

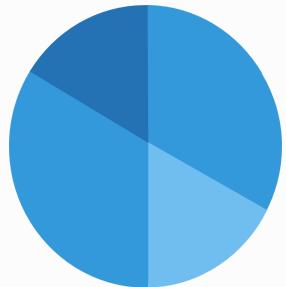
ANIMATE THE WEB WITH EMBERJS

Jessica Jordan



jjordan_dev

WHAT I DO FOR WORK



simplabs

WHAT I DO AFTER WORK





ANIMATIONS

ANIMATIONS MAY REFER TO...

Interactions on UI Elements

:hover

ANIMATIONS MAY REFER TO...

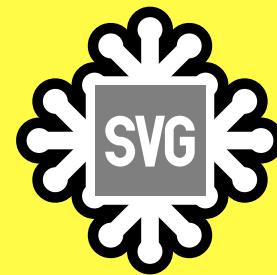
Page Transitions



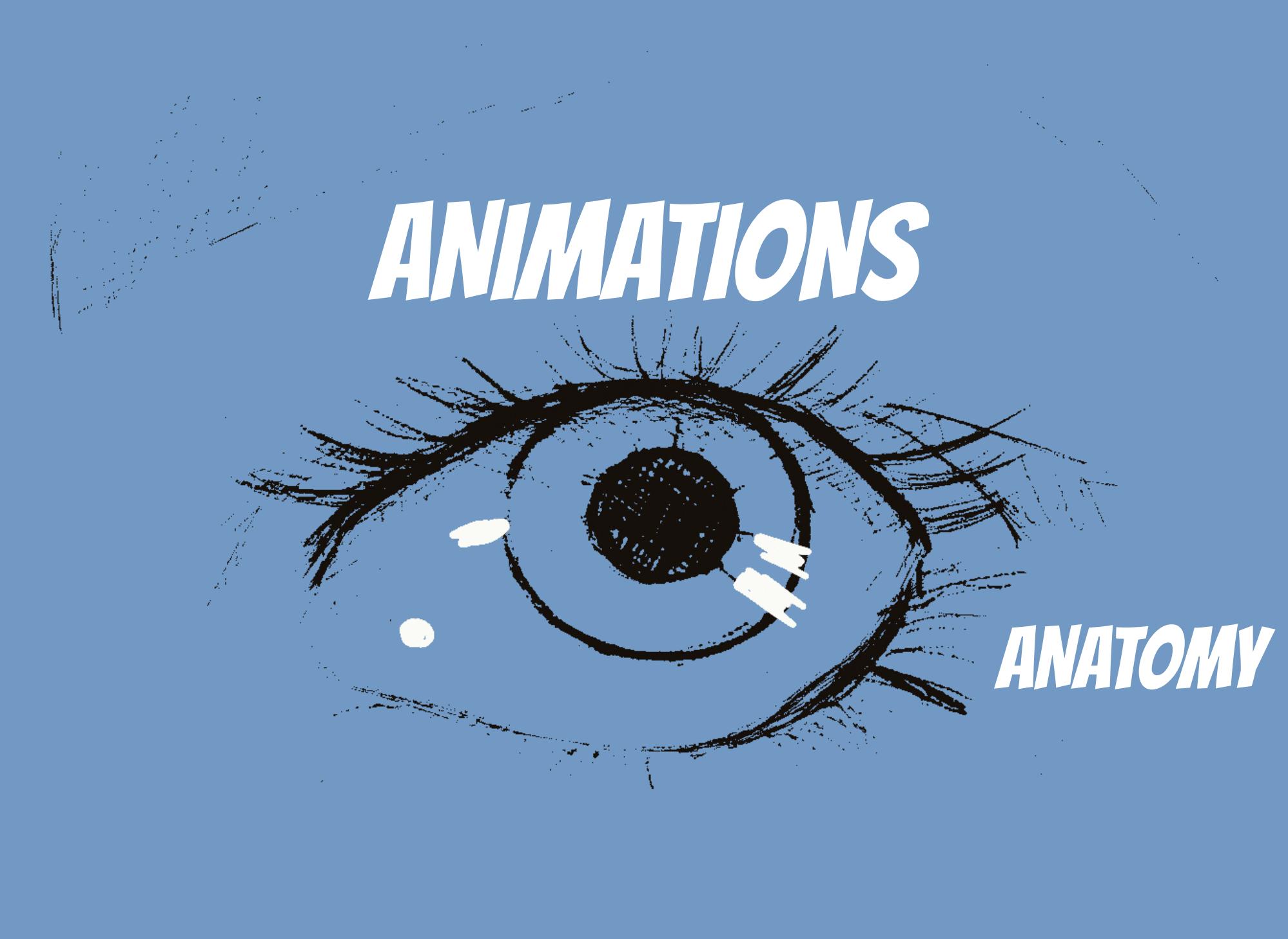
with e.g Ember Liquid Fire

ANIMATIONS MAY REFER TO...

Data Visualization



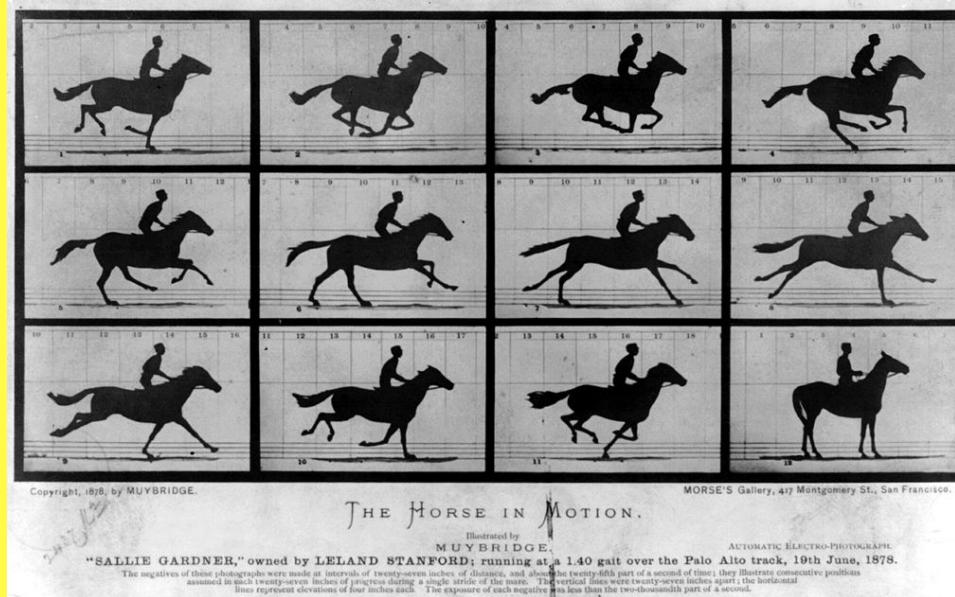
STORYTELLING THROUGH ANIMATIONS



ANIMATIONS

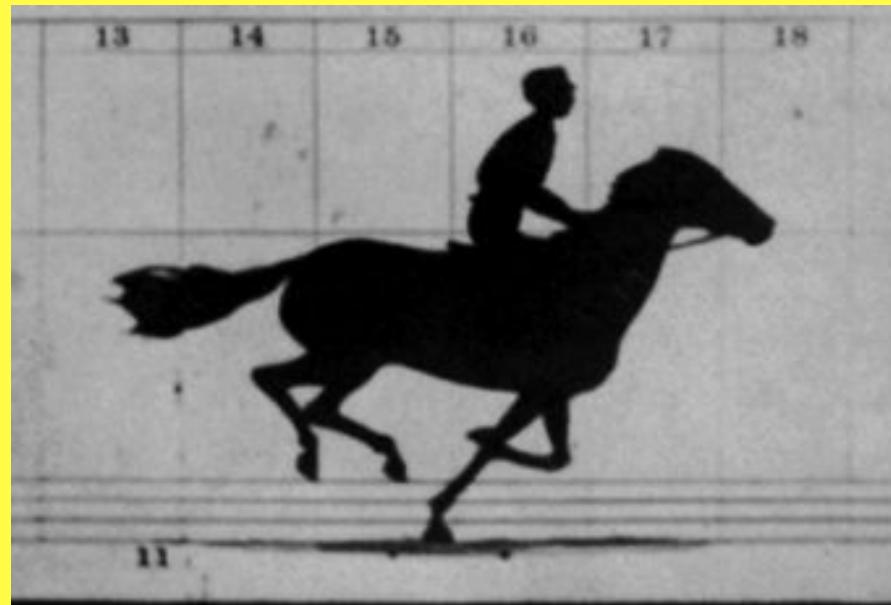
ANATOMY

FRAME-BY-FRAME ANIMATIONS



Muybridge - The Horse In Motion, 1878

FRAME-BY-FRAME ANIMATIONS



Muybridge - The Horse In Motion, 1878

EARLY BEGINNINGS OF ANIMATIONS



19th century animation devices: Phenakistoscope

***...LEADING TO FIRST
CINEMATOGRAPHY***



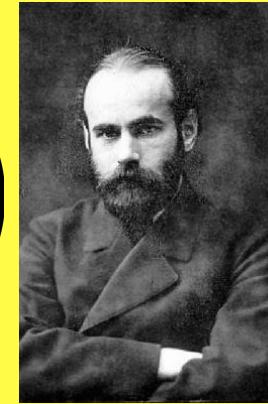
Roundhay Garden Scene 1888 - Louis Le Prince

ANIMATIONS - A DEFINITION

Image Sequence + Display Frequency = Illusion of motion

SMOOTH ANIMATIONS POWERED BY YOUR BRAIN

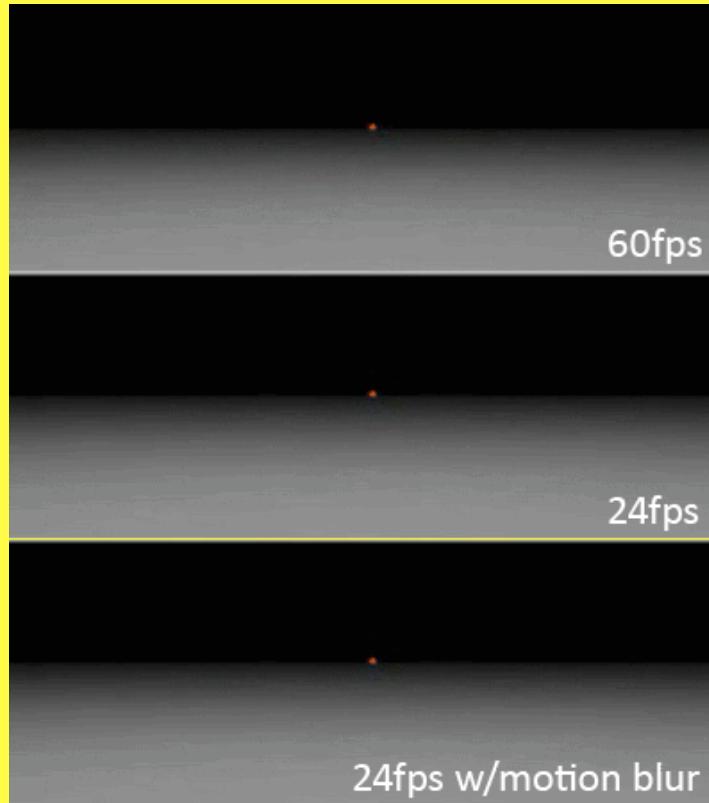
Φ



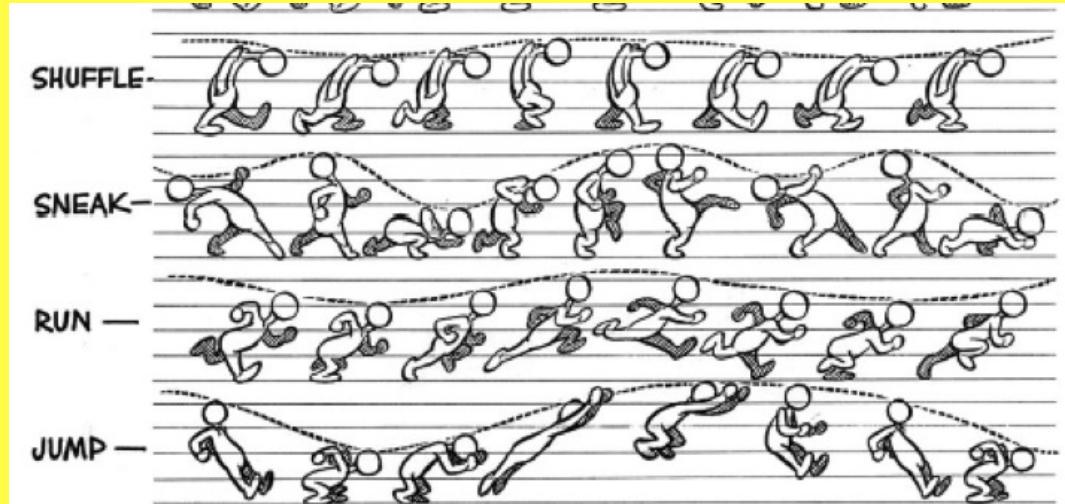
Phi Phenomenon

Gestalt Psychology by Max Wertheimer (1912)

EFFECTS OF FRAME RATES



FRAME-BY-FRAME ANIMATIONS IN CARTOONS



Alla Gadassik - "The Animated Line: Performing and Generating Movement in Early Animation"

***THE STORY OF ANIMATIONS CONTINUES
UNTIL TODAY***



ANIMATIONS ON THE WEB



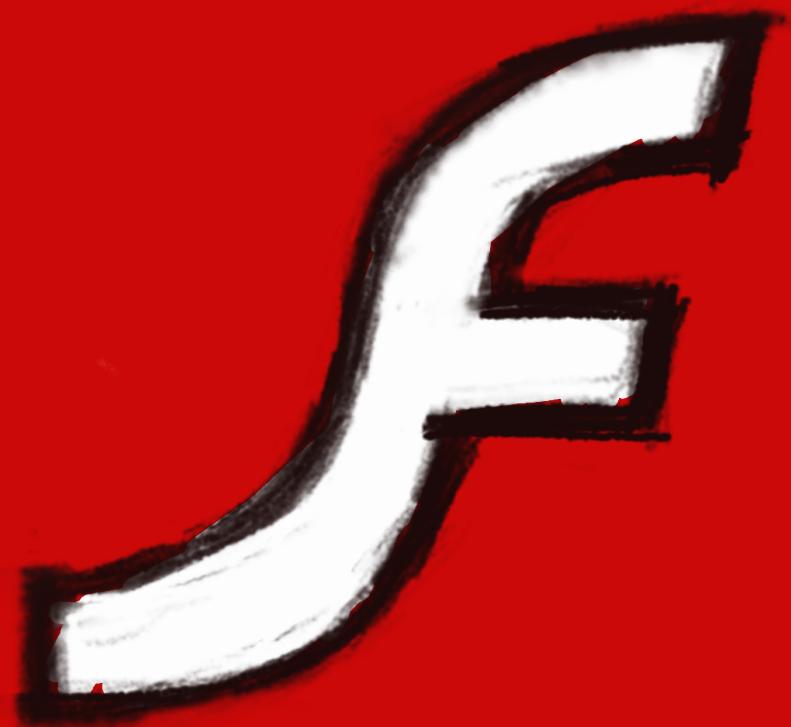
ANIMATIONS

TOOLS AND WEB APIs

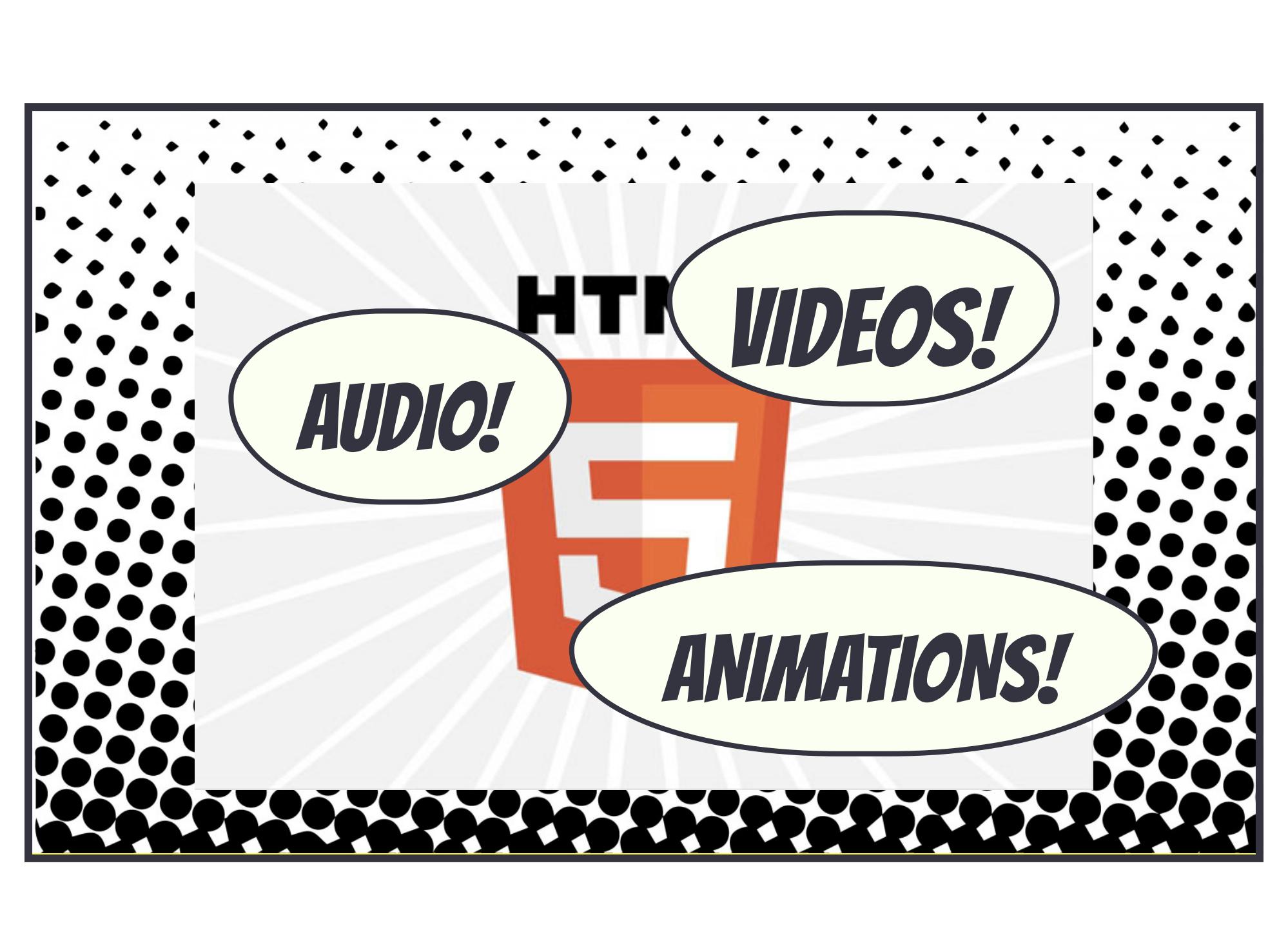
WEB ANIMATIONS 20 YEARS AGO?

(modem dials)

FLASH



SINCE 1996



AUDIO!

VIDEOS!

ANIMATIONS!

"HTML5" ANIMATIONS

HTML



CSS



JS



...and SVG, WebGL, XML and other Web APIs

WHY OPEN WEB STANDARDS?

open
consistent
available



What about the creator experience?

THE INFINITE CANVAS

Rachel Nabors, Keynote "Storytelling on the Shoulders of Giants" - OSCON 2014

ANIMATIONS DEMO

EMBER & HTML5 CANVAS

HTML5 CANVAS

<canvas></canvas>

Powerful Web API which can be leveraged for
animations

CANVAS CONTEXT OBJECT

```
<!-- index.html -->
<canvas id="comic-panel"></canvas>

// drawing.js
const canvas = document.getElementById('comic-panel');

if (canvas.getContext) {
  var ctx = canvas.getContext('2d');

} else {
  throw `Everything's fresh, but there's
  no context object here,
  so time for some polyfilling:
  bower install --save canvas-5-polyfill`;
}
```

HTML5 CANVAS & EMBER COMPONENTS

Let's build it!



CREATING THE COMPONENT

```
{ {comic-panel width=width height=height} }

// app/components/comic-panel.js
import Ember from 'ember';

export default Ember.Component.extend({
  tagName: 'canvas'
})
```

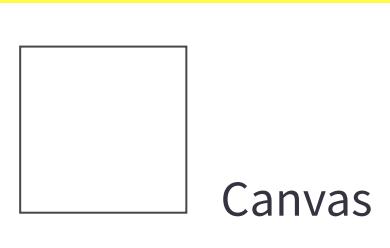
DRAWING TO THE CANVAS

sx, sy: origin of source image

sWidth, sHeight: width and height of source image

dx, dy: origin of canvas destination

dWidth, dHeight: width and height of canvas destination



Canvas

DRAWING TO THE CANVAS

```
// app/components/comic-panel.js
export default Ember.Component.extend({
  Ember.on('init', function() {
    const image = new Image();
    image.onload = () => {
      this.set('naturalHeight', image.height);
      this.set('naturalWidth', image.width);
      this.set('pseudoImg', image);
    };
    image.src = this.get('imgSrc');
  })
})
```

DRAWING TO THE CANVAS

```
// app/components/comic-panel.js
export default Ember.Component.extend({
  draw() {
    // ...
    ctx.clearRect(0, 0, canvasWidth, canvasHeight);

    ctx.drawImage(img, sx, sy, sWidth, sHeight,
                  0, 0, dWidth, canvasHeight);
  }
})

/* app/components/comic-panel.js */
setup: Ember.observer('pseudoImg', function() {
  const ctx = this.get('element').getContext('2d');
  this.set('ctx', ctx);
  this.draw();
})
```

GETTING ACTIONS HOOKED IN



FRAME 0

FRAME +

PLAY

RUN ANIMATIONS

```
// app/components/comic-panel.js
loop() {
  this.draw();
  this.nextFrame();
  Ember.run.later(this, this.loop, 100);
}
```

RUN AND CANCEL ANIMATIONS

```
const loop = Ember.run.later(this, this.loop, 100);  
this.set('currentLoop', loop);
```

```
if (!this.get('runAnimation')) {  
  Ember.run.cancel(currentLoop);  
  this.set('currentLoop', null);  
})
```

DEMO FINAL



FRAME 0

FRAME +

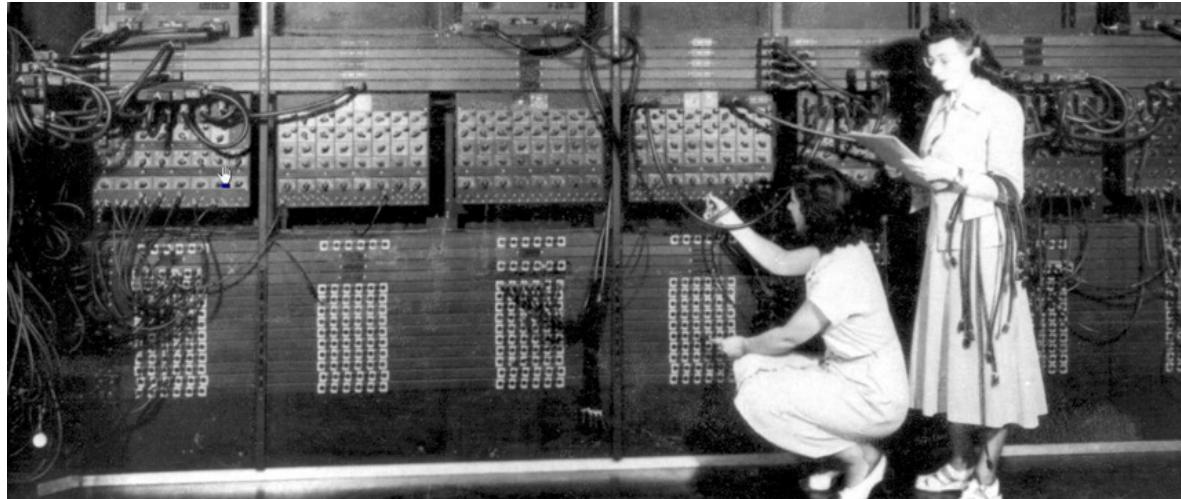
PLAY



HTML5 CANVAS - GOOD TO KNOW

- ♥ Performance
- ♥ Developer Control
- ? Creator Experience
- ? Accessibility

HTML5 REQUIRES LOTS OF WIRING UP...

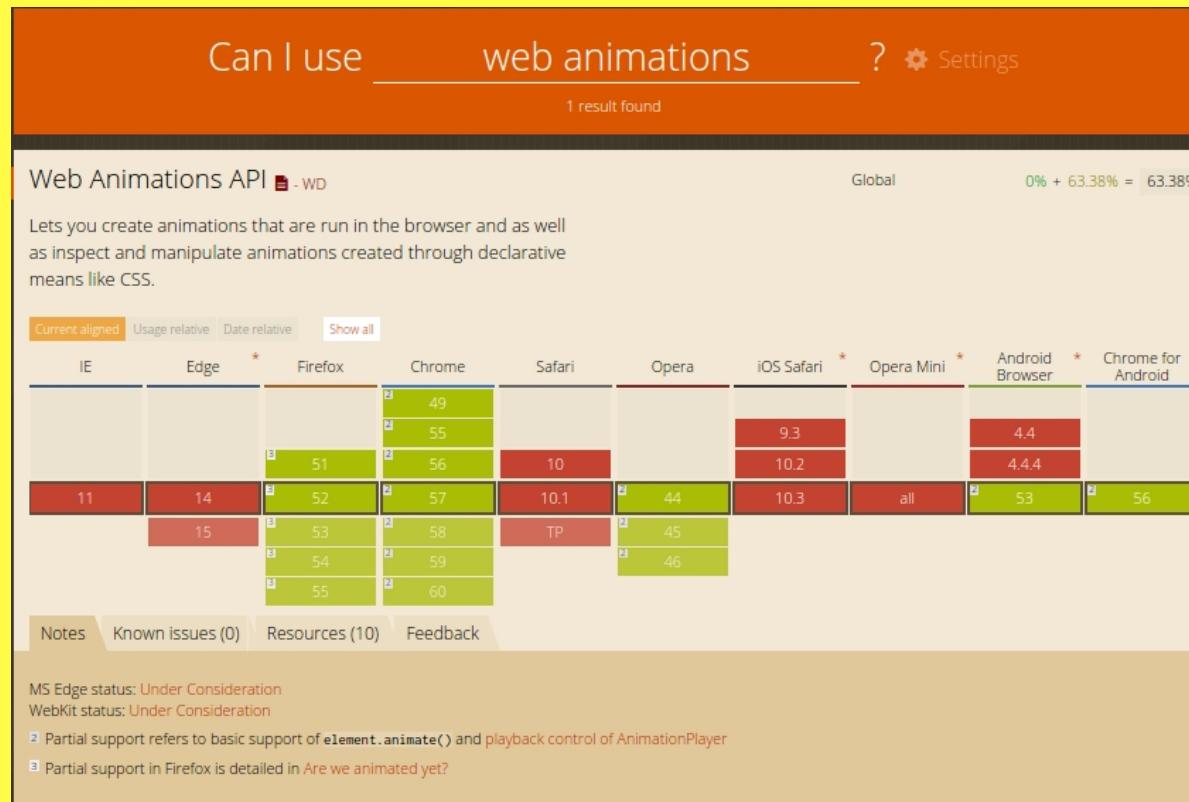


ANIMATIONS DEMO

EMBER & WEB ANIMATIONS API

WEB ANIMATIONS API - ANIMATION OF THE FUTURE

...BUT THE BROWSER SUPPORT?



That's a "No", right?



WEB ANIMATIONS JS POLYFILL

Build WAAPI powered animations today!

BUT OF COURSE...

...there's an addon for that!



```
ember install ember-web-animations-next-polyfill
```

CSS3 ANIMATIONS GO JAVASCRIPT

```
@keyframes rotating {  
  0% {  
    transform: rotate(0) translate3D(-50%, -50%, 0);  
    color: #000;  
  },  
  33% {  
    color: #431236;  
    offset: 0.333;  
  },  
  66% {  
    transform: rotate(360deg) translate3D(-50%, -50%, 0);  
    color: #000:  
  }  
}
```

CSS3

KEYFRAME EFFECTS

```
// KeyFrameEffect Objects:  
var rotating = [  
  { transform: `rotate(0) translate3D(-50%, -50%, 0)`,  
    color: '#000'  
  },  
  { color: '#431236',  
    offset: 0.333  
  },  
  { transform: 'rotate(360deg) translate3D(-50%, -50%, 0)',  
    color: '#000'  
  }  
];
```

JS

DEMO: ANIMATION COMPONENT IN EMBER BASED ON WAAPI



{ { comic-panel } }

CREATING KEYFRAME EFFECTS

CREATING KEYFRAME EFFECTS

```
// app/my-route/controller.js
let characterObject = {
    ....,
    keyFrames: [
        { backgroundPosition: '0 0' },
        { backgroundPosition: `0 100%` }
    ],
    ....
};
```

CREATING KEYFRAME EFFECTS

```
let characterObject = {  
    .......,  
    animationOptions: {  
        duration: 500,  
        easing: `steps(5)`,  
        iterations: 'Infinity'  
    }  
    ......  
};  
  
{ {comic-panel comicLayer=characterObject} }
```

CREATING AND STARTING THE ANIMATION

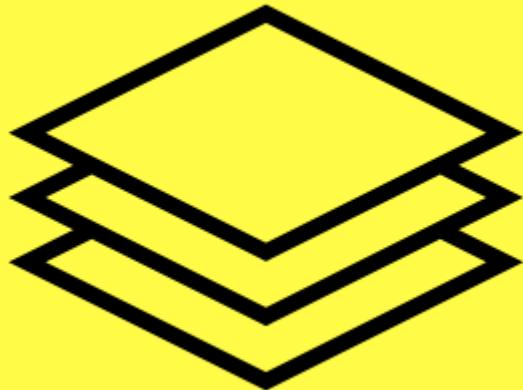
```
/* app/components/comic-panel/component.js */
export default Ember.Component.extend({
  ...
  startAnimation: Ember.on('didRender', function() {
    let keyFrames = this.get('keyFrames');
    let animationOptions = this.get('animationOptions');
    this.$()[0].animate(keyFrames, animationOptions);
  }),
  ...
})
```

LET'S MAKE IT REAL



PLAY

MULTI-LAYERED ANIMATIONS



EMBEDDING COMIC LAYER SUB COMPONENTS

```
/* app/components/comic-panel/template.hbs */
{{#each comicLayerList as |layer|}}
  {{comic-layer keyFrames=layer.keyFrames
                animationOptions=layer.animationOptions
                frameAction=(action "setKeyFrames"))}}
{{/each}}

// app/components/comic-panel-layer.js
createKeyFrames: Ember.on('didRender', function() {
  // ...
  const layer = this.get('element');
  const keyFrame = new KeyframeEffect(
    layer,
    this.get('keyFrames'),
    this.get('animationOptions')
  );
  this.sendAction('frameAction', keyFrame);
})
```

SYNCHRONIZE THE ANIMATION LAYERS

```
/* app/components/comic-panel/component.js */
setupAnimation() {
  const timeline = this.get('timeline');
  const keyFrameEffects = this.get('keyFrameEffects');

  const group = new GroupEffect(keyFrameEffects);

  const animation = new Animation(group, timeline);

  animation.pause();

  this.set('animation');
},
```

SYNCHRONIZE THE ANIMATION LAYERS

```
/* app/components/comic-panel/component.js */
export default Ember.Component.extend({
  // ...
  actions: {
    play() {
      this.get('animation').play();
    }
    pause() {
      this.get('animation').pause();
    }
  }
  // ...
})
```

DEMO FINAL



PLAY

WEB ANIMATIONS API - GOOD TO KNOW

- ♥ Creator Experience
- ♥ Developer Control
- ♥ Accessibility
- ? Performance



ANIMATIONS

EPILOGUE

**THE STORY ABOUT ANIMATIONS CONTINUES
UNTIL TODAY**

WITH ❤ EMBER & OPEN WEB STANDARDS

THE WEB IS YOURS TO BE ANIMATED

RESOURCES

Tomster and Zoey Illustration by Lindsey Wilson

"Inifinite Canvas" quote from Rachel Nabor's
Keynote @ OSCON 2014: "Storytelling On The
Shoulders of Giants"

Learn more about the Web Animations API with
the excellent How To Guide at MDN

Full source code for the animation demos



THANK YOU!

Jessica Jordan



jjordan_dev