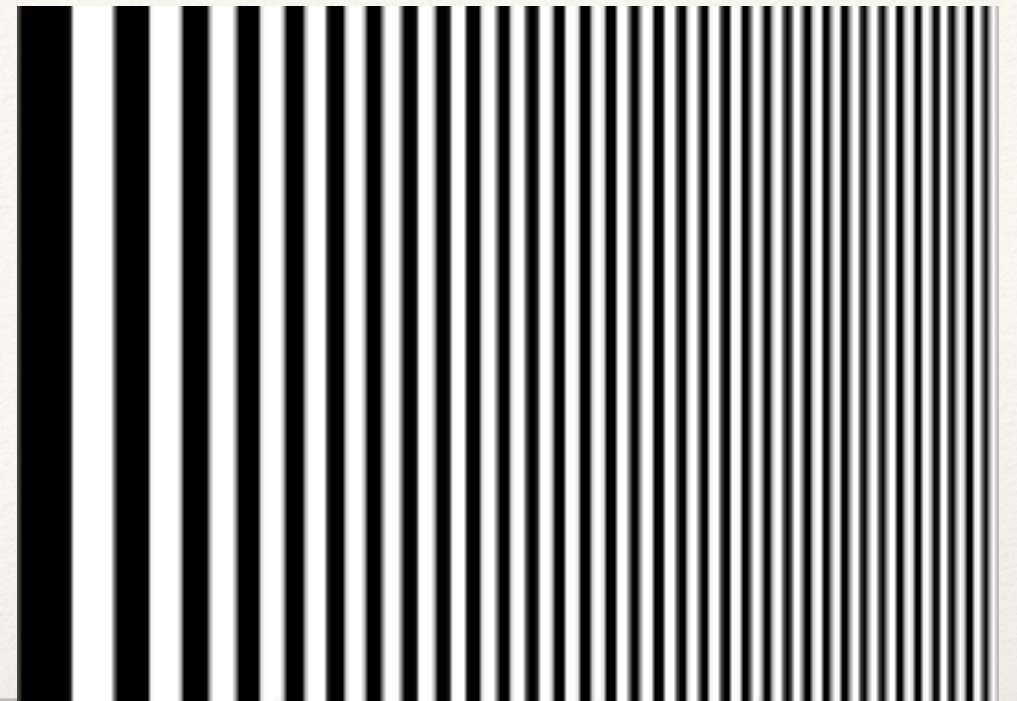


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Attributes and Modes

Elements of Graphics
CS324e

What are Shape Primitives?

- ❖ Shapes included in the library as a building block for more complex shapes
- ❖ Pieces that can be *rasterized* to screen based on pixel coordinates and other information about shape definition

What Are Attributes?

- ❖ Modify the appearance of shape primitives
- ❖ Apply to all primitives displayed **after** attribute
- ❖ Update the declared attribute to update the primitive's display properties

Fill and Stroke

- ❖ `background()` sets the background color of the screen
- ❖ `fill()` sets the fill color for a shape
- ❖ `stroke()` sets the outline color for a shape
- ❖ `noFill()` and `noStroke()` prevents fill and stroke from filling a shape or drawing the stroke respectively

Consider...

```
fill(255);
```

```
stroke(0);
```

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

```
fill(0);
```

```
stroke(255);
```

```
rect(50, 50, 50, 50);
```

What Are Modes?

- ❖ Change the functionality of shape primitive parameters
 - ❖ Same function will have a **different** outcome
- ❖ Applies to all shapes declared **after** the mode
- ❖ Update mode to update how a shape is created

Rectangle and Ellipse Modes

- ❖ `rectMode()` and `ellipseMode()` take a parameter:
 - ❖ CORNER, CORNERS, CENTER, RADIUS
- ❖ Mode parameter dictates how `rect()` and `ellipse()` parameters affect the shape
 - ❖ Changes shape's parameter value interpretation

Consider...

```
rectMode(CORNER); //default mode for rects
```

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

```
rectMode(CORNERS);
```

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

```
rectMode(RADIUS);
```

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

```
rectMode(CENTER);
```

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

Consider...

- ❖ What happens when this is the code in `draw()`?

```
background(210);
```

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

```
rectMode(CENTER);
```

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

Other Modes

- ❖ Modes allow for different structural models within the same method
- ❖ Important concept in graphics!
- ❖ Other modes in Processing:
 - ❖ `colorMode`
 - ❖ `textureMode`
 - ❖ `imageMode`
 - ❖ `shapeMode`
 - ❖ `blendMode`
 - ❖ `textMode`

Attribute Order

- ❖ The order of attribute and mode commands affects the output appearance

```
stroke(100);
```

```
rect(80, 120, 150, 40);
```

```
stroke(200);
```

```
rect(50, 100, 150, 40);
```

Draw Order

- ❖ The order of draw commands also affects the appearance of the output!

```
rect(50, 100, 150, 40);
```

```
rect(80, 120, 150, 40);
```

VS

```
rect(80, 120, 150, 40);
```

```
rect(50, 100, 150, 40);
```

Hands-on: Using Attributes

❖ Today's activities:

1. Experiment with attributes `stroke()`, `fill()`, `noStroke()`, and `noFill()`
2. Draw a rectangle and an ellipse then try out at least one alternate mode on these shapes
3. Experiment with attribute draw order
4. Consider the following questions:
 1. How can attribute order create the illusion of depth?
 2. How can primitive modes help us build images?