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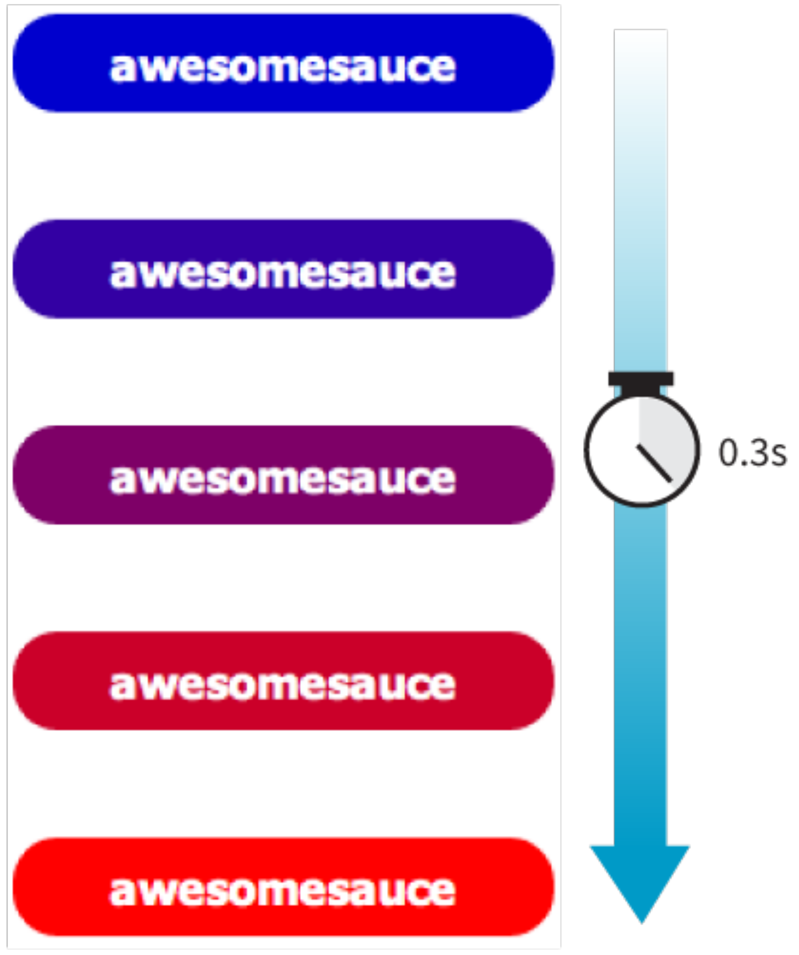
TRANSITIONS, TRANSFORMS, AND ANIMATION

OVERVIEW

- Creating smooth transitions
- Moving, rotating, and scaling elements
- Combining transitions and transforms
- 3-D transforms
- Keyframe animation overview

CSS Transitions

- CSS transitions create a smooth change from **one state to another**.
- They fill in the frames in between (**tweening**).
- **Example:** Gradually changing a button from red to blue (through purple) when the mouse pointer hovers over it.
  State 1: Default
  State 2: When the mouse is over the element



Transition Properties

`transition-property`
Which CSS property to change

`transition-duration`
How long the transition should take in seconds (or milliseconds)

`transition-timing-function`
The manner in which the transition accelerates

`transition-delay`
Whether there should be a pause before the transition starts and how long that pause should be (in seconds)

Specifying the Property

`transition-property`

Values: *Property-name*, `all`, `none`

Identifies the property that will receive a transition when it changes state.

Here, we want to smooth out the change in background color when the color changes from hovering or focus:

```
.smooth {
  ...
  color: #fff;
  background-color: mediumblue;
  transition-property: background-color;
}
.smooth:hover, .smooth:focus {
  background-color: red;
}
```

Defining Duration

`transition-duration`

Values: *Time*

Identifies how much time the transition will take. It's usually specified in seconds (**`s`**) or milliseconds (**`ms`**).

In this example, the transition from blue to red takes .3 seconds:

```
.smooth {
  ...
  color: #fff;
  background-color: mediumblue;
  transition-property: background-color;
  transition-duration: .3s;
}
.smooth:hover, .smooth:focus {
  background-color: red;
}
```

Timing Functions

`transition-timing-function`

Values: `ease`, `linear`, `ease-in`, `ease-out`, `ease-in-out`, `step-start`, `step-end`, `steps`, `cubic-bezier(#,#,#,#)`

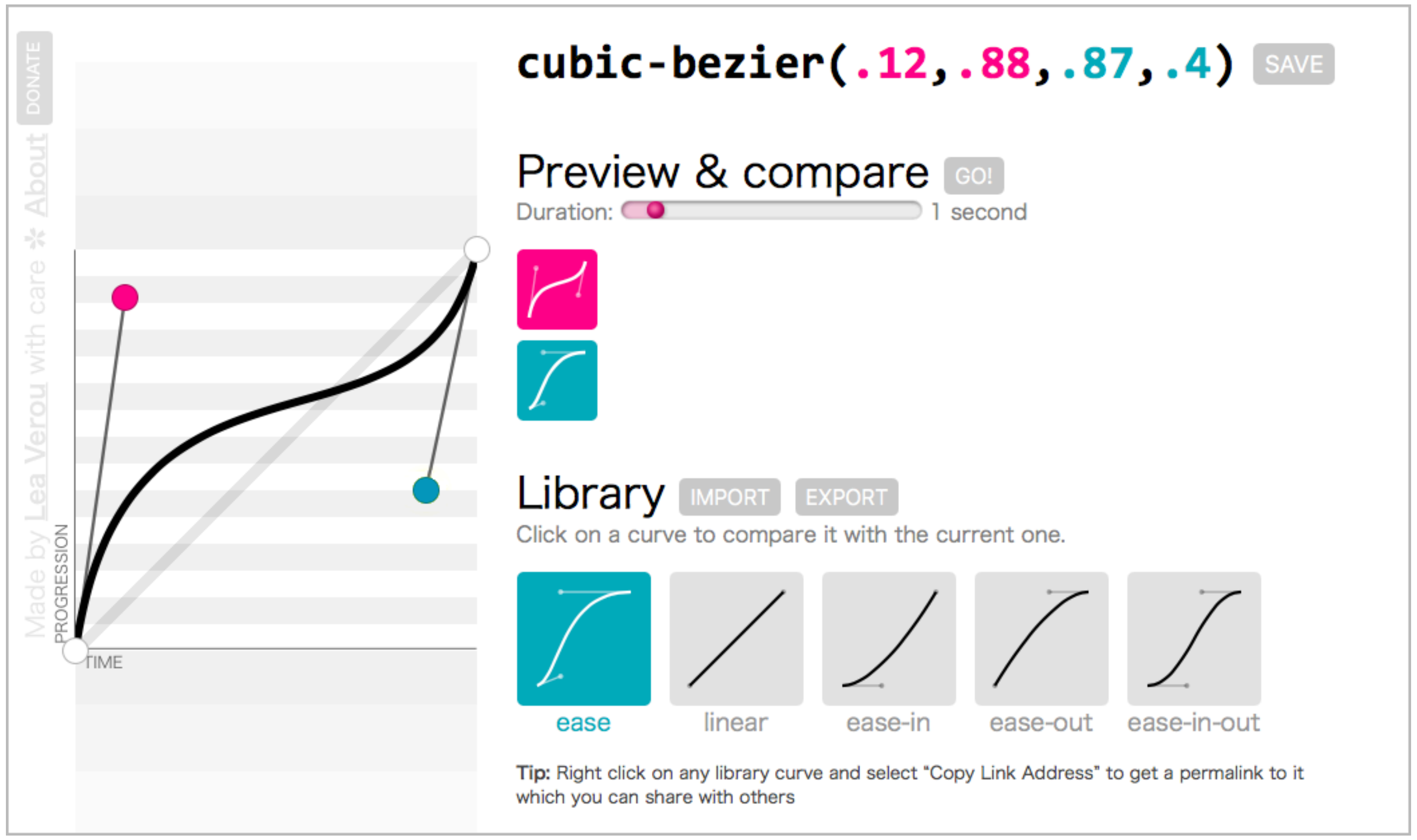
- The **timing function** describes the way the transition accelerates or decelerates over time.
- It has a big impact on the feel and believability of the animation.
- The default is **`ease`**, which starts slowly, accelerates quickly, then slows down again at the end.

Timing Functions (cont’d)

- **`linear`**: Stays consistent from beginning to end, feels mechanical
- **`ease-in`**: Starts slowly, then speeds up
- **`ease-out`**: Starts quickly, then slows down
- **`ease-in-out`**: Similar to ease, but with less acceleration in the middle
- **`cubic-bezier(#,#,#,#)`**: Defines a curve that plots acceleration
- **`steps(#, start`** *or* **`end)`**: Divides the animation into a number of steps. The `start` and `end` keywords indicate whether that transition happens at the beginning or end of each step.
- **`step-start`**: Changes states in one step, at the beginning of the duration time
- **`step-end`**: Changes states in one step, at the end of the duration time

Cubic Bezier Curves

- Acceleration can be plotted using a Bezier curve.
- Steep sections indicate quick rate of change; flat parts indicate slow rate of change.
- The curve is defined by the x,y coordinates of "handles" that control the curve.



cubic-bezier(.12,.88,.87,.4)

Preview & compare

Duration: 1 second

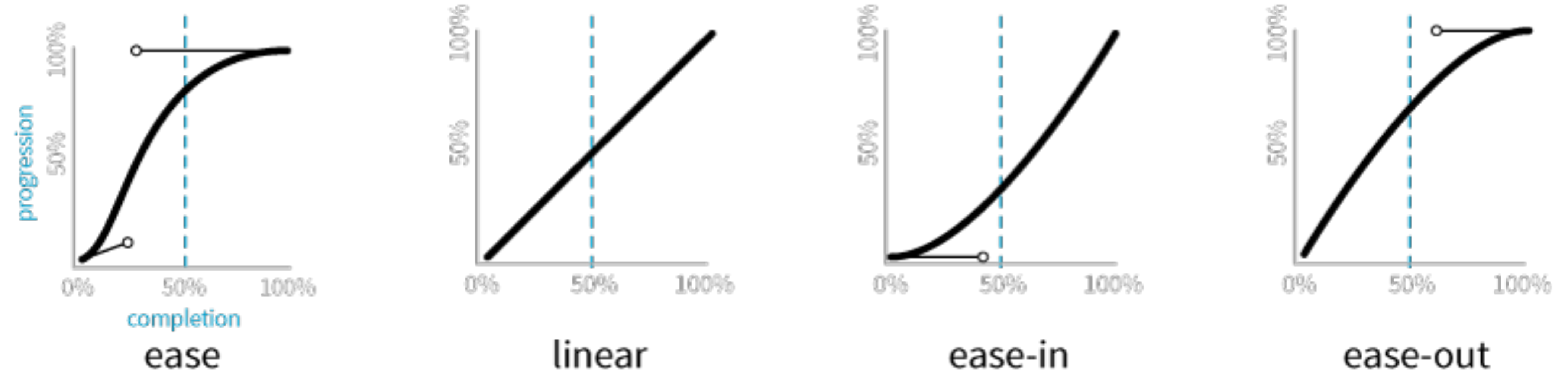
Library

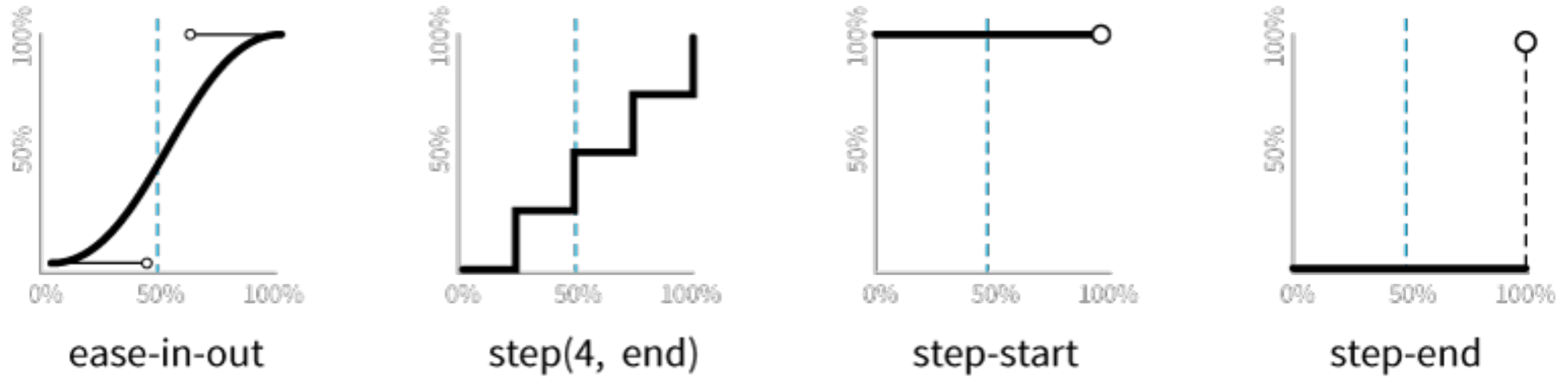
Click on a curve to compare it with the current one.

Tip: Right click on any library curve and select "Copy Link Address" to get a permalink to it which you can share with others

Cubic Bezier Curves for Keywords

The curves for **`transition-timing-function`** keyword values:





Transition Delay

`transition-delay`

Values: *Time*

Delays the start of the transition by the amount of time specified.

In this example, the transition will begin .2 seconds after the user hovers over the element:

```
.smooth {
  ...
  color: #fff;
  background-color: mediumblue;
  transition-property: background-color;
  transition-duration: .3s;
  transition-timing-function: ease-in-out;
  transition-delay: 0.2s;
}
.smooth:hover, .smooth:focus {
  background-color: red;
}
```

Shorthand transition Property

`transition`

Values: *property duration timing-function delay*

Combines all the transition properties into one declaration. Values are separated by character spaces.

The duration time must appear before delay time.

```
.smooth {
  ...
  color: #fff;
  background-color: mediumblue;
  transition: background-color .3s ease-in-out 0.2s;
}
```

Transitioning Multiple Properties

- You can set the transitions for multiple properties with one declaration.
- Separate value sets with commas.
- This declaration smoothes out the changes in background color, color, and letter spacing of an element:

```
.smooth {
  …
  transition: background-color 0.3s ease-out 0.2s,
              color 2s ease-in,
              letter-spacing 0.3s ease-out;
}
```

Making All Transitions Smooth

If you want the same duration, timing-function, and delay for all your transitions, use the **`all`** keyword for **`transition-property`**:

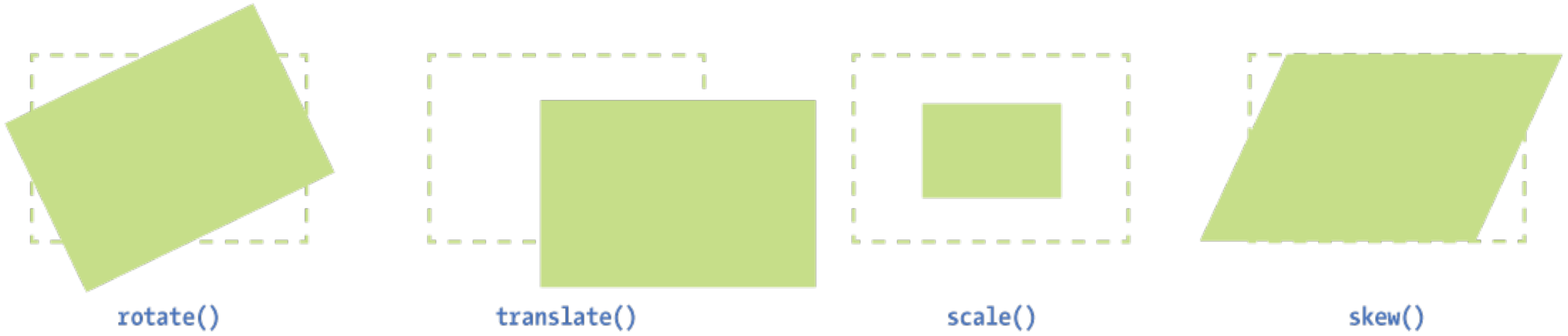
```
.smooth {
  …
  transition: all 0.2s ease-in-out;
}
```

CSS Transforms

`transform`

Values: `rotate()`, `rotateX()`, `rotateY()`, `translate()`, `translateX()`, `translateY()`, `scale()`, `scaleX()`, `scaleY()`, `skew()`, `skewX()`, `skewY()`, `none`

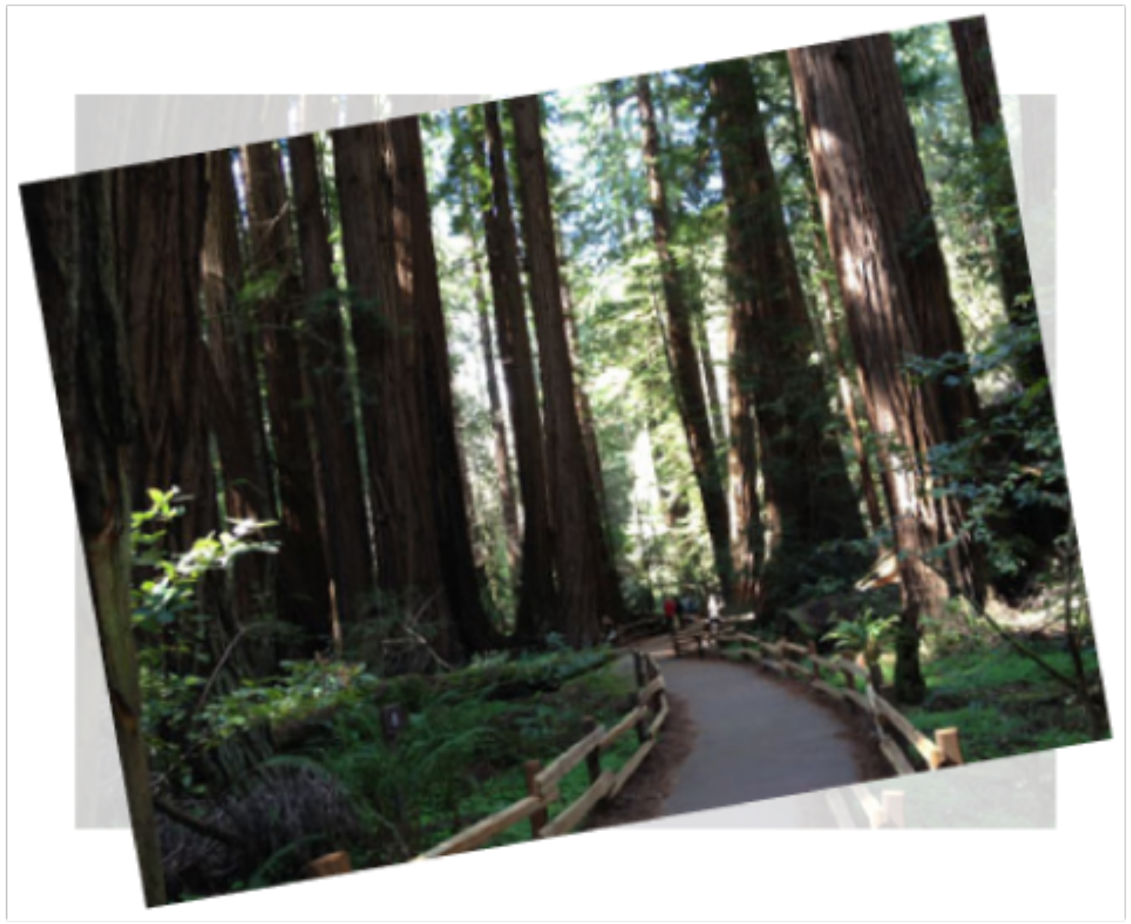
The **`transform`** property changes the shape and location of an element when it initially renders. It is not animated but can be with transitions.



Transforming the Angle (rotate)

Use the **`rotate()`** function as the value of `transform` to rotate the element at a given angle:

```
img {
  width: 400px;
  height: 300px;
  transform: rotate(-10deg);
}
```



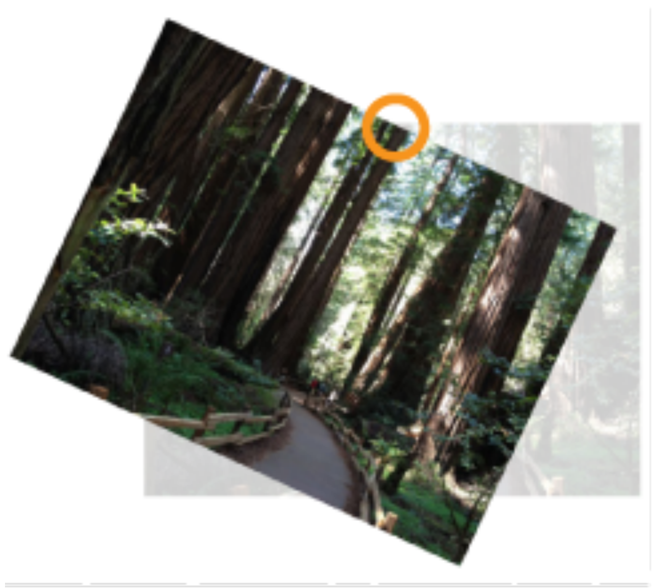
```
transform: rotate(-10deg);
```

Transform Origin

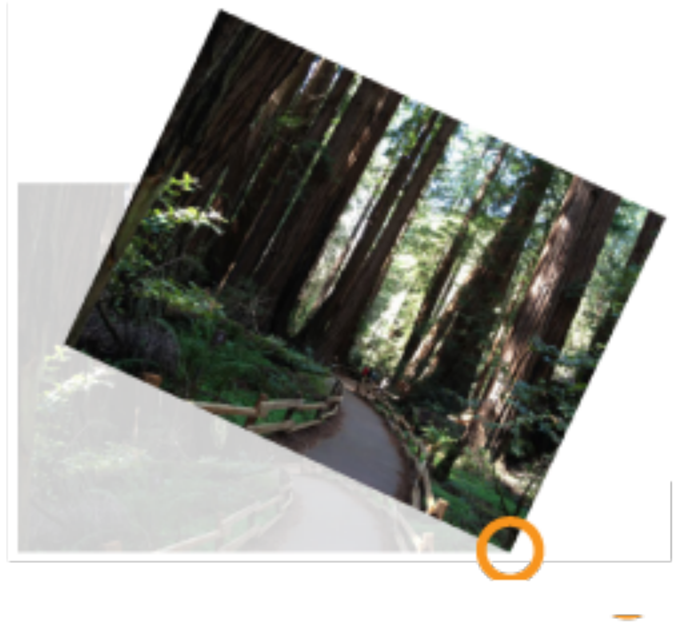
`transform-origin`

Values: *Percentage*, *length*, `left`, `center`, `right`, `top`, `bottom`

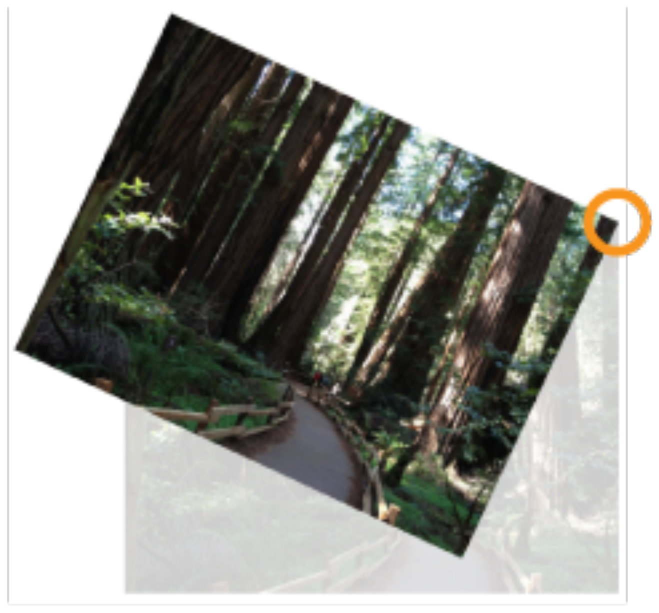
The point around which an element is transformed, defined by horizontal and vertical offsets.



```
transform-origin: center top;
```



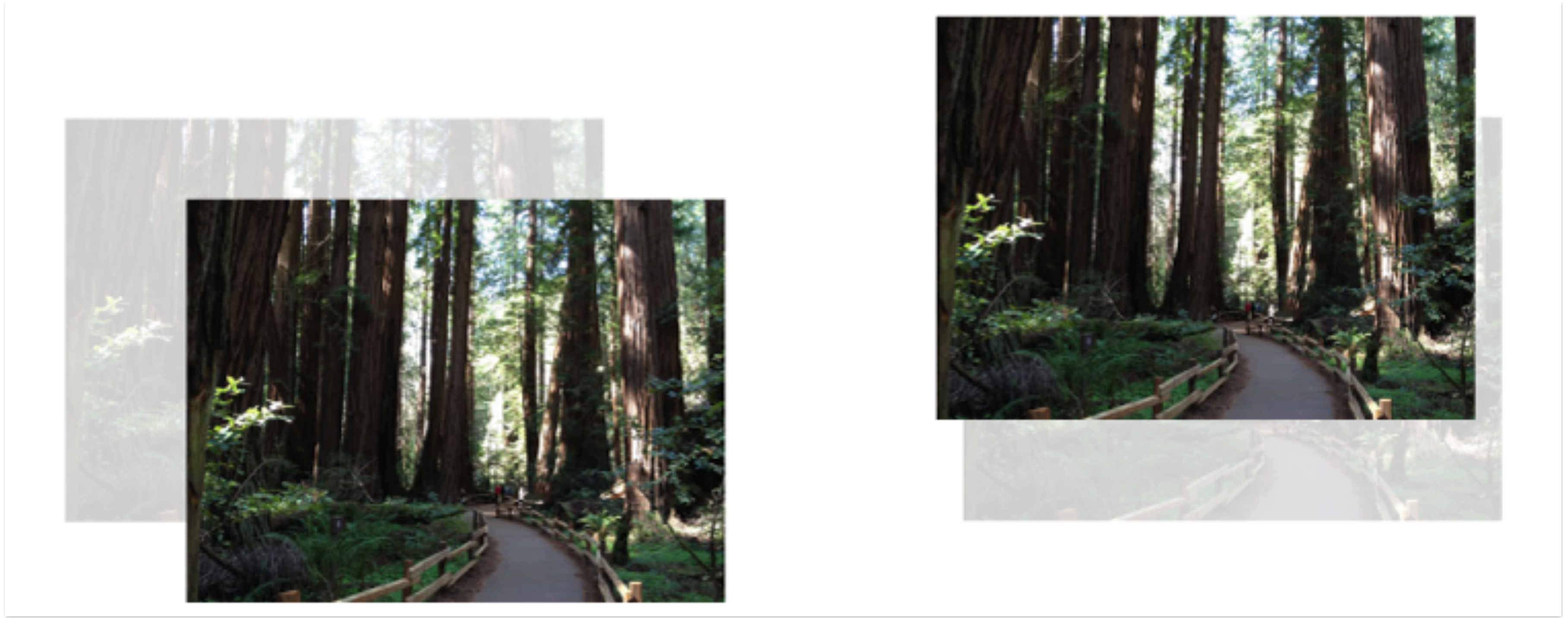
```
transform-origin: 100% 100%;
```



```
transform-origin: 400px 0;
```

Transforming Position (translate)

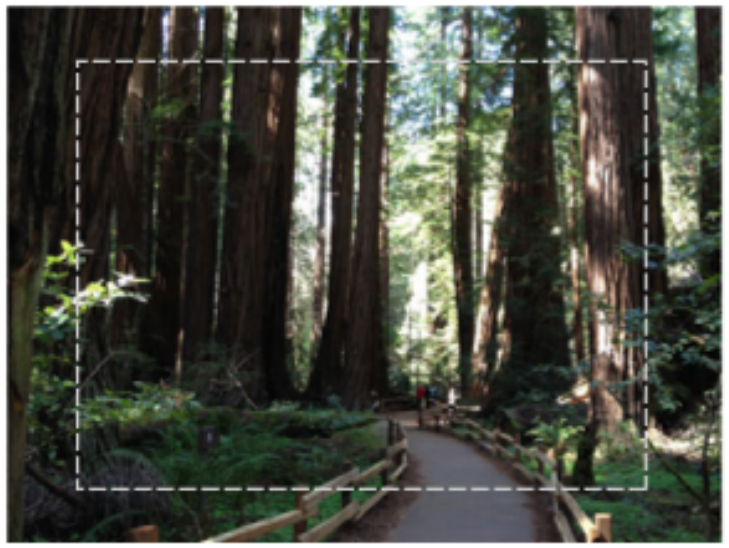
- Use the **`translate()`** function as the value of `transform` to render an element at a new location.
- The values are an x-offset and a y-offset. When you provide one value, it's used for both axes.



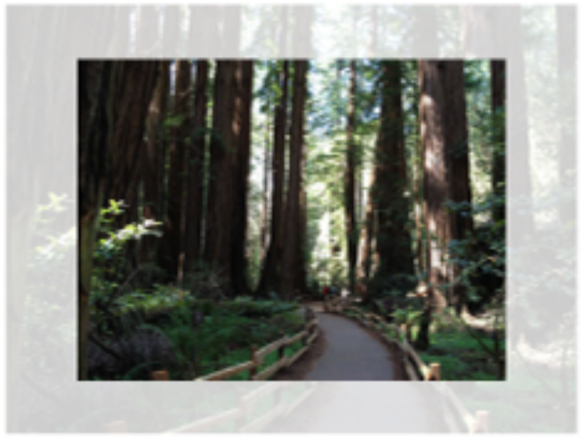
```
transform: translate(90px, 60px);          transform: translate(-5%, -25%);
```

Transforming Size (scale)

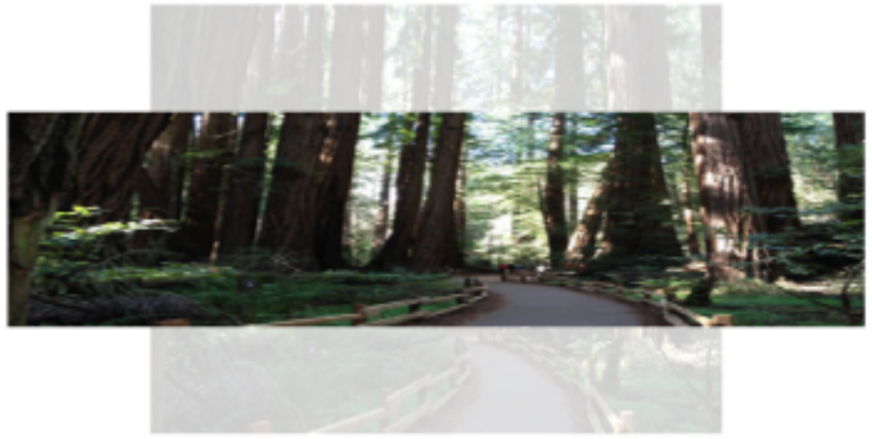
- Use the **`scaleX()`**, **`scaleY()`**, or **`scale`** function to change the size at which an element renders.
- The value is a unitless number that specifies a size ratio.
- The **`scale()`** shorthand provides x-offset and y-offset values (providing one value applies to both axes).



`transform: scale(1.25);`



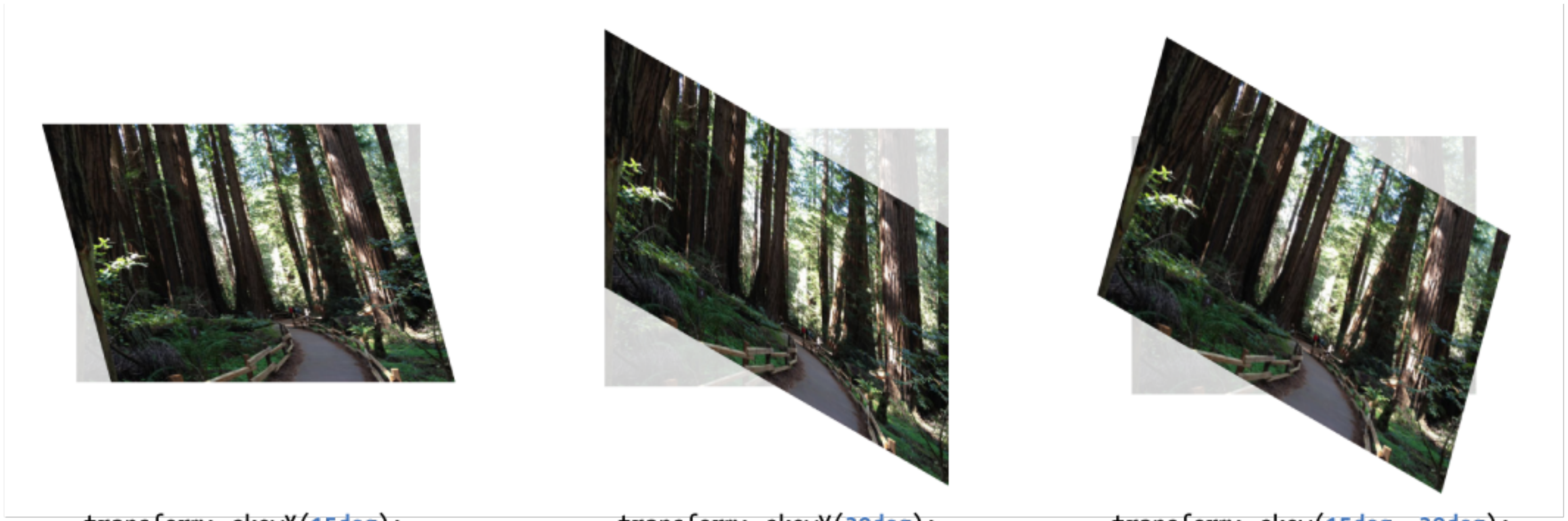
`transform: scale(.75);`



`transform: scale(1.5, .5);`

Transforming Slant (skew)

- Use the **`skewX()`**, **`skewY()`**, or **`skew`** function to change the angle of the horizontal or vertical axes (or both).
- The value is the number of degrees the angle should be.
- The **`skew()`** shorthand provides x-offset and y-offset values (providing one value applies it to *the x-axis only*).



`transform: skewX(15deg);` `transform: skewY(30deg);` `transform: skew(15deg, 30deg);`

Multiple Transforms

You can apply more than one transform type in a declaration:

```
img:hover, img:focus {
  transform: scale(1.5) rotate(-5deg) translate(50px,30px);
}
```

They're applied in the order in which they're listed. Order matters in the final result.

NOTE: If you apply a transform on an element in a different state (for example, `:hover`), repeat all transforms applied so far to that element or they will be overwritten.

Smoothing Out Transformations

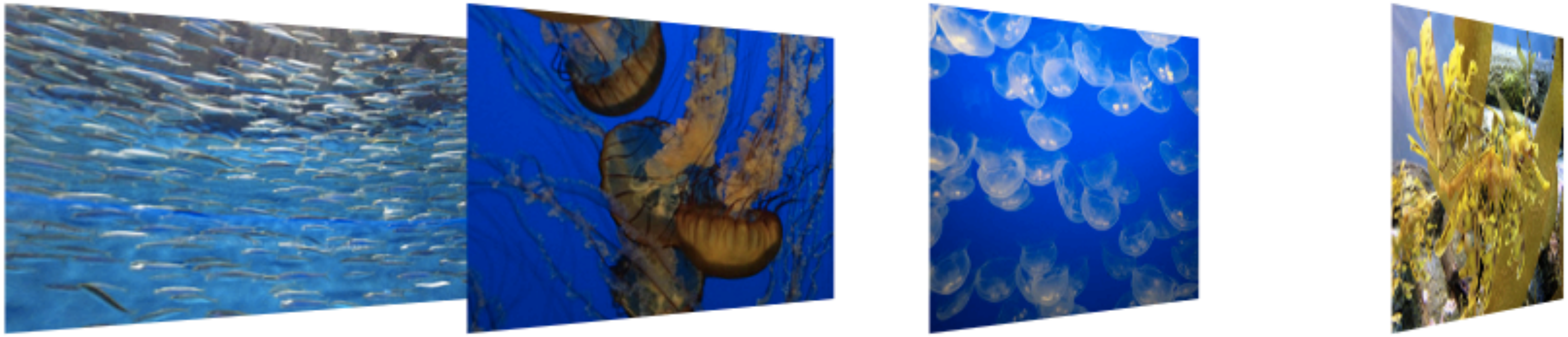
Smooth out a transform using the **`transition`** property.

Example:
Make an element appear to rotate smoothly when the mouse moves over it or when it’s in focus:

```
a:hover img.twist, a:focus img.twist {
  transform: rotate(-5deg);
}
img.twist {
  transition-property: transform;
  transition-duration: .3s;
}
```

3-D Transforms

You can apply perspective to element boxes to make them appear as though they're in a 3-D space.



3-D Transforms (cont’d)

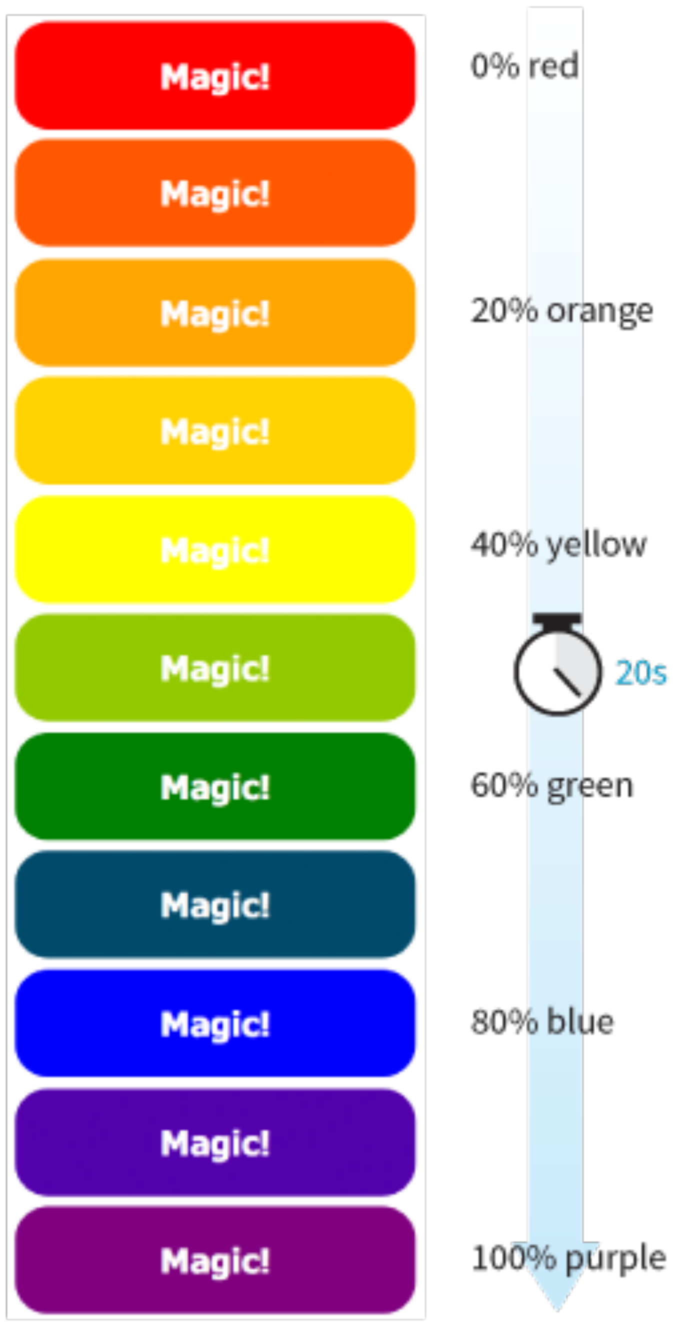
- Apply the **`perspective`** property to the containing element (the lower the value, the more extreme the perspective):

```
ul {
  ...
  perspective: 600;
{
```

- Apply one of the 3-D transform functions to each child element:

```
li {
  ...
  transform: rotateX(45deg);
{
```

Intro to Keyframe Animation



Keyframe animation enables you to create transitions between a series of states (keyframes):

1. **Establish the keyframes** with a @keyframes rule:

```
@keyframes animation-name {
  keyframe { property: value; }
  /* additional keyframes */
}
```

2. **Apply animation properties** to the element(s) that will be animated.

Intro to Keyframe Animation (cont'd)

Keyframes establish colors at each point in the animation and give the sequence a name ("rainbow"):

```
@keyframes rainbow {
 0% { background-color: red; }
20% { background-color: orange; }
40% { background-color: yellow; }
60% { background-color: green; }
80% { background-color: blue; }
100% { background-color:
purple; }
}
```

The animation properties are applied to the animated element (including which keyframe sequence to use):

```
#magic {
  …
  animation-name: rainbow;
  animation-duration: 5s;
  animation-timing-function:
linear;
  animation-iteration-count:
infinite;
  animation-direction: alternate;
}
```