today

Due: Ex 3

Random and Transform + Generative Design

Introduce Midterm: Due Wed, Feb 10

Student Presentations

Reading: Ch 4-6 on p.60, optional Ch 14

Wednesday, Feb 3

Due: Component 1, 2, 3 of Midterm project

Push Pop

Lab to work on midterm project

Student Presentations

Random

“… the physical world is usually idiosyncratic. … We can simulate the unpredictable qualities of the world by generating random numbers.” - Casey Reas

random ( ) function

The random() function always returns a **floating**-point value, so be sure the variable on the left side of the assignment operator (=) is float like this:

To generate a pseudo random number between 0 and high and assign it to f

```
float f;
f = random(high);
```

To generate a pseudo random number between low and high

```
f = random(low, high);
```

```
void draw ( ) {
  float r= random(0, 100);
}
```

a variable named r will randomly use a value between 0 and 100, each time the program draws.

check out: sketch_4_7_random_circle.pde

```
//Basic Random Circle

void setup() {
  size(640, 360);
}

void draw() {
  float x=random(0, width);
  float y=random(0, height);

  ellipse(x, y, 100, 100);
}
```

check out: sketch_4_7_random_circle.pde

```
//Basic Random Circle

void setup() {
  size(640, 360);
}

void draw() {
  float x=random(0, width);
  float y=random(0, height);

  ellipse(x, y, 100, 100);
}
```

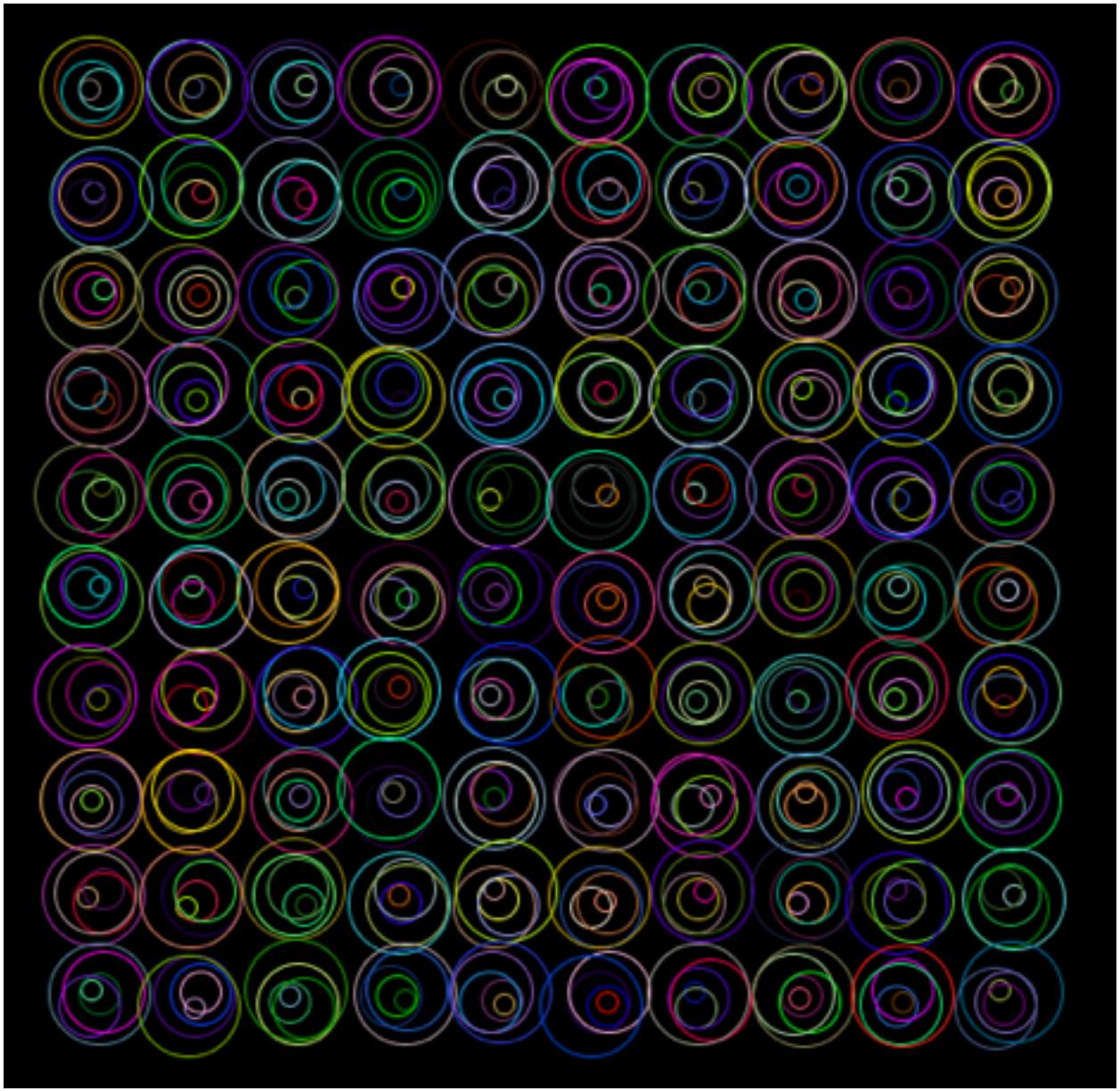
also check out: sketch_4_2_Variable_Random.pde
random x position for a drawing circles

a more complex example:

sketch_4_2_Random_CirclePossibilities.pde

```
//GOAL: random position, radius, color and alpha

float xPosition; //circle position
float yPosition;

float circleRa; //circle radius

float circleR; //circle color in RGB mode
float circleG;
float circleB;

float circleAlpha; //circle alpha
```

sketch_random_concentric_circle_pattern.pde



sketch_random_concentric_circle_pattern.pde

```
void setup () {
  size (800, 800);
  background (0);
  ellipseMode(CENTER);
  noFill();
  stroke(255);
  strokeWeight(1);
  noLoop();
}

void draw () {

  for (float i=0; i<10; i++) {
    float x=50;
    x=x+x*i;
    for (float j=0; j<10; j++) {
      float y=50;
      y=y+y*j;

      for (float k=0; k<5; k++) {
        float ir=10;  //inner most circle radius
        float spacing=10;  //radius difference between each circle
        float r;

        r=ir+spacing*k;
        ellipse (x, y, r, r);
      }
    }
  }
}
```

```
void setup () {
  size (800, 800);
  background (0);
  ellipseMode(CENTER);
  noFill();
  stroke(0);
  strokeWeight(1);
  noLoop();
}

void draw () {

  for (float i=0; i<10; i++) {
    float x=50;
    x=x+x*i;
    for (float j=0; j<10; j++) {
      float y=50;
      y=y+y*j;
      for (float k=0; k<5; k++) {
        float ir=10;
        float spacing=10;
        float r;

        float rr=random(0, 255);
        float g=random(0, 255);
        float b=random(0, 255);

         stroke(rr, g, b);

        r=ir+spacing*k;
        ellipse (x+random(0, 10), y+random(0, 10), r, r);
      }
    }
  }
}
```

better random - Perlin noise

Returns the Perlin noise value at specified coordinates.

The resulting value will always be between 0.0 and 1.0

Perlin noise is a random sequence generator producing a more natural, harmonic succession of numbers than that of the standard random() function. It was developed by Ken Perlin in the 1980s and has been used in graphical applications to generate procedural textures, shapes, terrains, and other seemingly organic forms

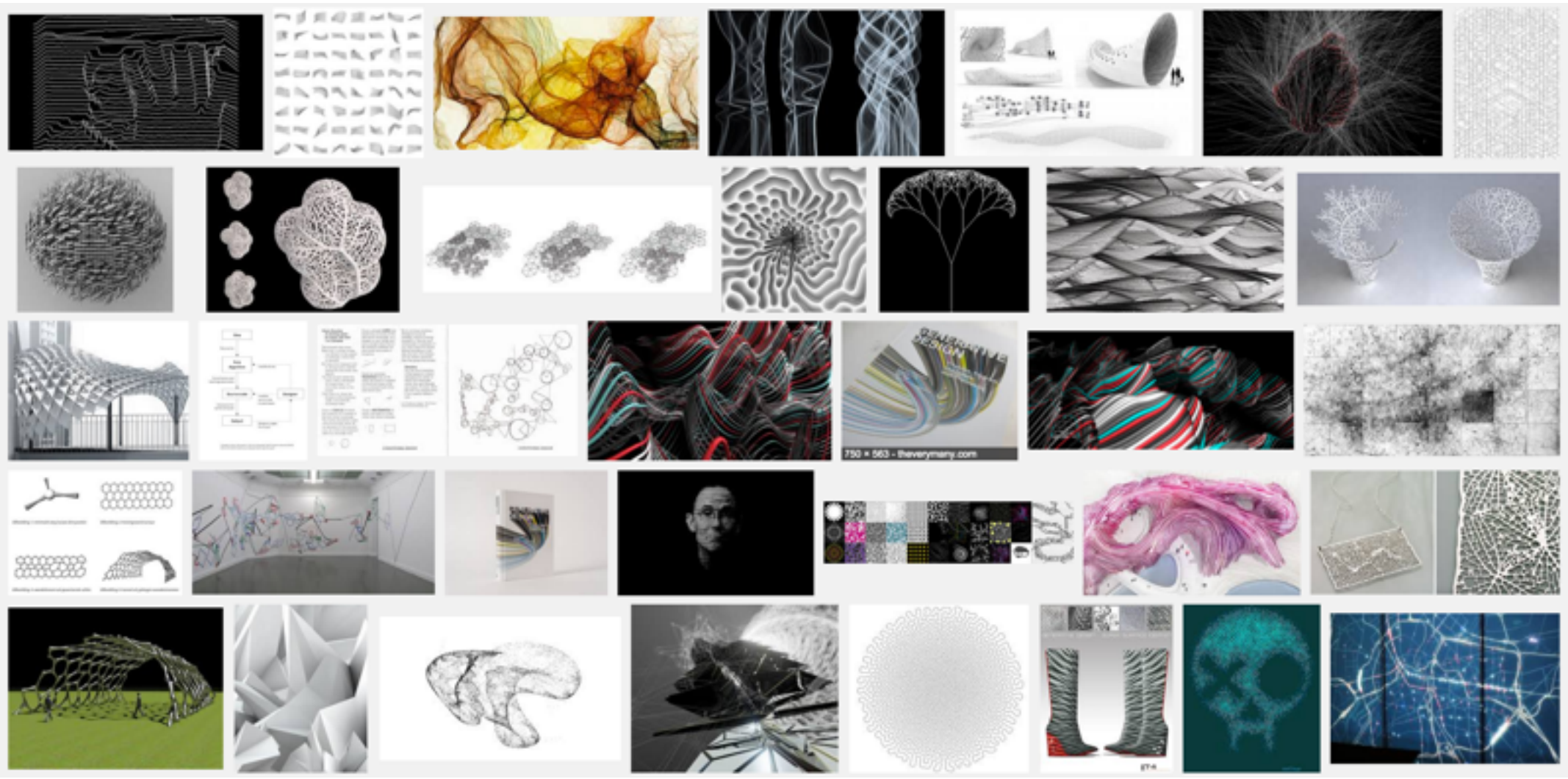
```
float xPercentage = 0;

void draw() {
  background(200);
  xPercentage += .01;
  float x = noise(xPercentage) * width; //adds noise to xPercentage value
  line(x, 0, x, height);
}
```

What is Generative Design?

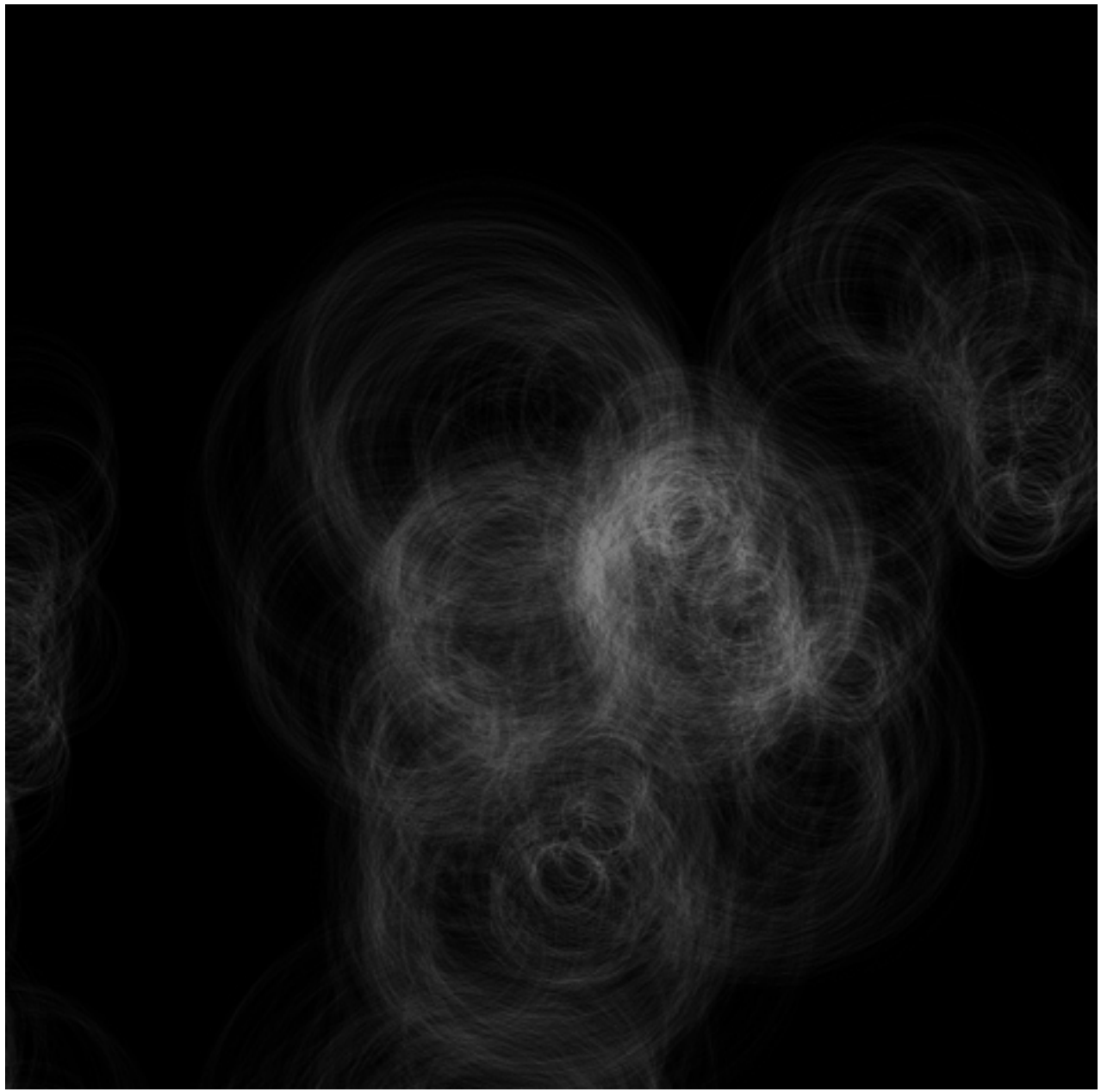
So new that no formal definition exists!

Involving variable(s) that evolve on its own according to a set of defined algorithm.

What does it look like?



an example of generative design: sketch_gen1.pde

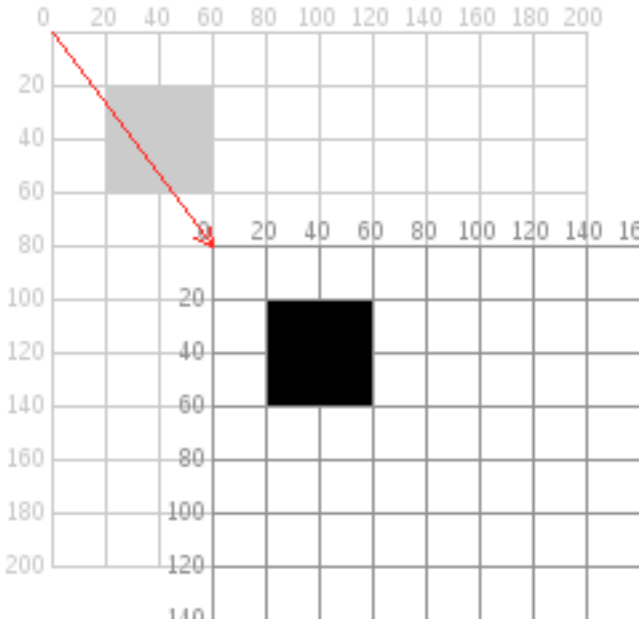


```
float x, y;
float oX, oY;       //original x and original y
float r=50, theta;  //r is radius of the circles, theta is the angle of rotation

void setup() {
  size(600, 600);
  background(0);
  strokeWeight(0.1);

  oX=width/2;       //start generating in the middle of the canvas
  oY=height/2;
}

void draw() {
  if (oX>width) {                  //step back 20, if goes off to the right of width
    for (int i=0; i<20; i++) {
      oX=oX-oX*i;
    }
  }

  for (theta = 0; theta < 2* PI; theta += 0.01) {       //stippled circles
    x = oX + cos(theta)*r;
    y = oY + sin(theta)*r;
    point(x, y);
  }

  oX = oX +random(-2, 2);
  oY = oY +random(-5, 5);
  r=r+random(-2, 2);
  float alpha=random(-50, 50);
  stroke(255, alpha);

  if (r<10) {                      //reduce alpha in small circles
    alpha=20;
    r=50;
```

Transform

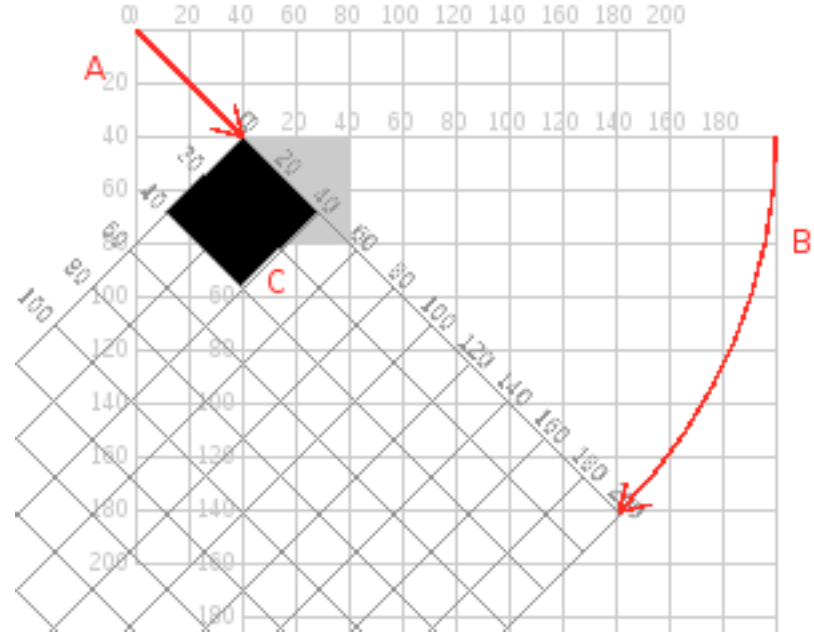
translate
rotate
scale

translate



```
translate(60,80);
rect(20,20,40,40);
```

translate
then rotate




```
translate(40,40);
rotate(radians(45));
rect(0,0,40,40);
```

Where is the center of rotation?

sketch_14_1_basic_translate_rotate_scale.pde

```
void setup() {
  size(500, 500);
  background(0);
  stroke(250);
  fill(255);
}

void draw() {

  translate(100, 100); //move the origin from (0,0) to (10,10)
  //translate (mouseX,mouseY);
  rotate (PI/4); //rotate the rectangle 45 degrees clockwise
  //float rad = radians(45);
  //rotate(rad);
  scale (1.5); //scale up 1.5 times

  rect(0, 0, 100, 50);
}
```

The order of operation matters!

What happens when you draw another shape after the coordinates have been

translated
rotated
scaled

?

Midterm - Generative Design

Project Guideline
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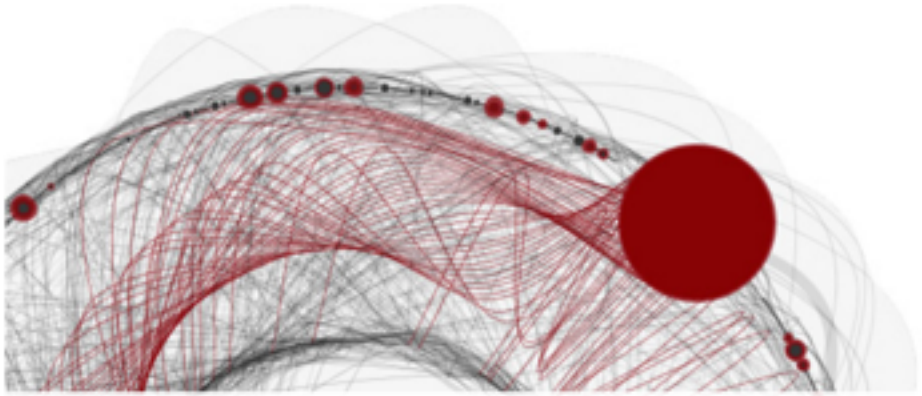

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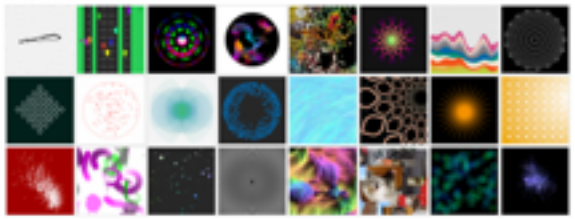

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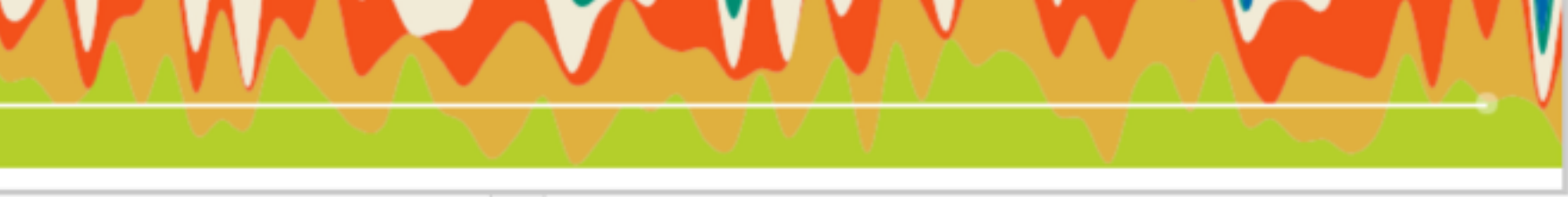

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ohs are useful data representations for displaying changing
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data).

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today

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