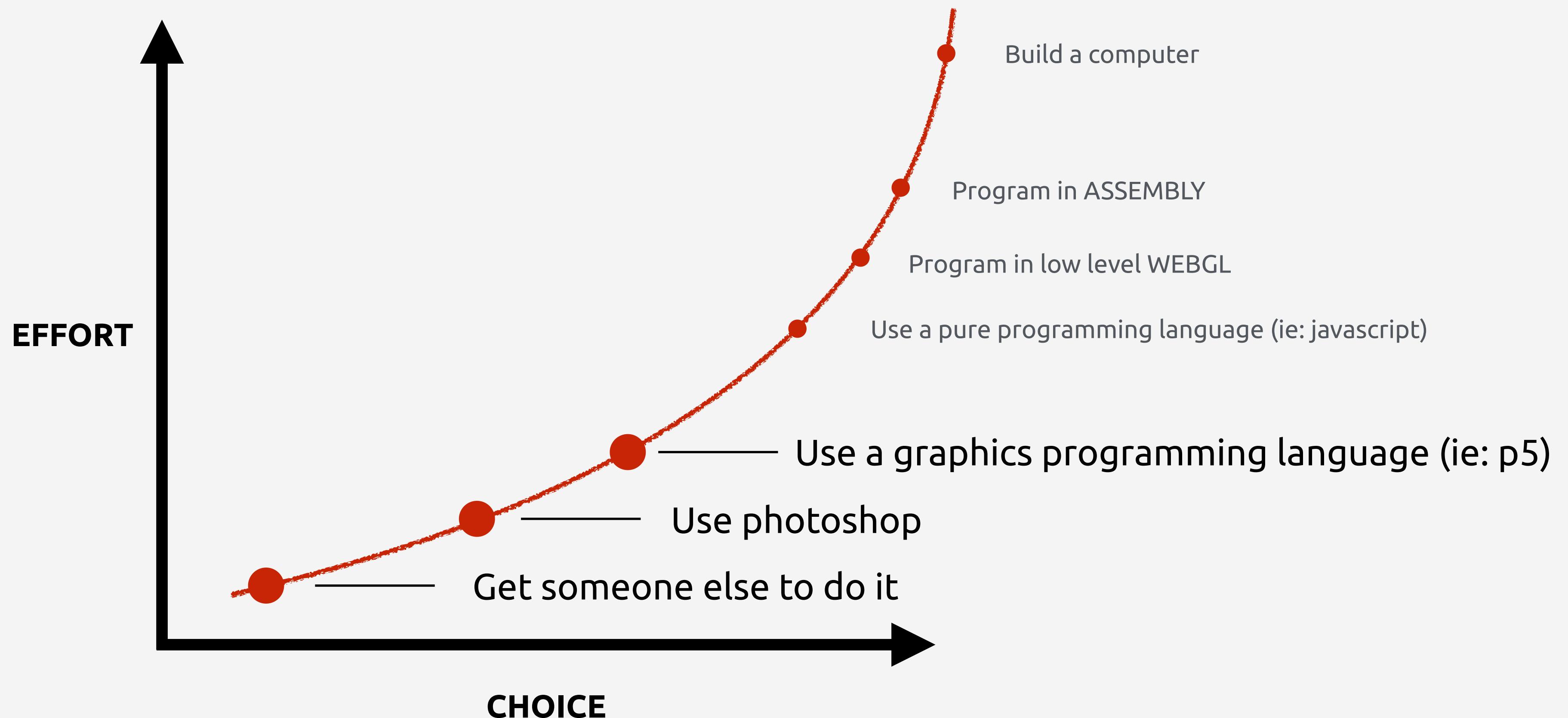
# IS THIS COMPUTER PROGRAMMING?



# MAKING A SANDWICH

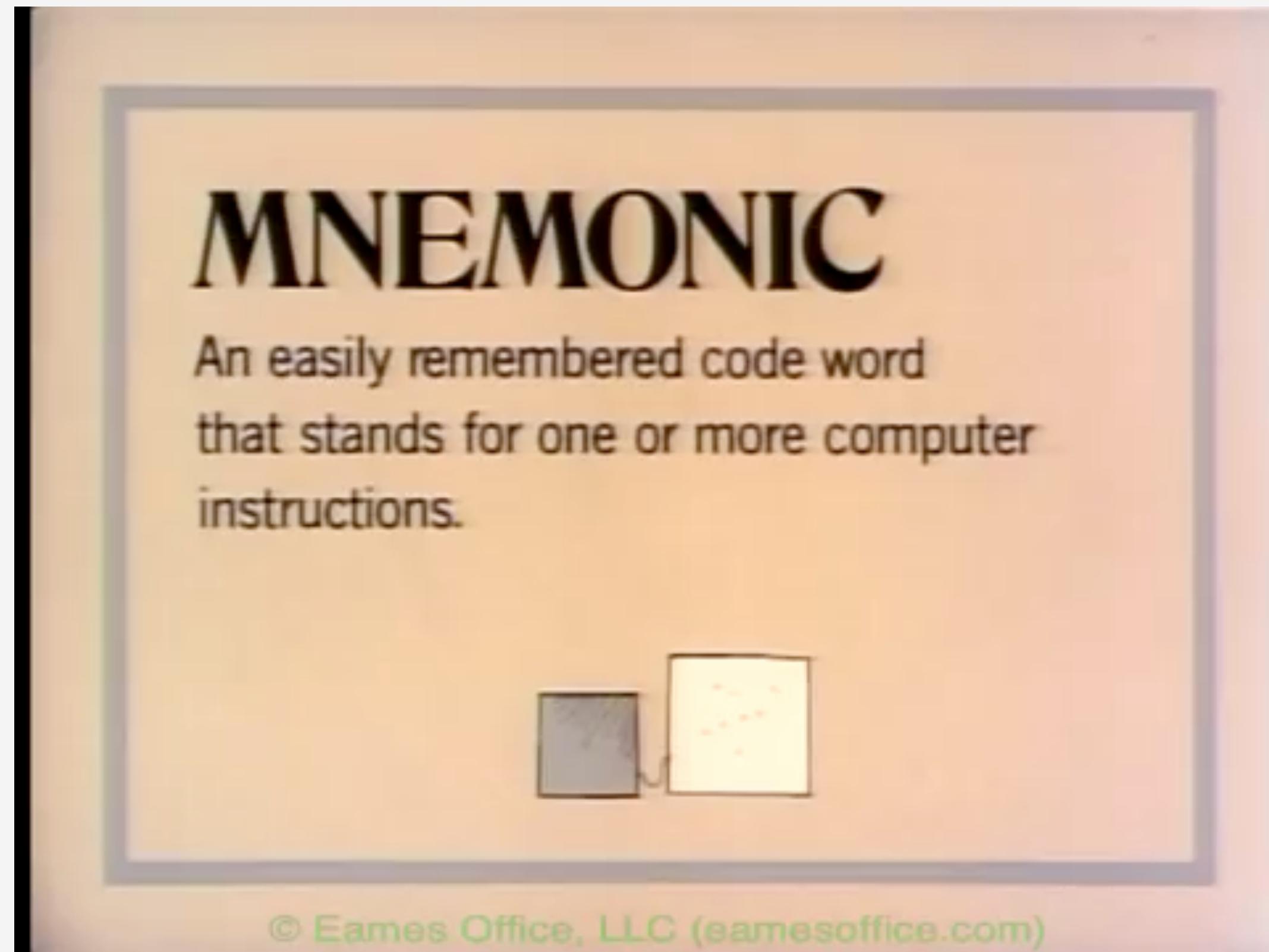


# CREATE A DIGITAL ARTWORK



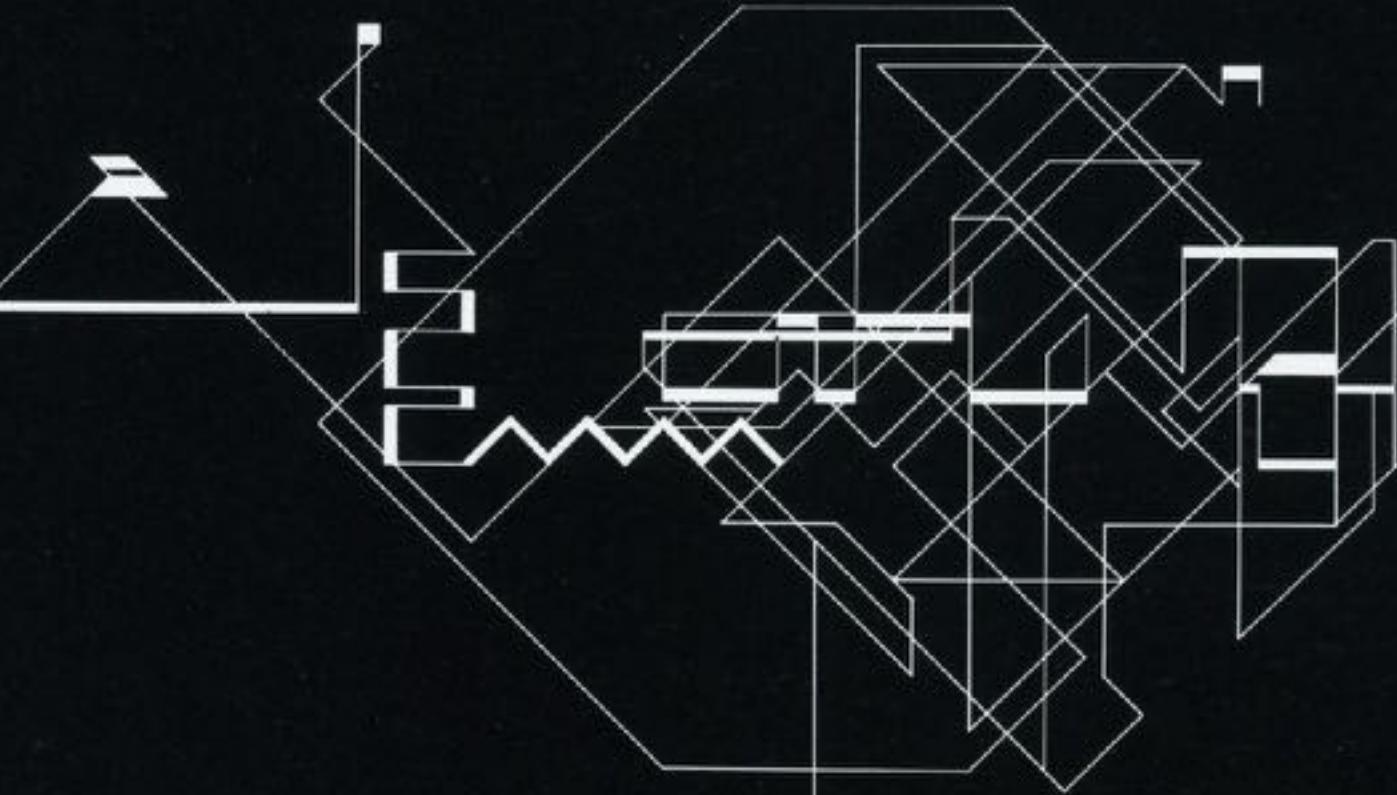
# A COMPUTER GLOSSARY

Charles and Ray Eames 1966

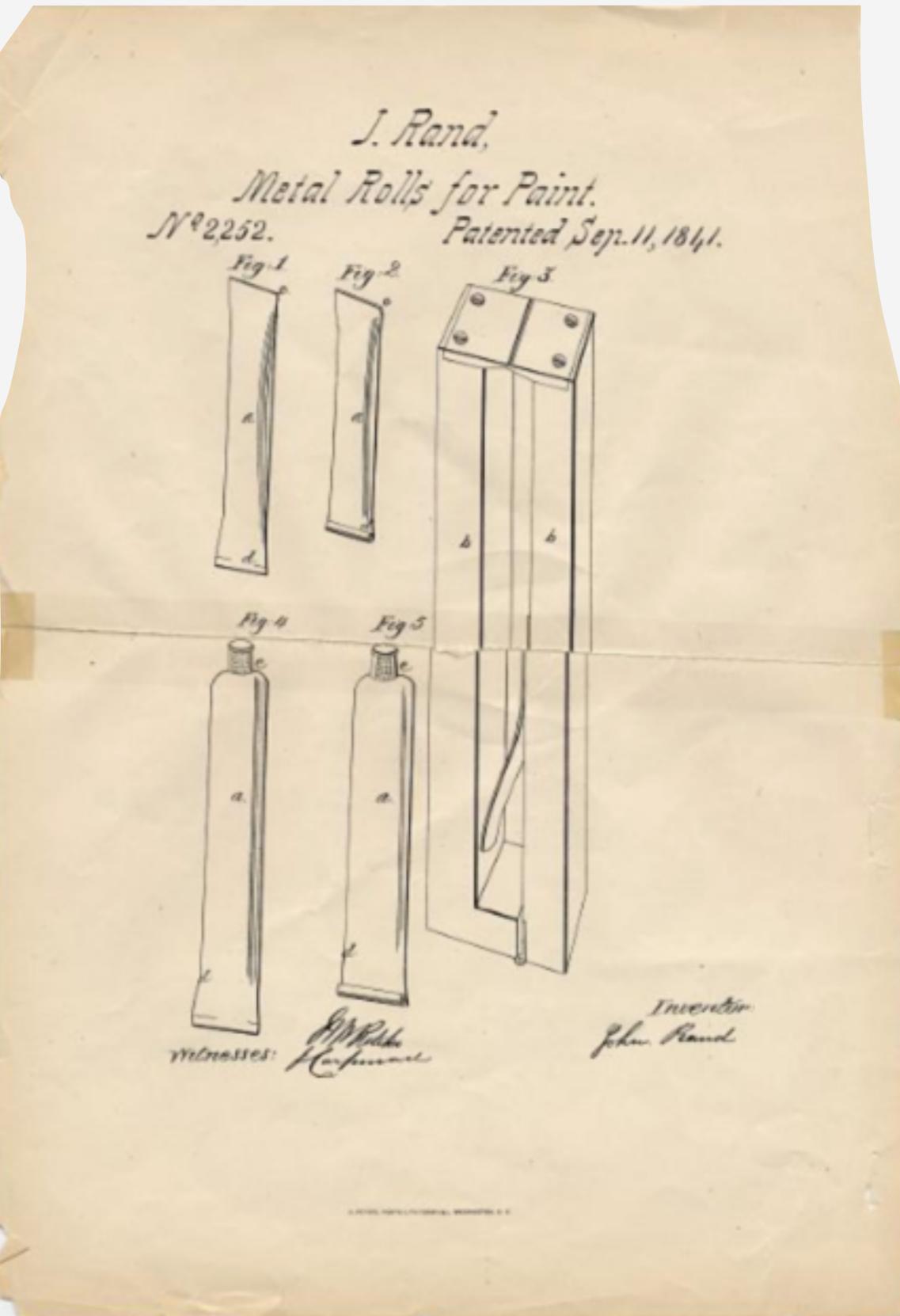


<https://www.youtube.com/watch?v=elgX6sPOqCY>

BUT WHAT DOES THAT HAVE TO DO WITH DESIGN?



# ART AND TECHNOLOGY

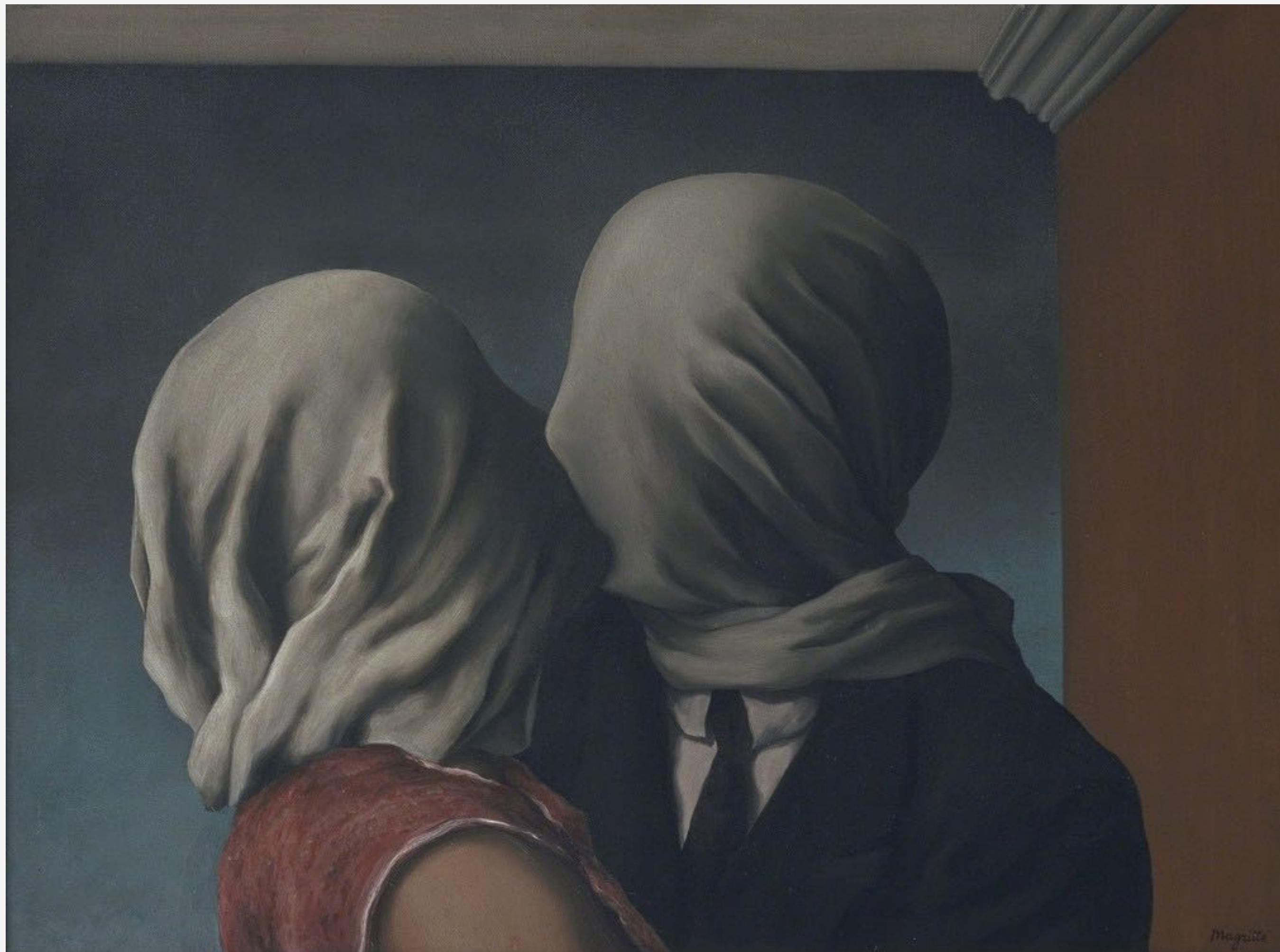


John Goffe Rand, Collapsible metal tube



Claude Monet, Impression, soleil levant

# VISUAL STORY TELLING



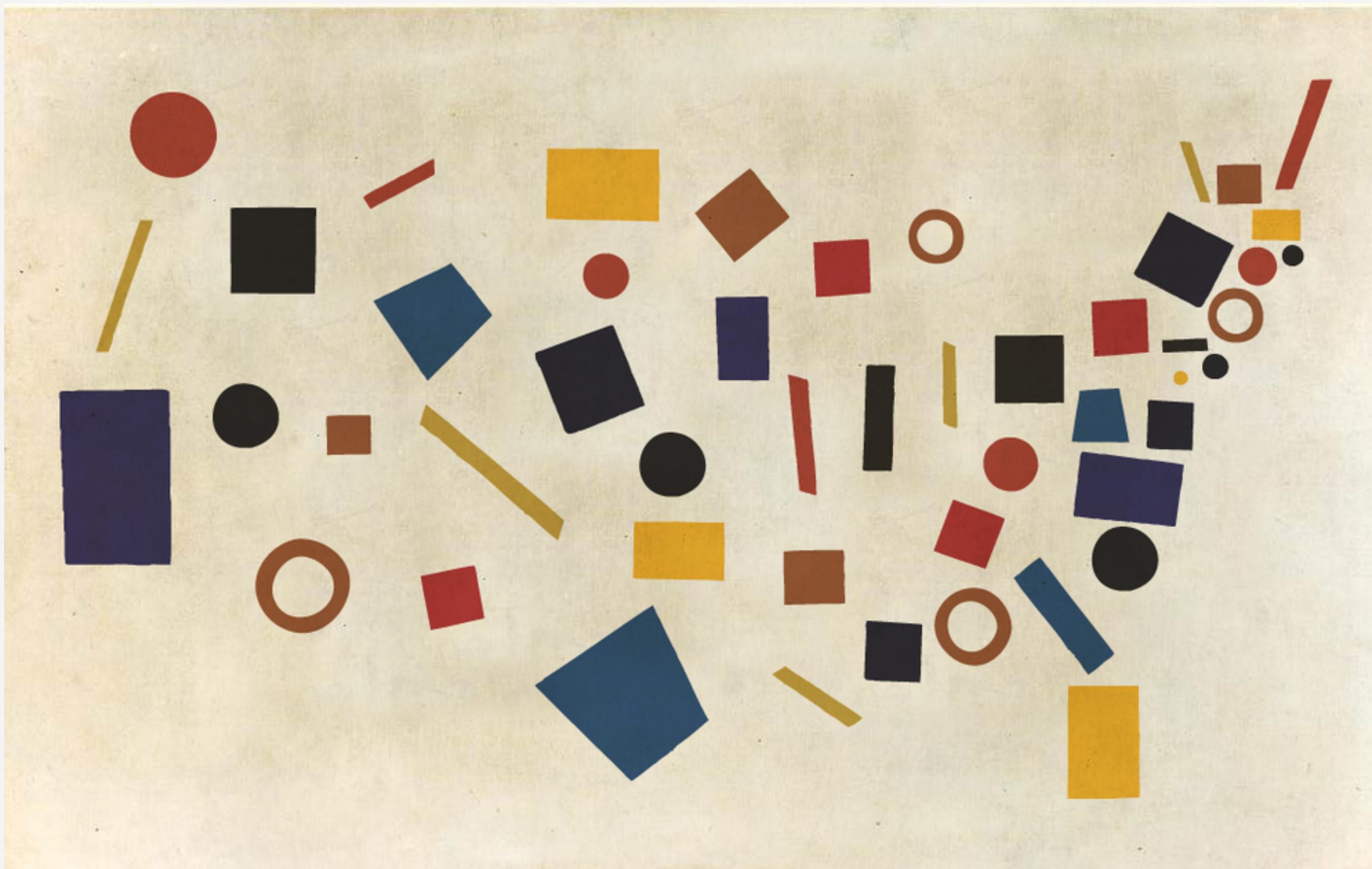
Rene Magritte



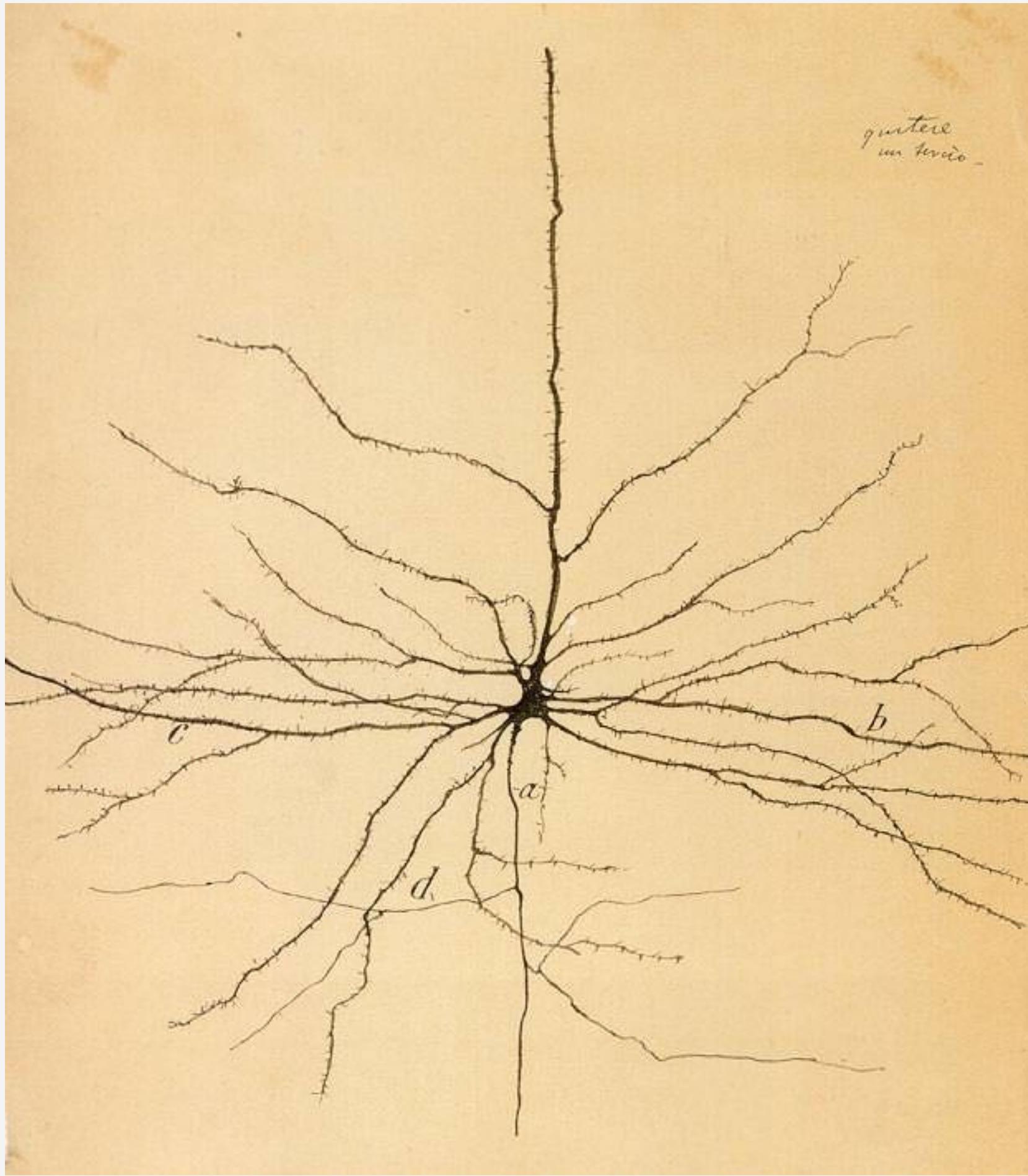
Anselm Kiefer



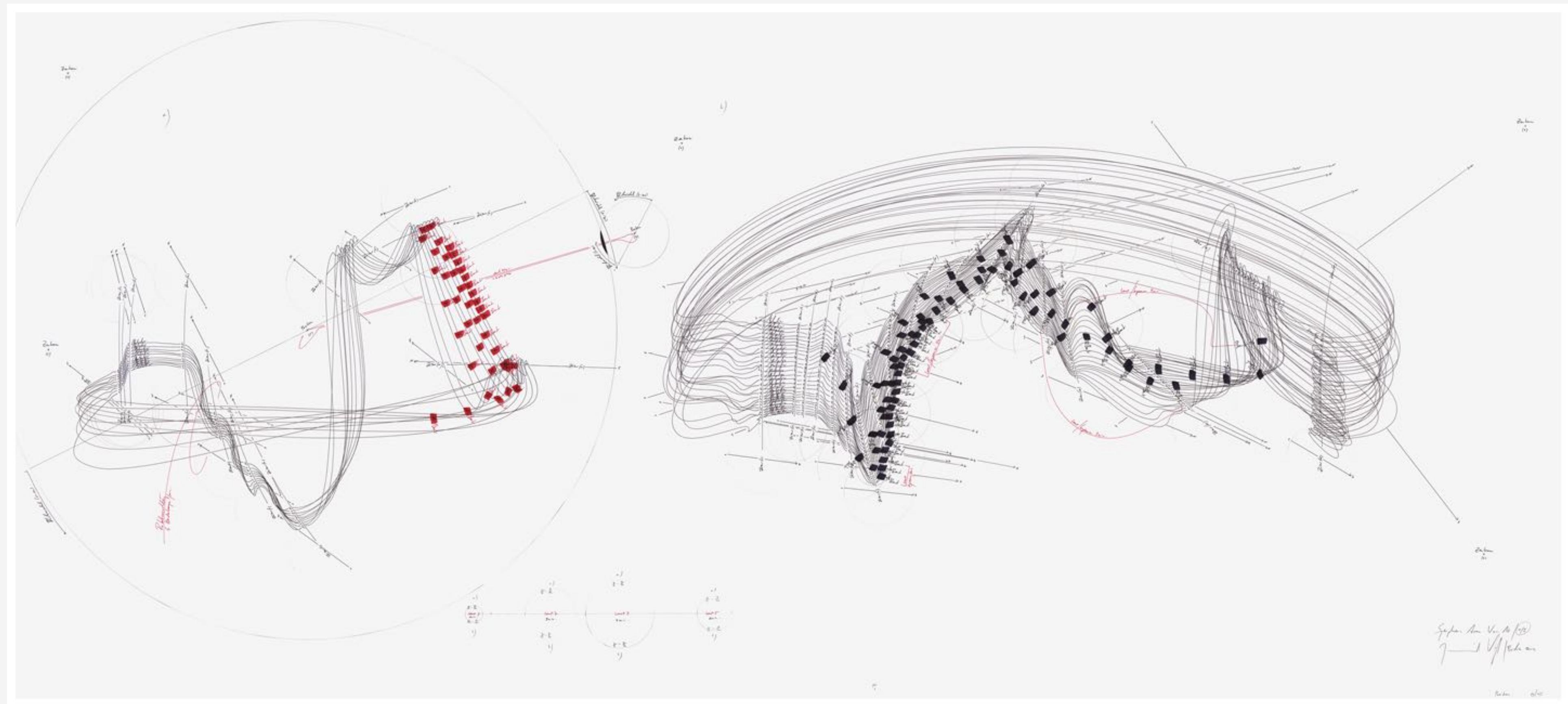
Luigi Serafini



Kazimir Malevich



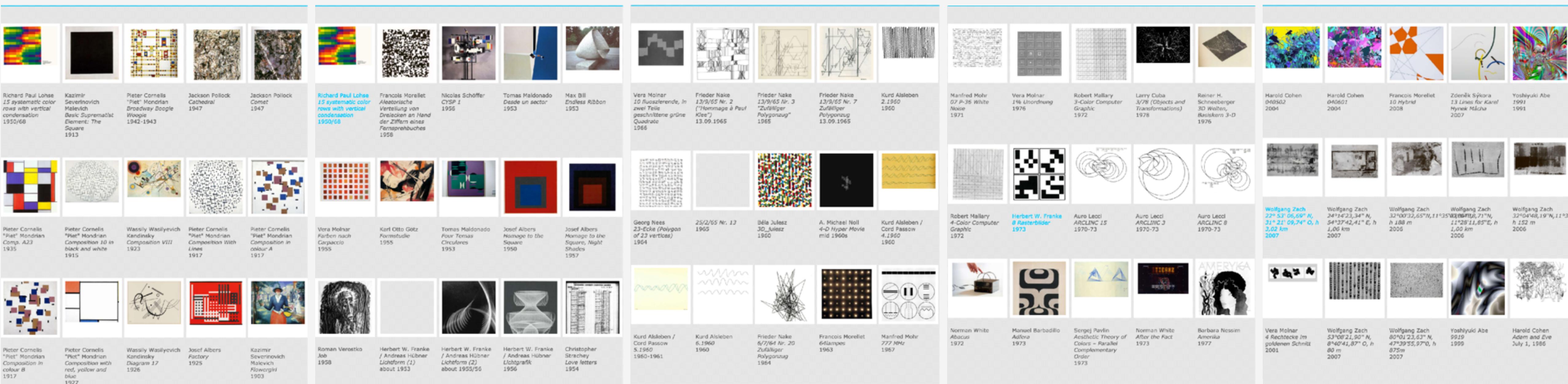
Santiago Ramón y Cajal



Jorinde Voigt

# BRIEF HISTORY OF COMPUTER ART

Computational and algorithmic art during the 20th century



Before 1950

1950 - 1960

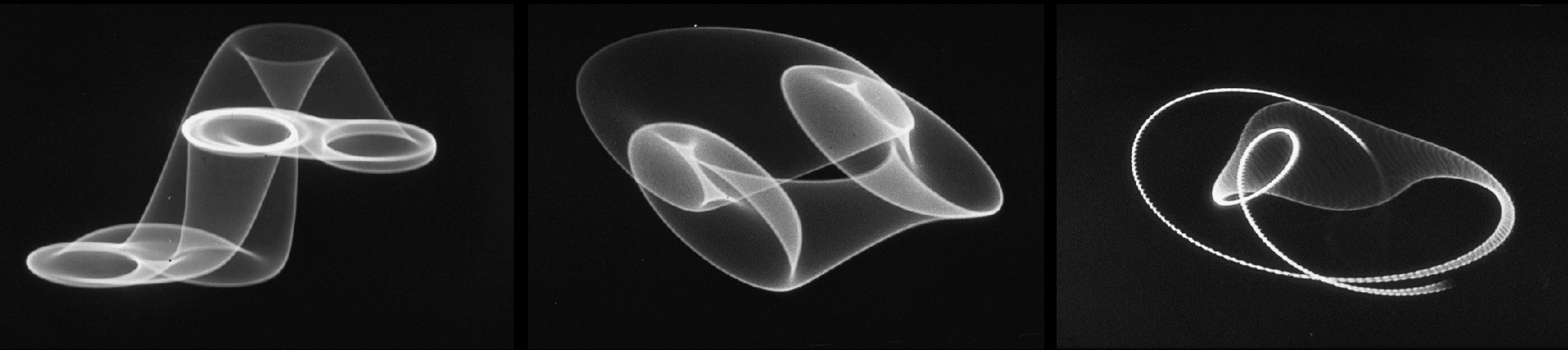
1960 - 1970

1970 - 1980

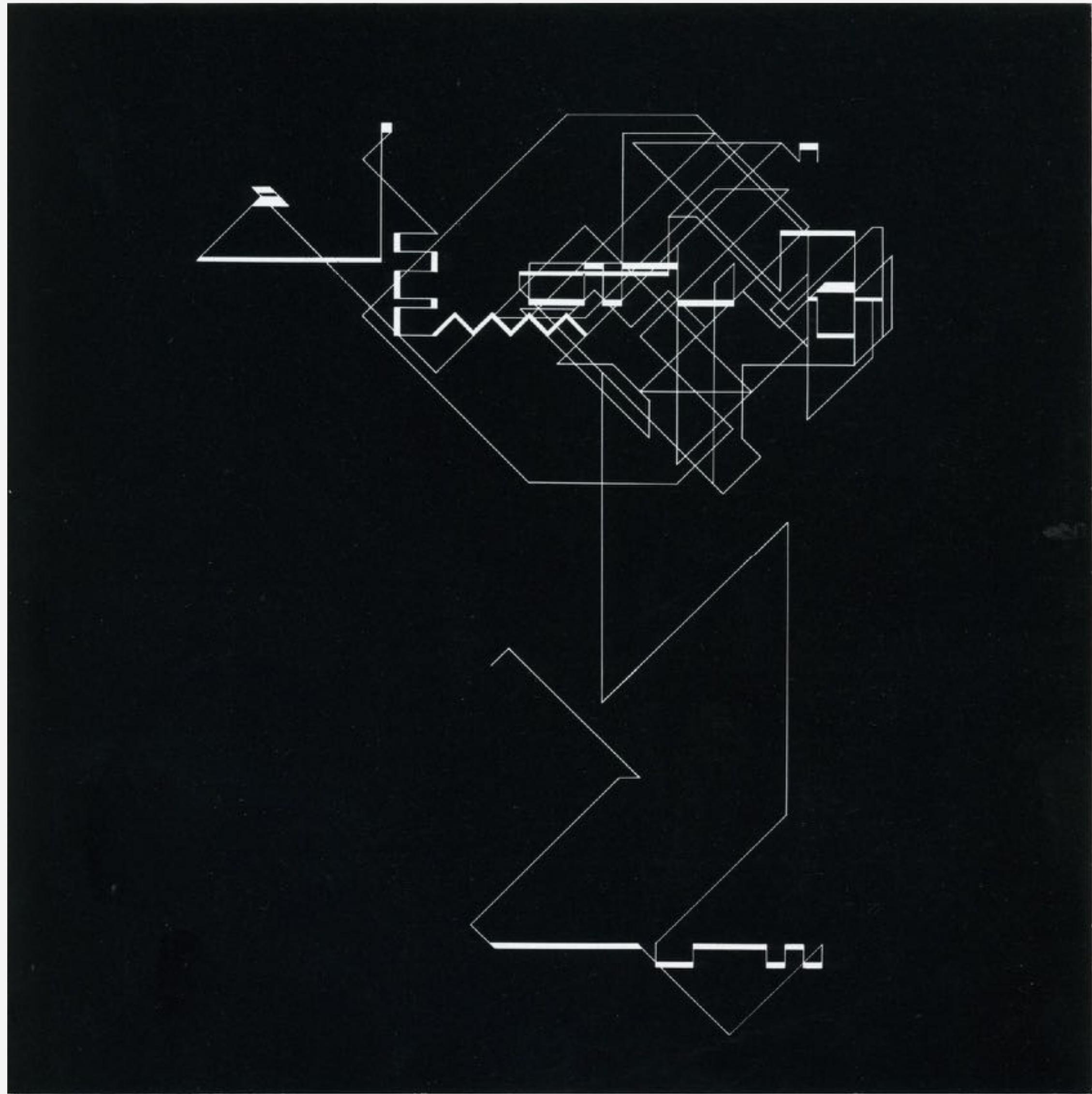
After 1980

<http://dada.compart-bremen.de>

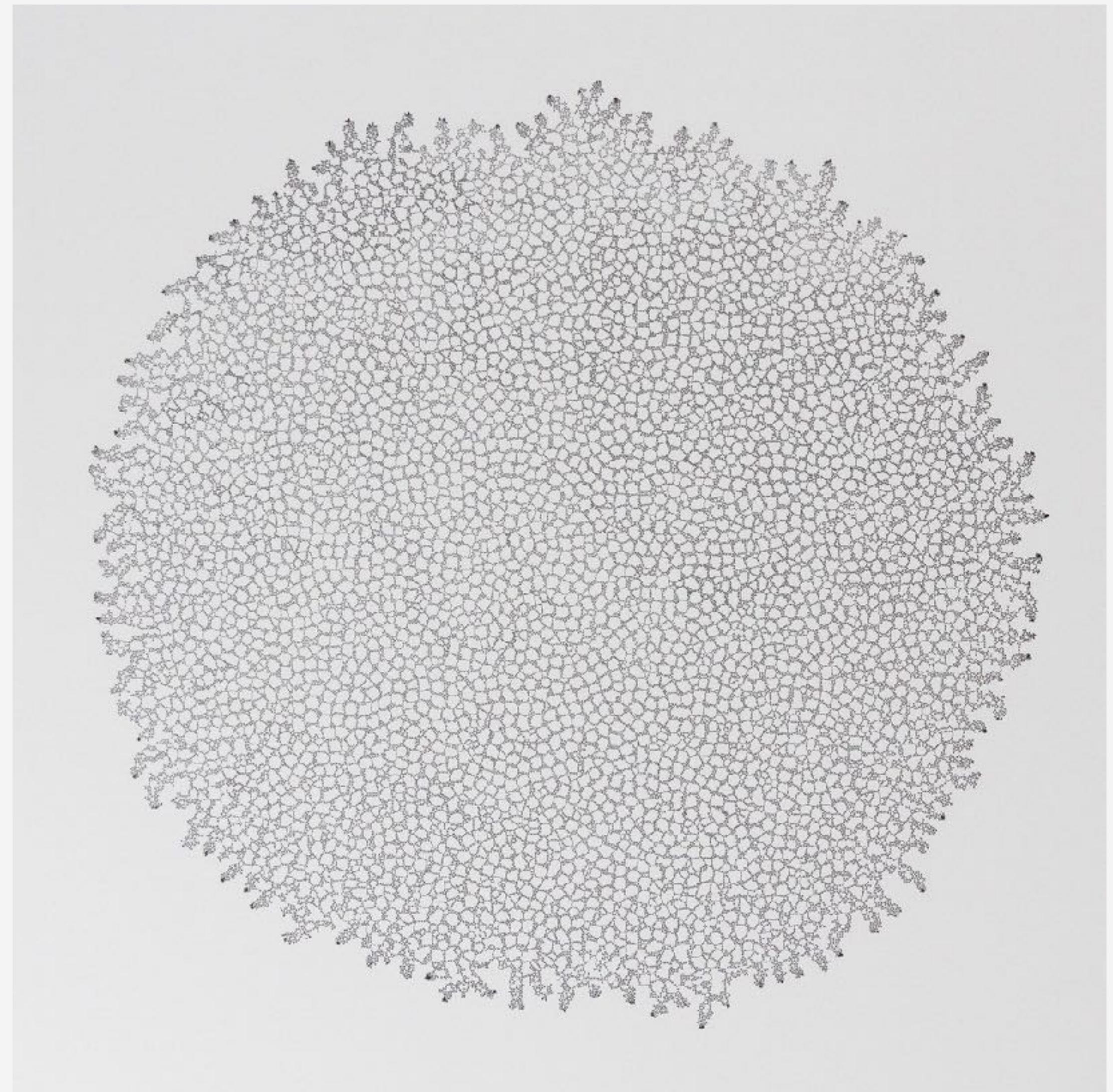
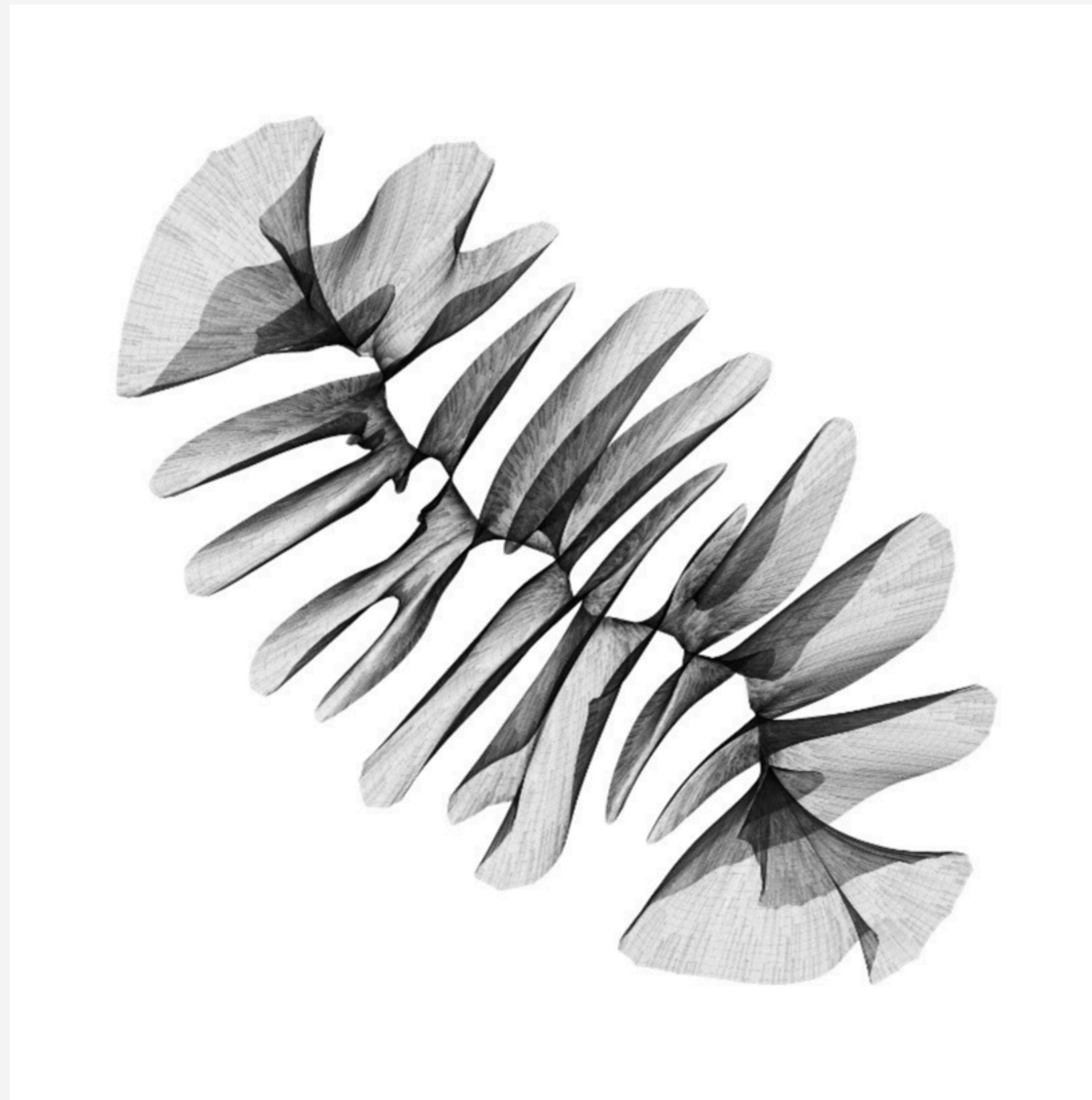
<http://digitalartmuseum.org/history>



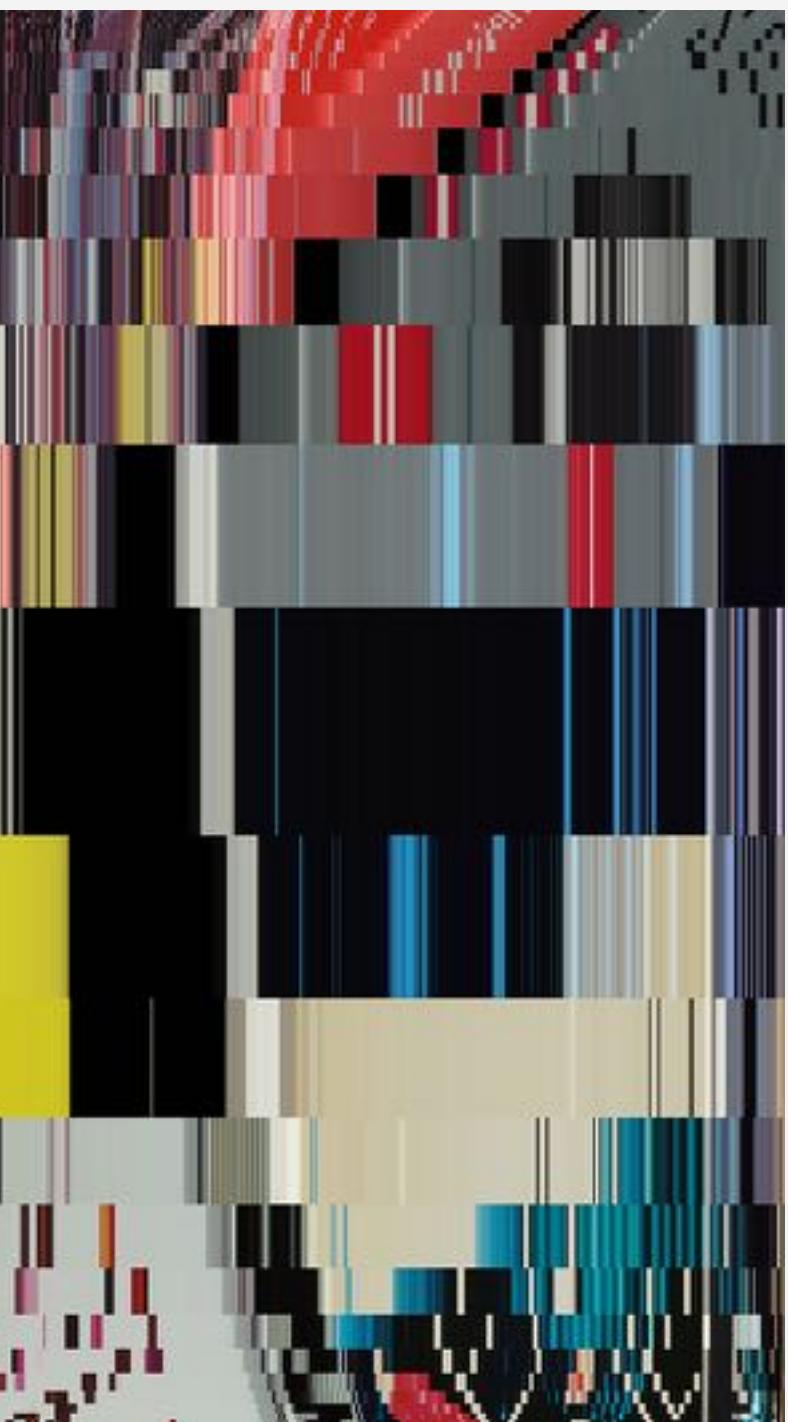
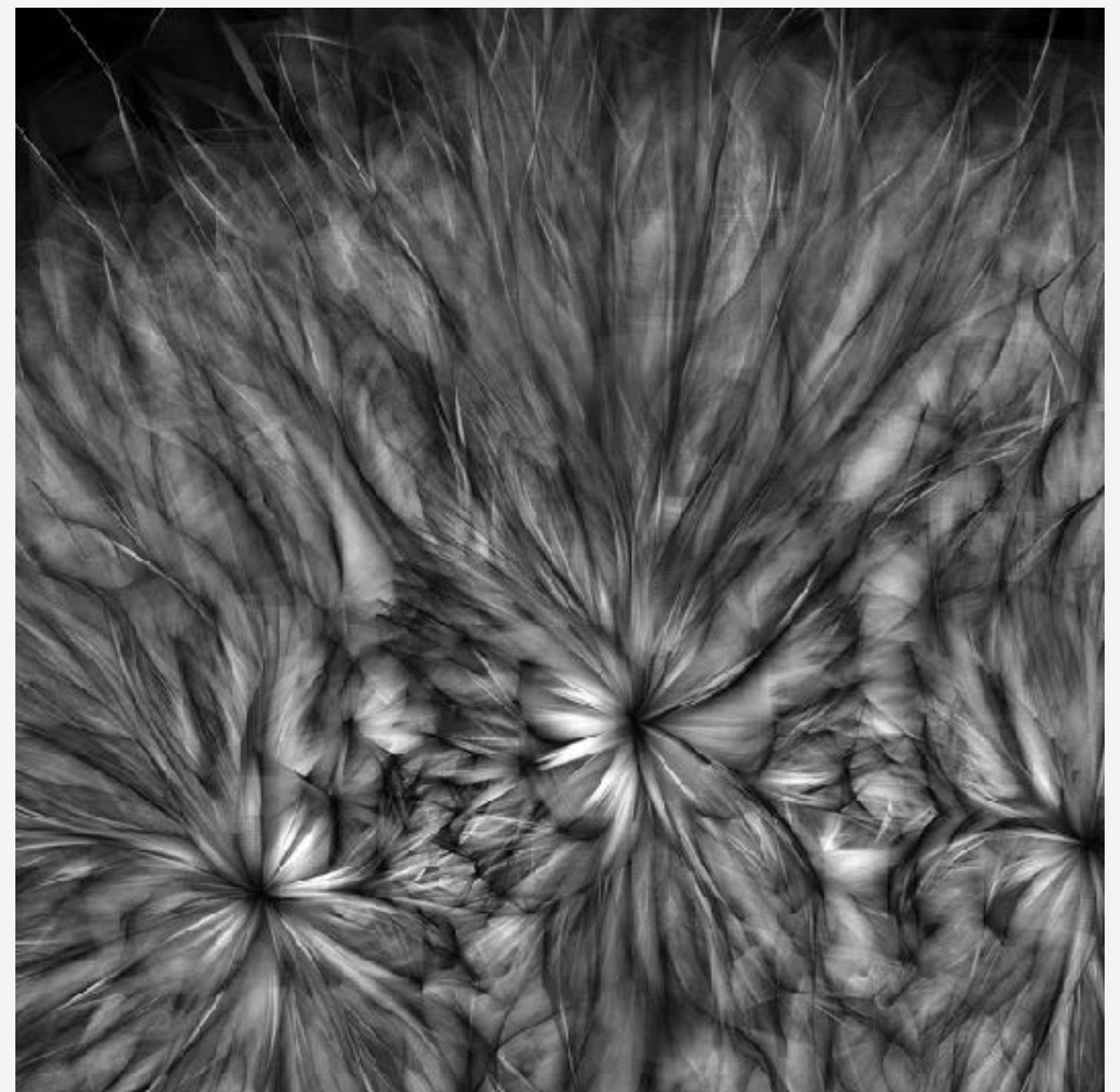
Herbert W. Franke



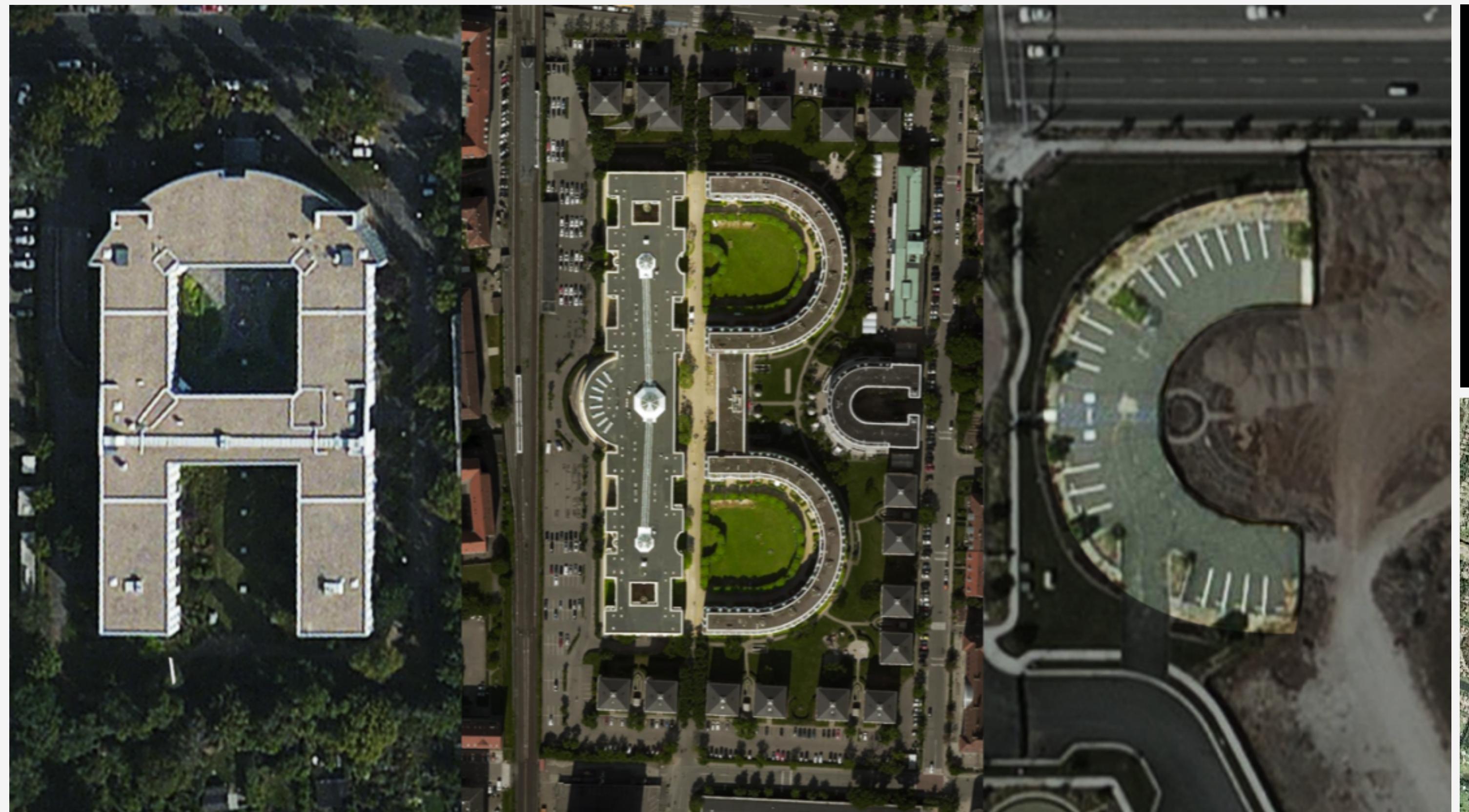
Manfred Mohr



Andreas Hoff



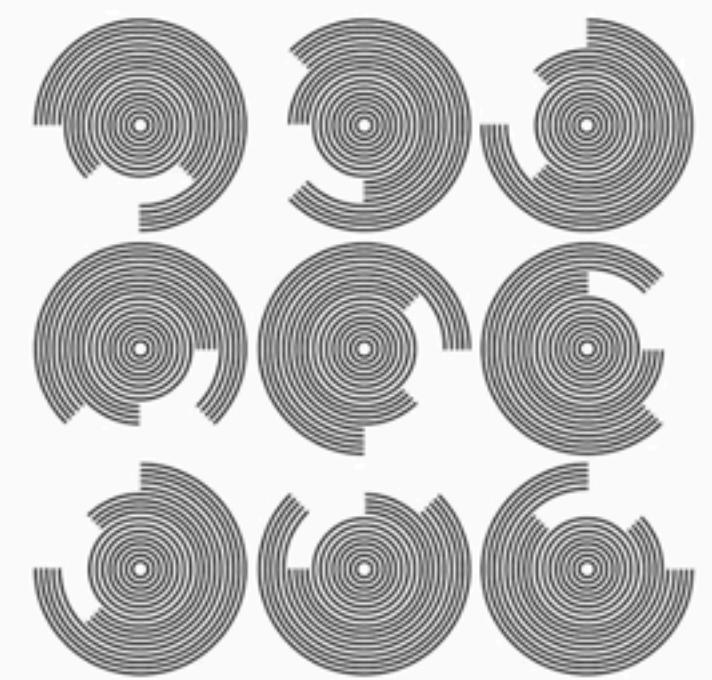
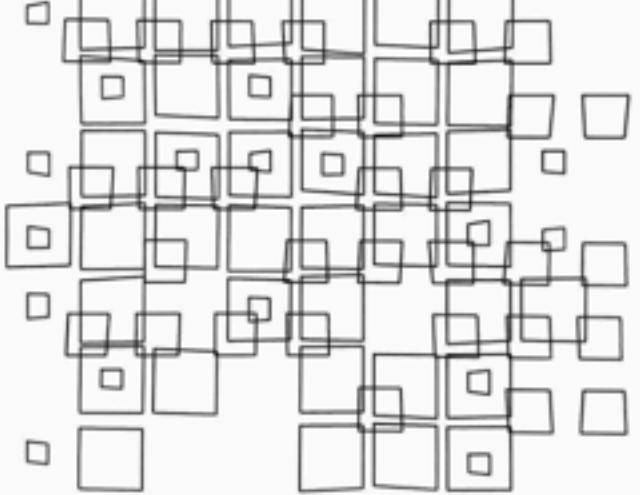
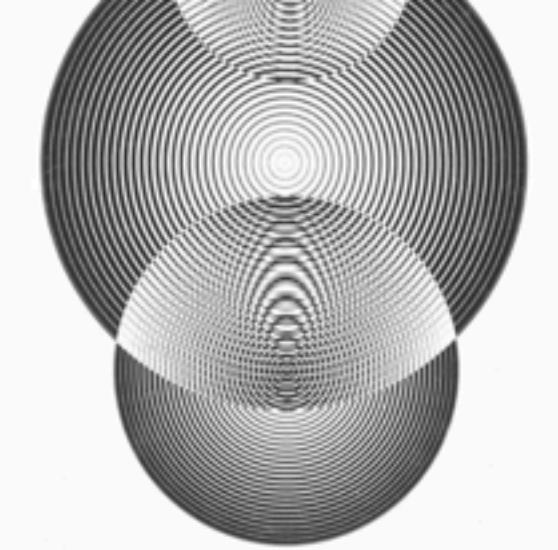
Casey Reas



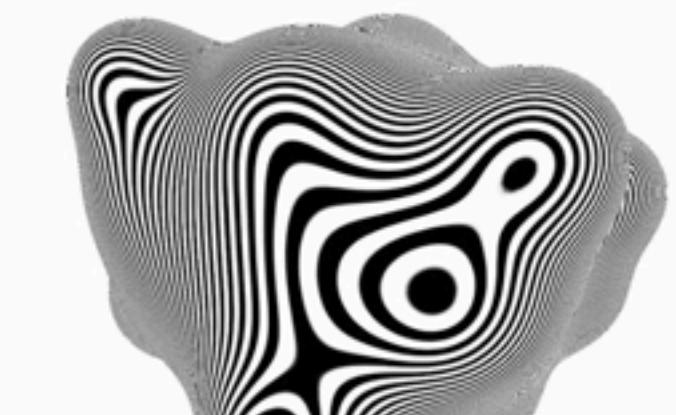
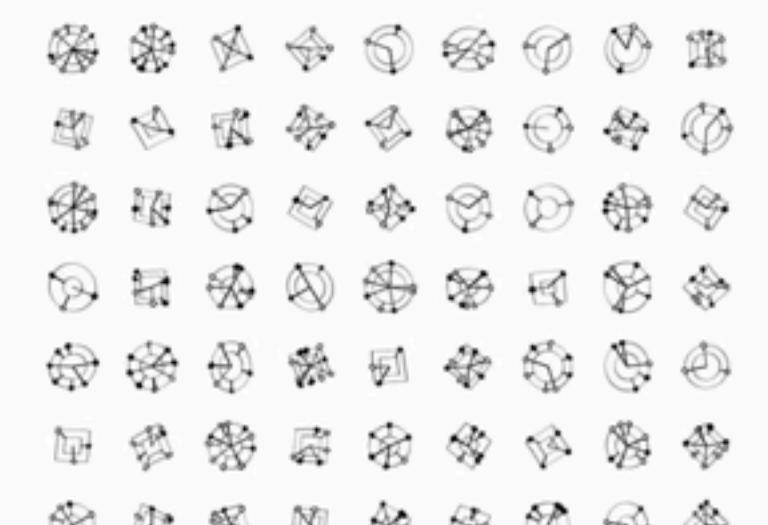
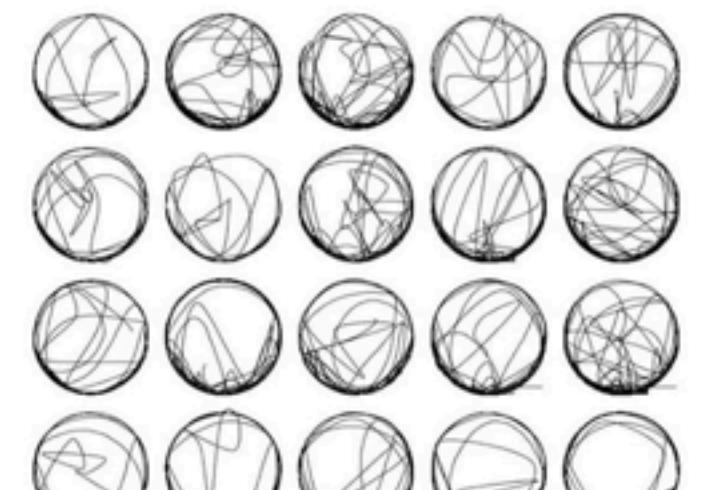
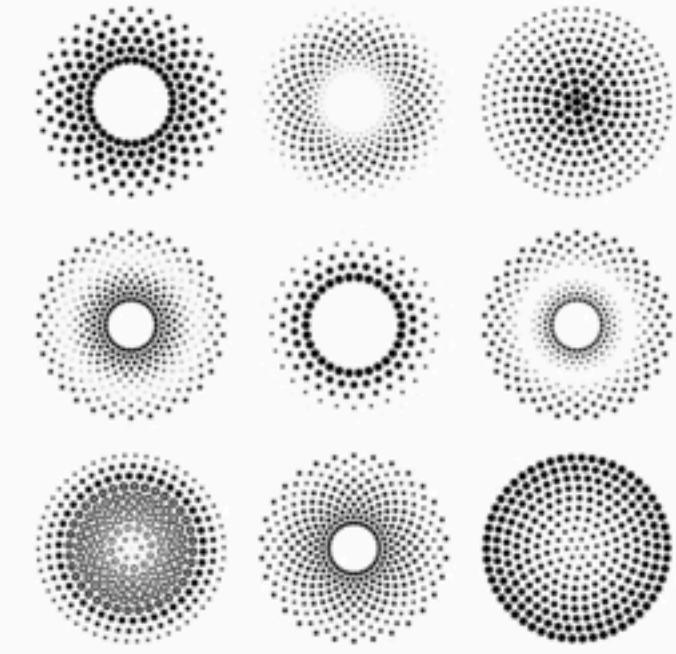
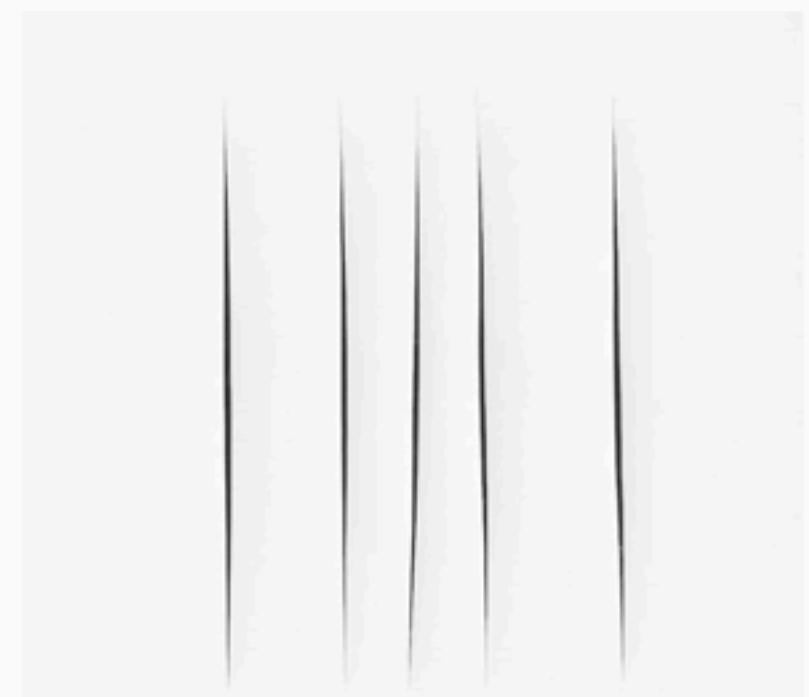
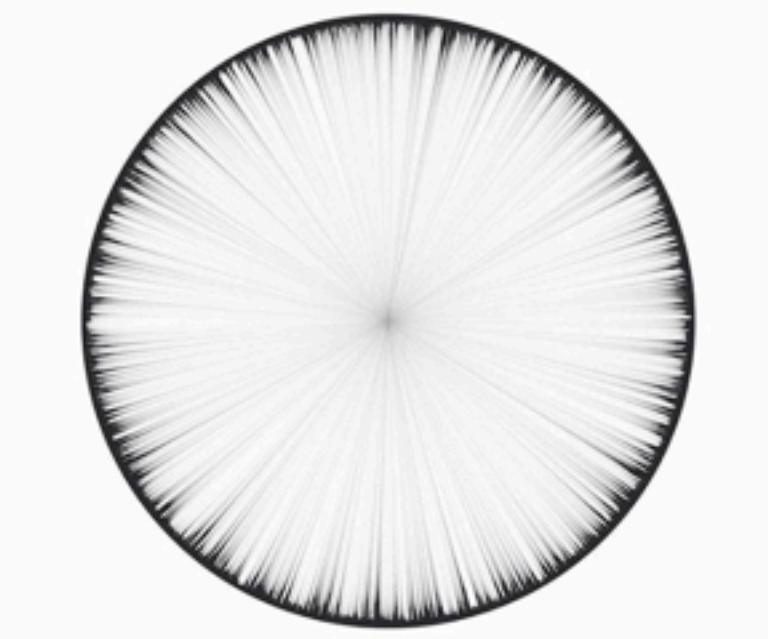
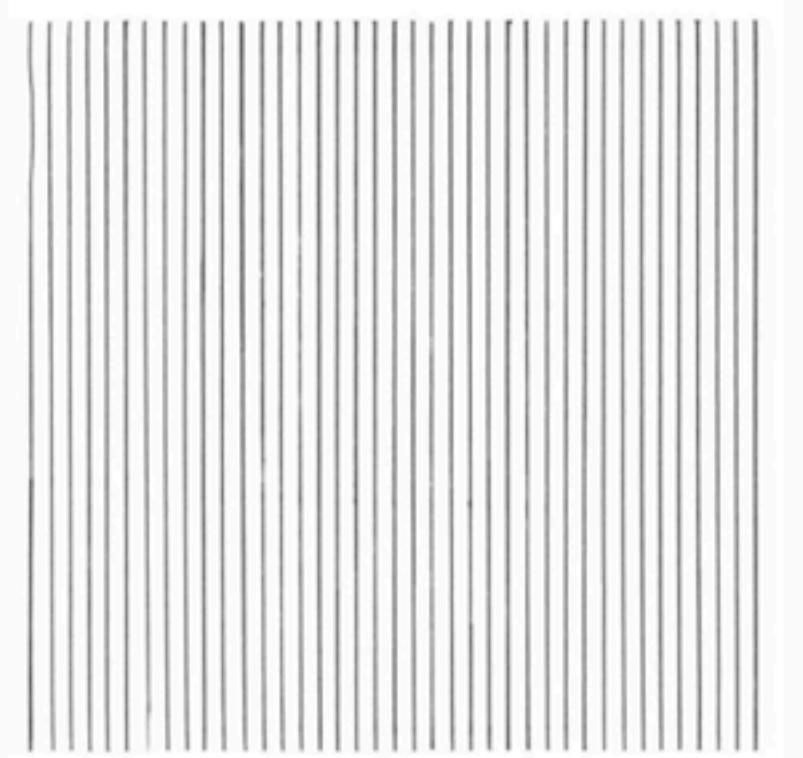
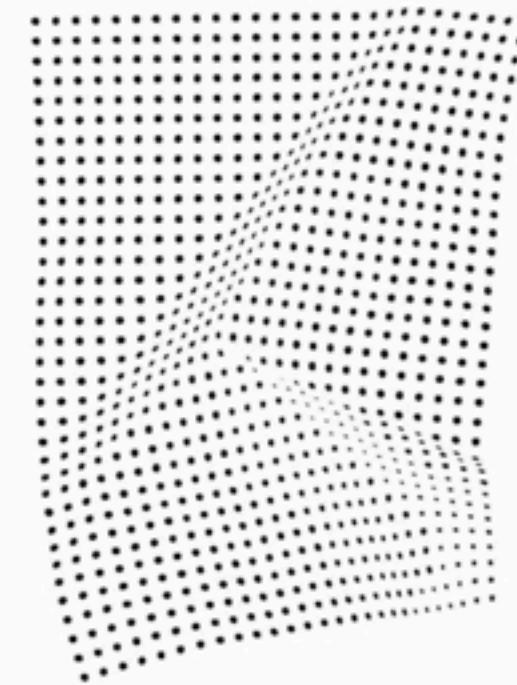
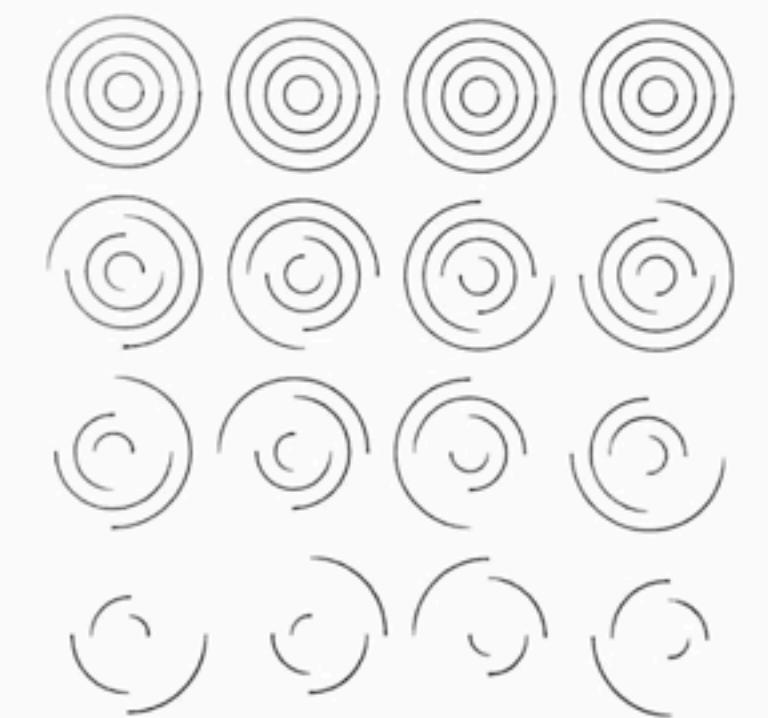
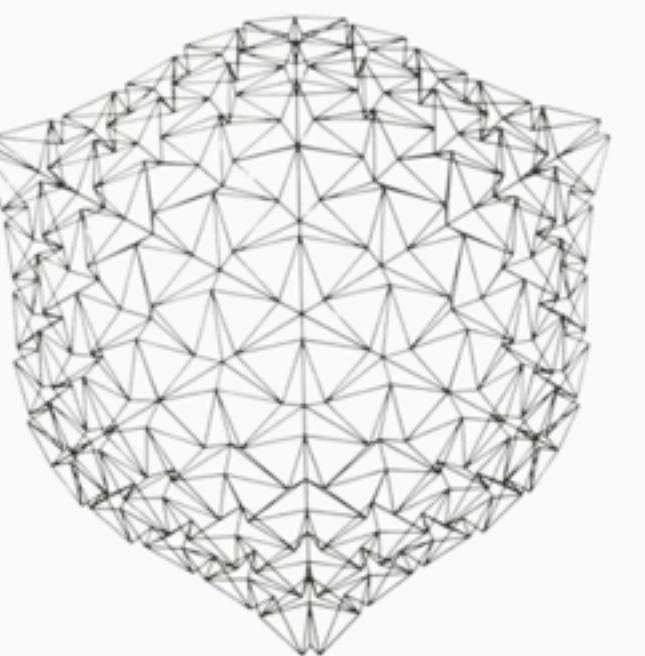
KICKSTART THE  
PLATETRY SEARCH  
FOR LETTERFORMS



Benedikt Groß



flowerflowerflowerflower  
flowerflowerflowerflower



<https://www.instagram.com/in.white.rooms/?hl=en>

# OUR WORKSPACE:

The screenshot shows the p5.js reference website. At the top, there's a navigation bar with links for Processing, p5.js, Processing.py, Processing for Android, and Processing for PS. Below the navigation is a large pink logo with the text "p5.js" and "Processing fun times JavaScript quirkiness". A search bar labeled "Search the API" is on the right. The main content area has a heading "Reference" and a sub-section "Color". It lists various functions under "Color": alpha(), blue(), brightness(), color(), creating & reading, setting background(), clear(), colorMode(), fill(), noFill(), and stroke().

[p5js.org/reference](https://p5js.org/reference)

The screenshot shows the CodePen website. On the left, there's a sidebar with options like "CREATE" (Pen, Project, Post, Collection), "YOUR" (Dashboard, Profile, Pinned Items, Activity), "EXPLORE" (Picked, Popular, Following, Topics), "GROW" (Jobs, CodePen PRO, Challenges), and "Meetups, Newsletter, Blog, Docs & Support". The main area is titled "Picked Pens" and shows a grid of six code snippets. The first snippet is "Pure CSS Donut & Ice Cream" by Rafaela Lucas, showing a donut hole with ice cream. The second is "Loader animation" by Aaron Iker, showing a circular loader. The third is "Rotate poly around base" by Ana Tudor, showing a polygon rotating around its base. The fourth is "Caching - Triangle Tree" by Dan Zan, showing a fractal triangle tree. The fifth is "Growth II" by Sean Price, showing a growth simulation. The sixth is "Link & Button - Shattered" by Abuhaker Saood, showing a button effect.

[codepen.io](https://codepen.io)

# 2D DRAWING COMMANDS

`size(width, height)`

---

`background(r, g, b)`

---

`stroke(r, g, b, a)`

---

`fill(r, g, b, a)`

---

`strokeWeight(w)`

---

`noStroke()`

---

`noFill()`

---

`smooth(level)`

---

`save("imgName.png")`

---

`point(x, y)`

---

`line(x1, y1, x2, y2)`

---

`rect(x, y, width, height)`

---

`ellipse(x, y, width, height)`

---

`arc(x, y, width, height, start, stop)`

---

`quad(x1, y1, x2, y2, x3, y3, x4, y4)`

---

`triangle(x1, y1, x2, y2, x3, y3)`

---

`curve(x1, y1, x2, y2, x3, y3, x4, y4)`

---

`bezier(x1, y1, x2, y2, x3, y3, x4, y4)`

---

## CLASS EXERCISE

Pick any object in the room and create an abstract representation of it  
using the p5 drawing commands.

# HOMEWORK

## 1. Self portrait

Please program a self portrait in p5 using any commands and in any visual style you like.

Be mindful of details and make purposeful visual decisions.

\* Submission via Slack, ie: 10:03 lior ben gai Week 1 : <https://codepen.io/soogbet/pen/MMMjZN>

## 2. Watch:

Hello World! Processing (film) - <https://vimeo.com/60735314> [ 40 minutes ]