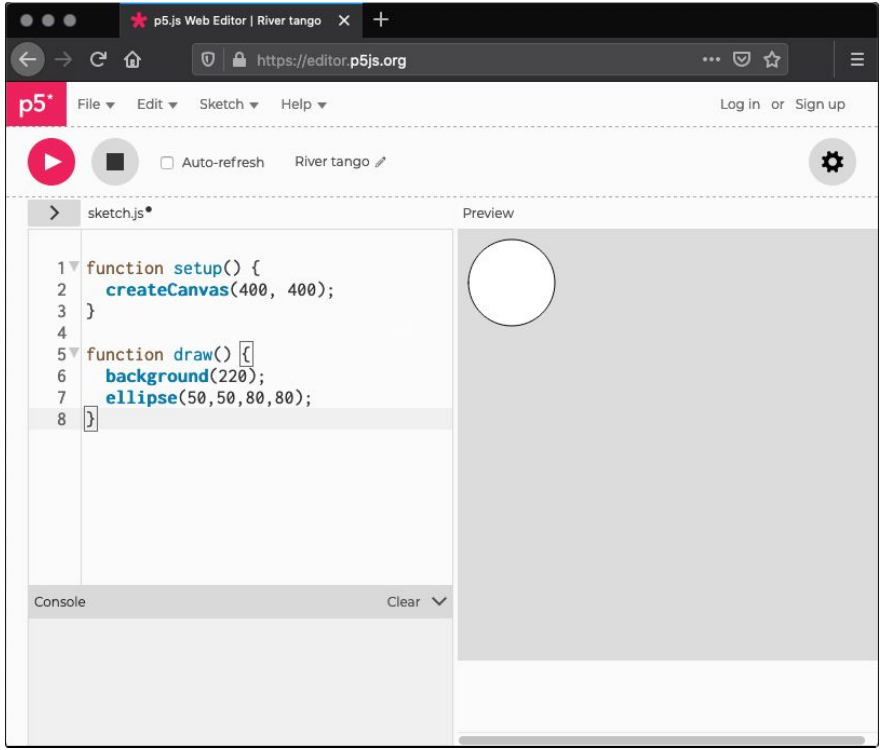
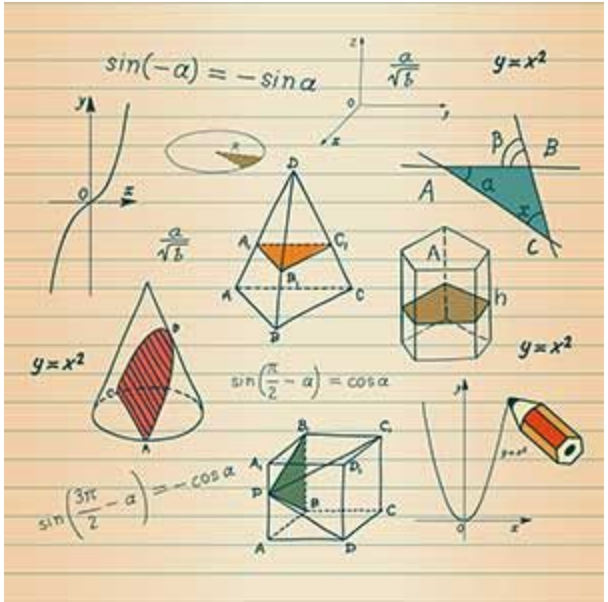
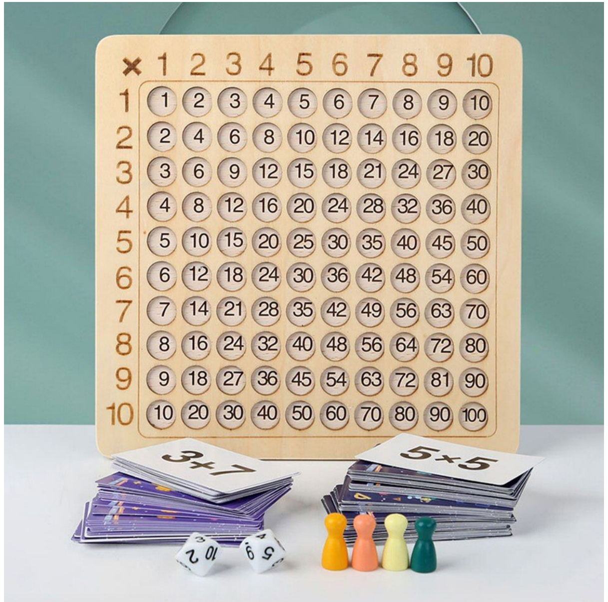
INTERACTION


DOT MATRIX WITH STEREO SOUND
TAKOYAKI GAMES
GAME BOY COLOR
LIGHT
Nintendo
SELECT START
Nintendo GAME BOY


p5.js Web Editor | River tango
https://editor.p5js.org
p5*
File
Edit
Sketch
Help
Log in or Sign up
Auto-refresh
River tango
sketch.js
Preview
1 function setup() {
2 createCanvas(400, 400);
3 }
4
5 function draw() {
6 background(220);
7 ellipse(50,50,80,80);
8 }
Console
Clear


sin(−α) = −sin α
y = x²
sin(π/2 − α) = cos α
sin(3π/2 − α) = −cos α
y = x²
y = x²


× 1 2 3 4 5 6 7 8 9 10
3+7
5×5

Architecture

An architect asked AI to design skyscrapers of the future. This is what it proposed

Published 6th September 2022

```
function setup() {
  createCanvas(400, 400);
}

function draw() {
  background(220);
}
```

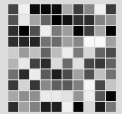
```
let x = 3.14;
let y = 10;

function setup() {
  createCanvas(400, 400);
}

function draw() {
  background(220);
  print(x, y);
}
```

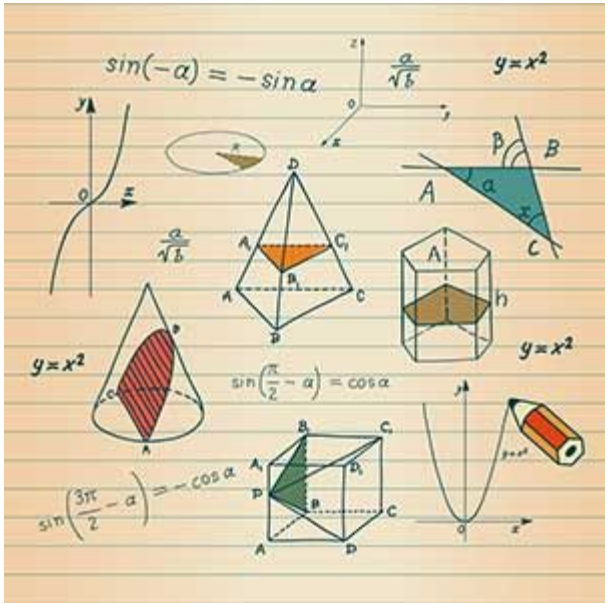
```
let a;

function setup() {
  createCanvas(400, 400);
  a = new A(3.14, 10);
}

function draw() {
  background(220);
  a.display();
}

class A{

  constructor(x, y){
    this.x = x;
    this.y = y;
  }

  display(){
      ellipse(this.x, this.y, 10, 10);
      rect(this.x + this.y, this.y, 10, 10);
  }
}
```

```
let a;

function setup() {
  createCanvas(400, 400);
  a = new A(3.14, 10);
}

function draw() {
  background(220);
  a.display();
}

class A{

  constructor(x, y){
    this.x = x;
    this.y = y;
  }

  display(){
     for(let i = 0; i < 10; i++){
          ellipse(i + this.x, this.y, 10, 10);
      rect(i + this.x + this.y, this.y, 10, 10);
    }
  }
}
```

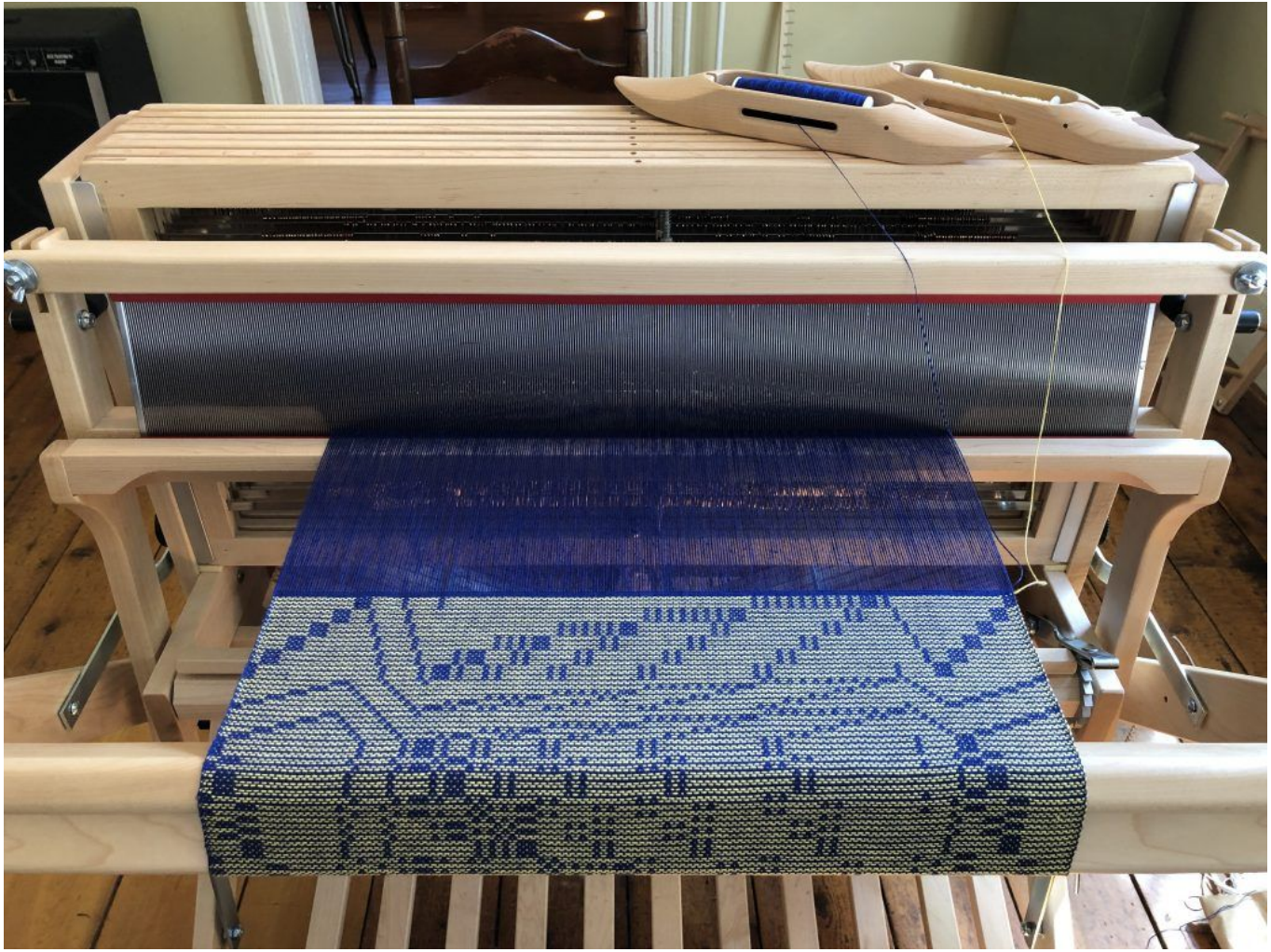
```
let a = [];
let offset = 140;

function setup() {
  createCanvas(400, 400);
  noStroke();
}

function draw() {
  background(220);
  for(let i = 0; i < 10; i++){
    for(let j = 0; j < 10; j++){
      a[j] = new A(i, j);
      a[j].display();
    }
  }
}

class A{

  constructor(x, y){
    this.x = x;
    this.y = y;
  }

  display(){
      rect(this.x * 11, this.y * 11, 10, 10);
    }
}
```

```
let a = [];
let offset = 140;

function setup() {
  createCanvas(400, 400);
  noStroke();
}

function draw() {
  background(220);
  for(let i = 0; i < 10; i++){
    for(let j = 0; j < 10; j++){

      a[j] = new A(i, j);

      if(mouseIsPressed){
        fill(random(255));
      }

      a[j].display();
    }
  }
}

class A{

  constructor(x, y){
    this.x = x;
    this.y = y;
  }

  display(){
      rect(this.x * 11, this.y * 11, 10, 10);
    }
}
```




sin(−α) = −sinα
y=x²
y=x²
y=x²
sin(π/2 − α) = cosα
sin(3π/2 − α) = −cosα


× 1 2 3 4 5 6 7 8 9 10
1 1 2 3 4 5 6 7 8 9 10
2 2 4 6 8 10 12 14 16 18 20
3 3 6 9 12 15 18 21 24 27 30
4 4 8 12 16 20 24 28 32 36 40
5 5 10 15 20 25 30 35 40 45 50
6 6 12 18 24 30 36 42 48 54 60
7 7 14 21 28 35 42 49 56 63 70
8 8 16 24 32 40 48 56 64 72 80
9 9 18 27 36 45 54 63 72 81 90
10 10 20 30 40 50 60 70 80 90 100
3×7
5×5



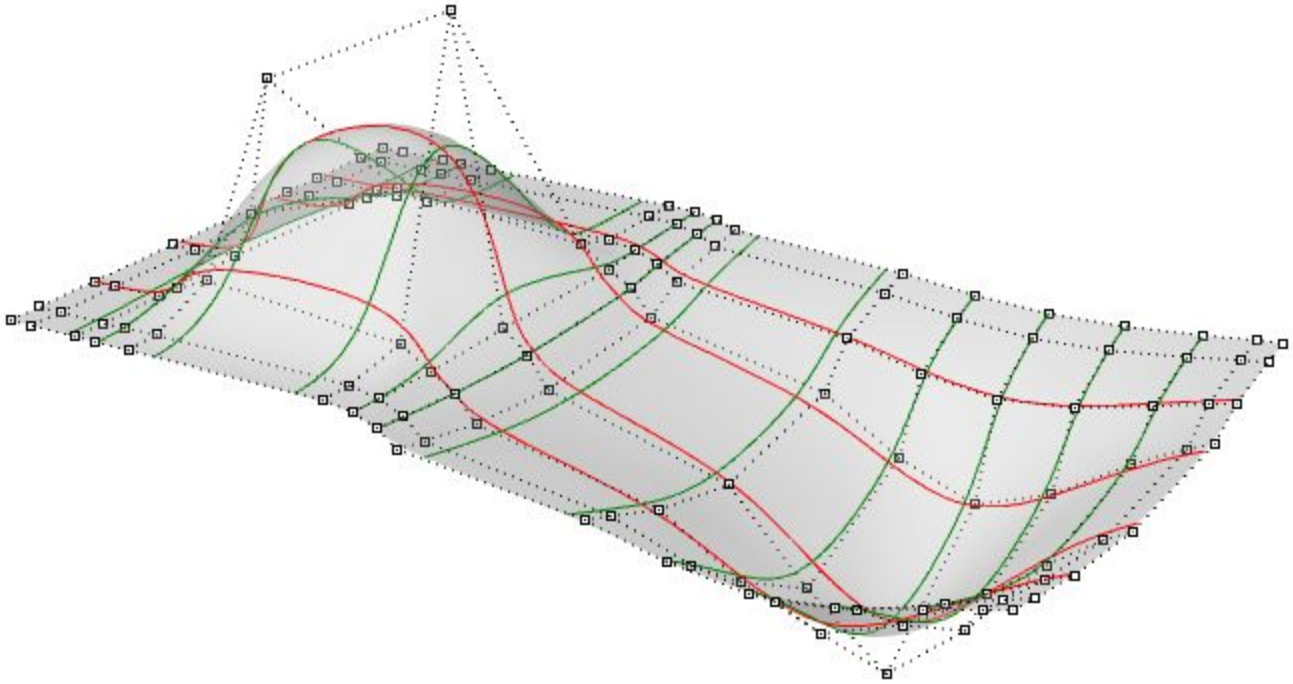
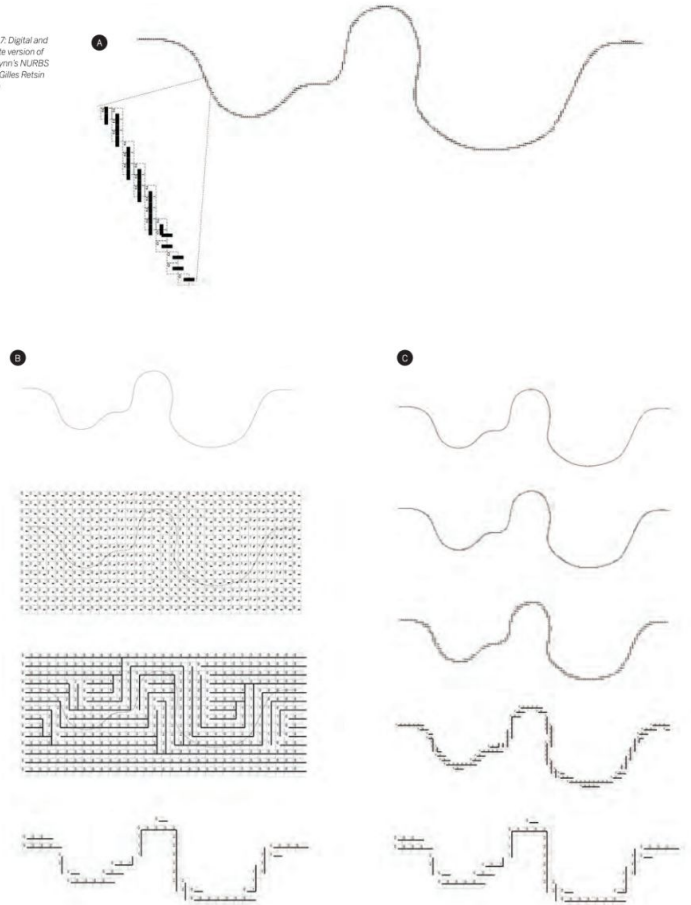


Figure 7: Digital and Discrete version of Greg Lynn's NURBS curve, Gilles Retsin (2016)



is, however, no notion of a parthood or assembly, just a continuous distribution of material. In fact, the project can be understood as the *ultimate continuity*, not only continuous in the UV-space of a surface, but also in a volumetric way. So, despite the non-geometric qualities of the project, the Protohouse should still be considered a continuous and analog syntax.

2 The Discrete

In a further step toward discreteness, the amount of entropy in the system is reduced, and an initial approach to parthood, serial repetition, and assembly is introduced. Rather than supposing a large, notional 3D printer, the subsequent development looks at the assembly of line segments into a large whole. The elements don't have a predefined connection; they can be connected in multiple ways. In that sense, the connection is not serialized, and there is still a considerable amount of customization and tolerance in the system. The competition for the Budapest National Gallery (2014) (fig. 2) and the Helsinki Guggenheim (2014) (figs. 3 and 4) reflect this approach. Both projects are based on a serial repetition of discrete "sticks," or linear timber struts. This kind of material organization is discrete, but given the high amount of tolerance in the connections, it is also still analog. These "stick projects" are fundamentally different from Greg Lynn's, as they are not based on surface, topology, and geometry, but on volume. Lynn's curve diagram becomes a volumetric assembly of sticks (fig. 5). This approach is also different from the Protohouse, as there is a notion of parts, assembly, and serial repetition. At the same time, they resonate with the volumetric and fibrous organization of the Protohouse. In conclusion: sticks are discrete, but not yet digital. Both stick projects start to dissolve defined wholes, introducing a porous assembly based on parts. Although diagrammatically organized as a series of slabs, the argument for the Budapest National Gallery is that there are in fact no slabs active as objects in the composition. There are only parts, and relations between the parts.

It's interesting to note here that this kind of approach relates more to Stan Allan's "field conditions" than to Greg Lynn's writing. Essentially Allan's field conditions are based on serial repetition and the dissolution of the figure. Figures are composed out of the interaction and relation of a multitude of elements. This idea already goes beyond geometry and topology. Moreover, the field conditions proposed by Allen are also open-ended, and not part of a formal style; they could, for example, be both curved or straight. Allan's field conditions already imply an aesthetic and ethical world that is very different from Lynn's and the later proto-parametric approaches. It flirts with minimalist artists like Sol Lewitt and Donald Judd, who, of course, have an inherent link to the syntactical and systemic. It also identifies some of the core

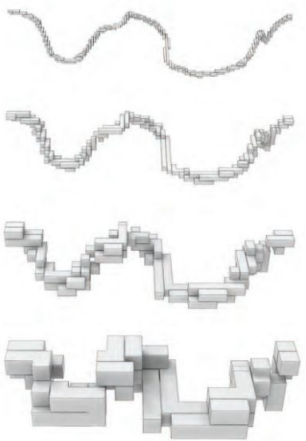


Figure 8: Digital and Discrete version of Greg Lynn's NURBS curve, Gilles Retsin (2016)

buildings of late-modernism as field conditions, such as Le Corbusier's Venice Hospital and, indirectly, projects such as van Eyck's Orphanage. In doing so, it creates a historical link between new, computational approaches and late-modernism. We'll speculate more about this further along in this paper, but essentially, one could draft an alternative history of precedents for the digital, bypassing Antoni Gaudí, Frei Otto, and Greg Lynn. This lineage would then run over early computational experiments by people like Paul Coates and the structuralist architecture of van Eyck and Hertzberger, to the serialized production of Jean Prouvé, the minimalist art by Sol Lewitt, Stan Allan's field conditions, and then, effectively, the discrete and the digital as outlined further below.

3 Discrete and Digital

The next iteration of work advances and prototypes a digital syntax, based on serially repeated building blocks with a digital connection logic, similar to Neil Gerschenfeld's Digital Materials. As explained before, these building blocks act the same way as digital data, which means that they can be recombined and are reversible, universal, and versatile. The first important precedents of this approach is EZCT's Universal House project (Morel 2011), which proposes a physical building block that can be assembled into multiple different buildings. With a kind of dark humor, the building block itself is

Figure 9: Suncheon Art Platform, Gilles Retsin Architecture (2016)

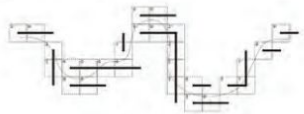
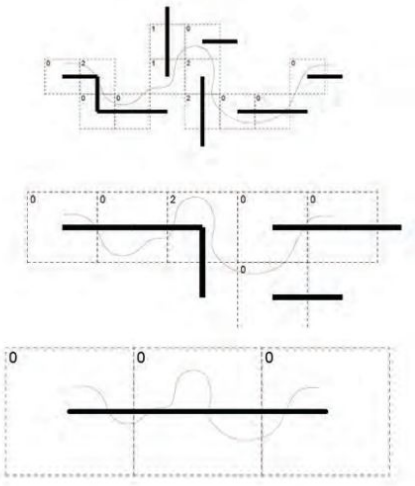
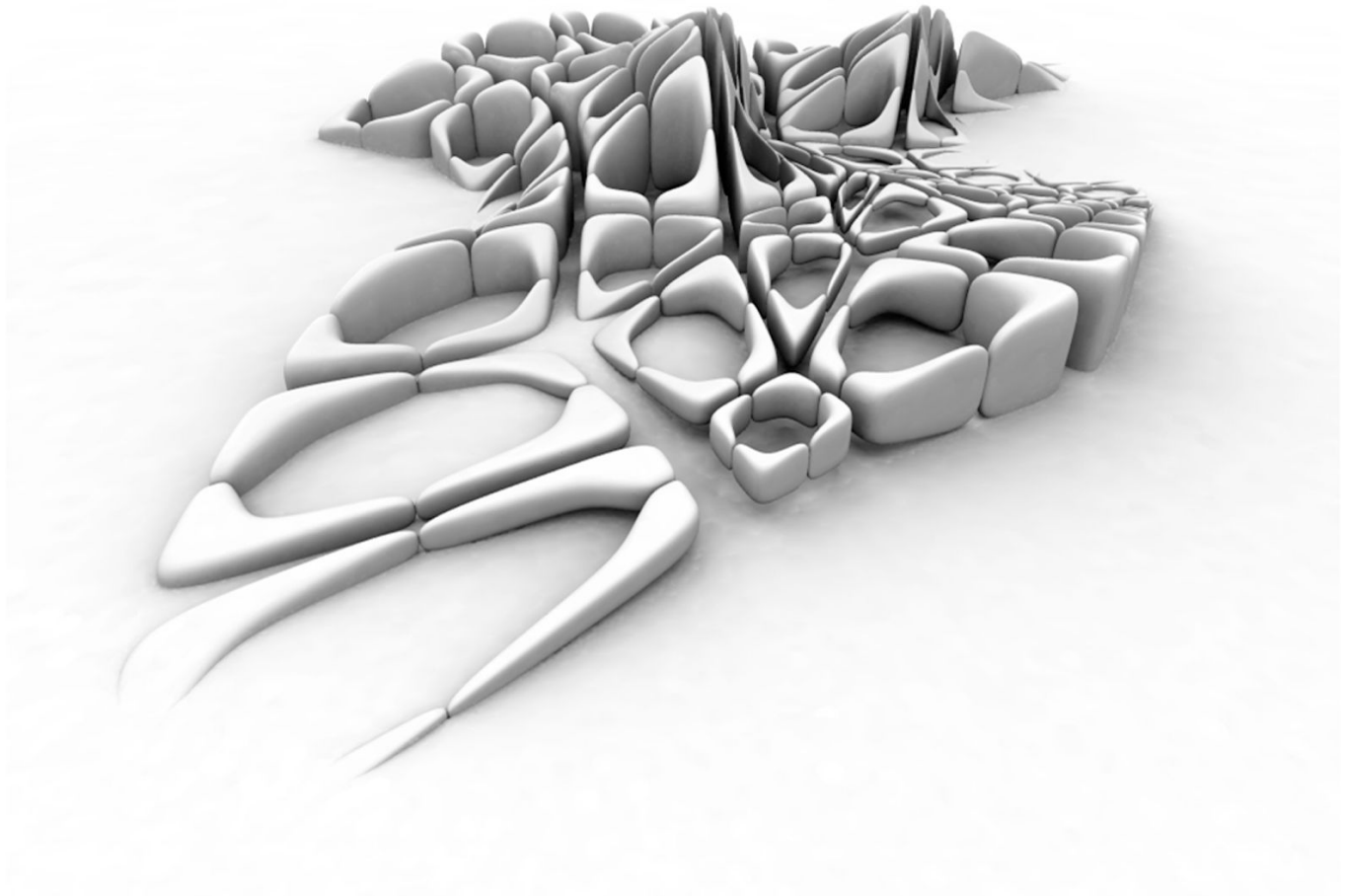
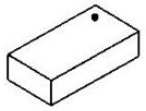


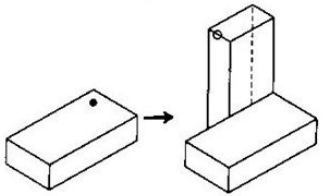
Figure 10: Digital and Discrete version of Greg Lynn's NURBS curve, Gilles Retsin Architecture (2016). "How Low Can You Go?"



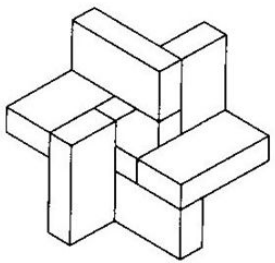




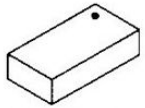
initial shape



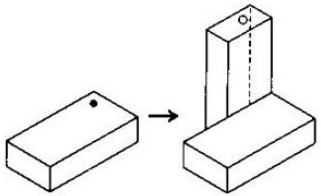
rule



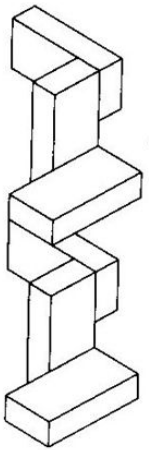
design

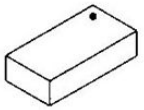


initial shape

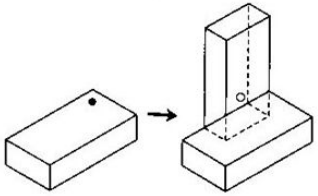


rule

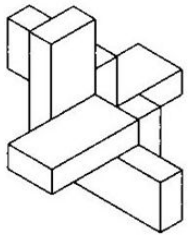




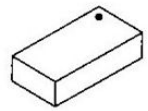
initial shape



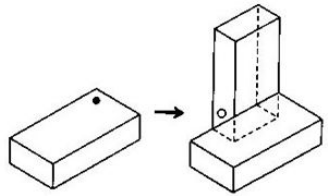
rule



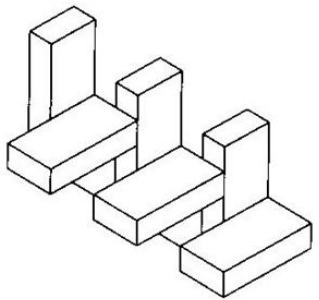
design



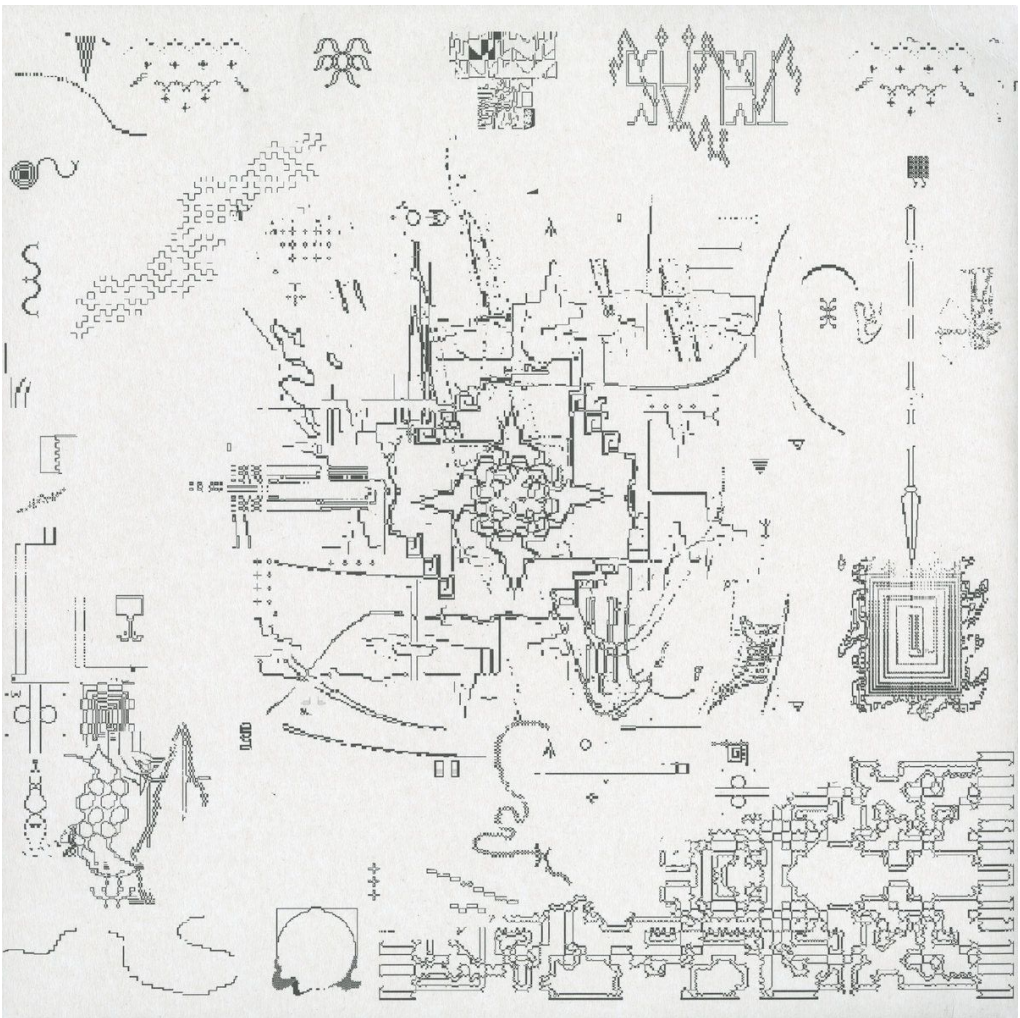
initial shape

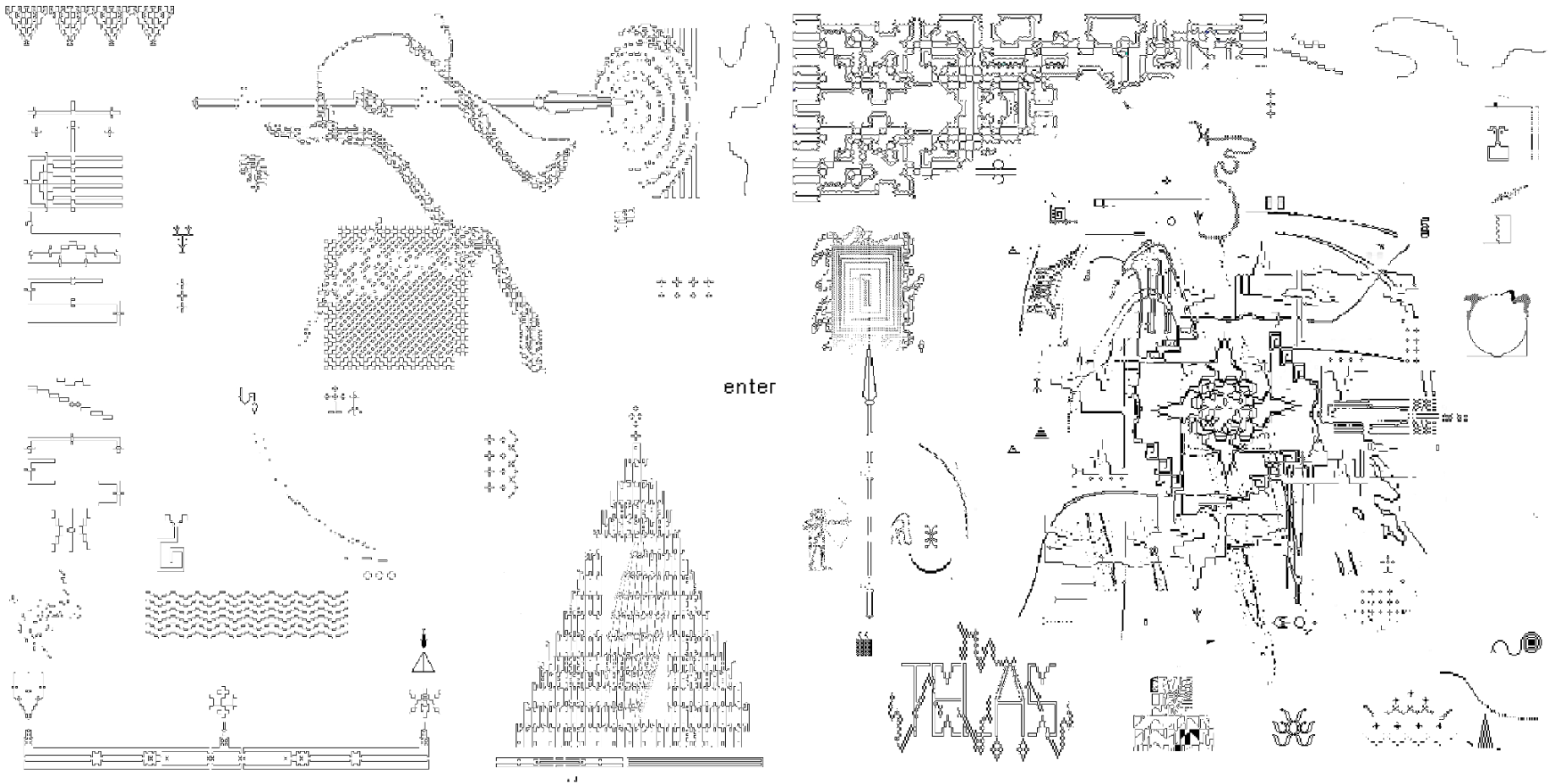


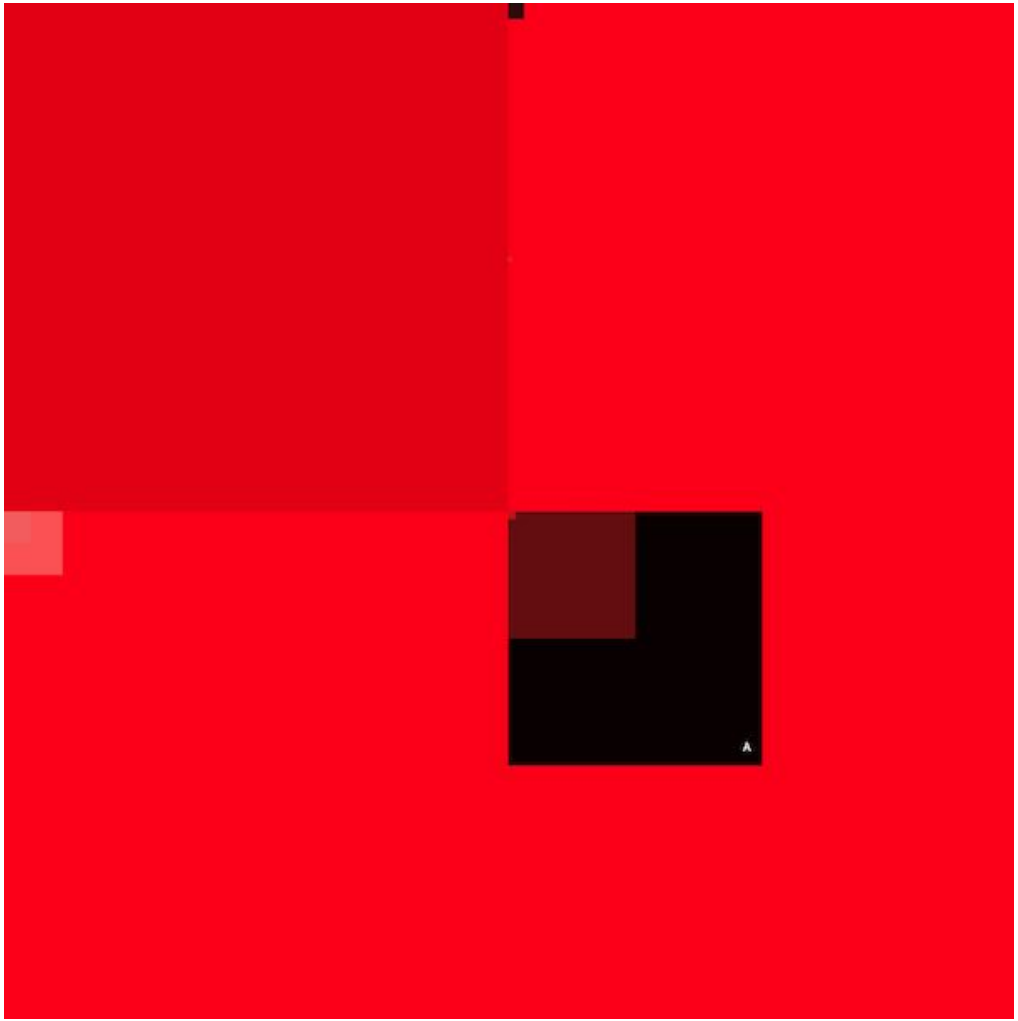
rule



design




enter



Homework: Create an interactive grid of rectangle objects that, when hovered over, change color.