# Programming Fundamentals with JavaScript

## Methods

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# Next Piece: Operating on Images + Pixels

1. Start with the foreground image you want (`fgImage`)
2. And with the background image you want (`bgImage`)
3. Make a blank image of the same size (`output`)
4. For each pixel (`currentPixel`) in `fgImage`
   1. Look at `currentPixel` and if it is green,
      - Look at same position in `bgImage`
      - And set `output`’s corresponding pixel to `bgImage`’s pixel
   2. Otherwise: set `output`’s corresponding pixel

# Next Piece: Operating on Images + Pixels

Examine colors in pixels

1. Start with the foreground image you want (`fgImage`)
2. And with the background image you want (`bgImage`)
3. Make a blank image of the same size (`output`)
4. For each pixel (`currentPixel`) in `fgImage`
    1. Look at `currentPixel` and if it is green,
        - Look at same position in `bgImage`
        - And set `output`'s corresponding pixel to `bgImage`'s pixel
    2. Otherwise: set `output`'s corresponding pixel

# Next Piece: Operating on Images + Pixels

Set pixels in an image

1. Start with the foreground image you want (`fgImage`)
2. And with the background image you want (`bgImage`)
3. Make a blank image of the same size (`output`)
4. For each pixel (`currentPixel`) in `fgImage`
   1. Look at `currentPixel` and if it is green,
      - Look at same position in `bgImage`
      - And set `output`'s corresponding pixel to `bgImage`'s pixel
   2. Otherwise: set `output`'s corresponding pixel

# Calling Methods: Syntax

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

- Methods
  - Perform some (complex) operation
  - Act **on** an object

# Calling Methods: Syntax

```
var fgImage = new SimpleImage("drewRobert.png");
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```

What object to invoke the method on

- Methods
  - Perform some (complex) operation
  - Act **on** an object

# Calling Methods: Syntax

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

A "dot" (.)

- Methods
  - Perform some (complex) operation
  - Act **on** an object

# Calling Methods: Syntax

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

The name of the method

- Methods
  - Perform some (complex) operation
  - Act **on** an object

# Calling Methods: Syntax

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

Parentheses, enclosing any parameters

- Methods
  - Perform some (complex) operation
  - Act **on** an object

# Calling Methods: Semantics

- Execution goes into the method
- Do whatever code is there
- The method returns an answer back
- Method call evaluates to that value
- Execution resumes after the method call

# Calling Methods: Semantics

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# Calling Methods: Semantics

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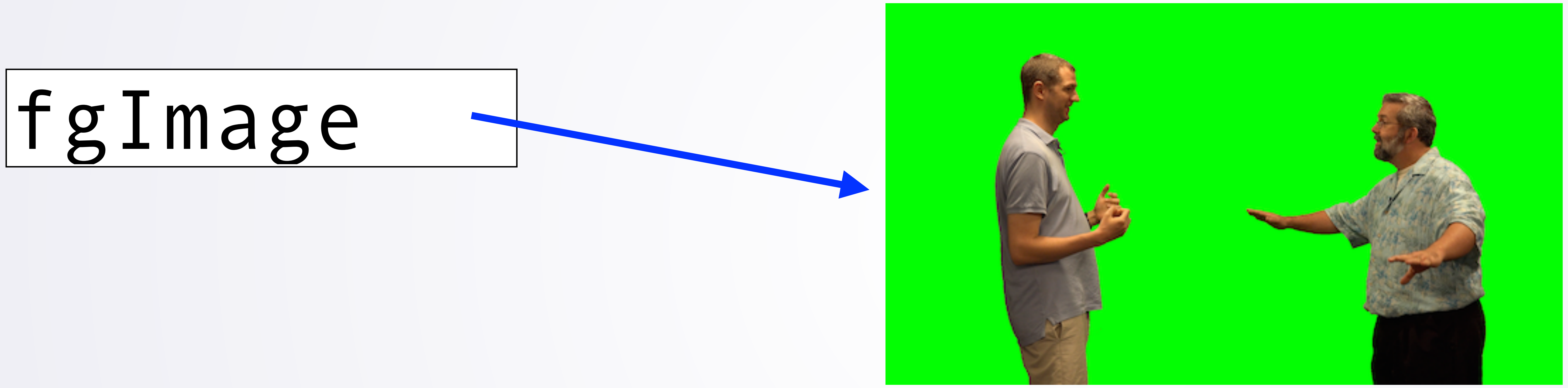
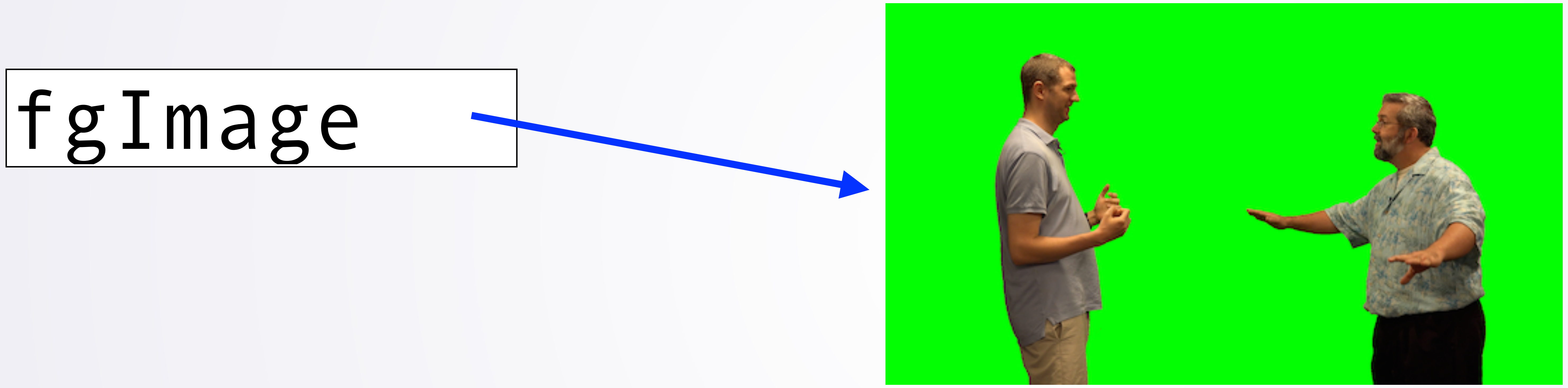


fgImage

# Calling Methods: Semantics

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

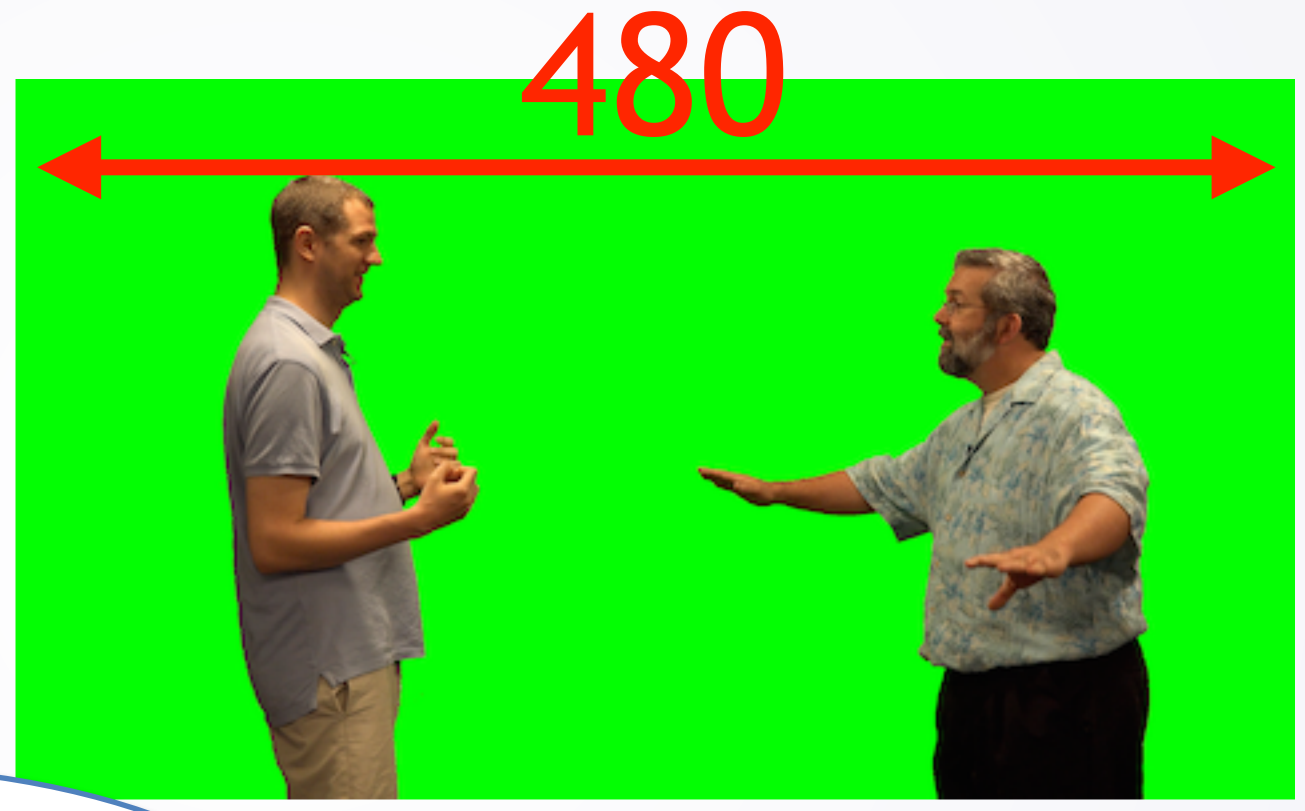


(Code for getWidth()
in DLTP Library)

# Calling Methods: Semantics

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

fgImage

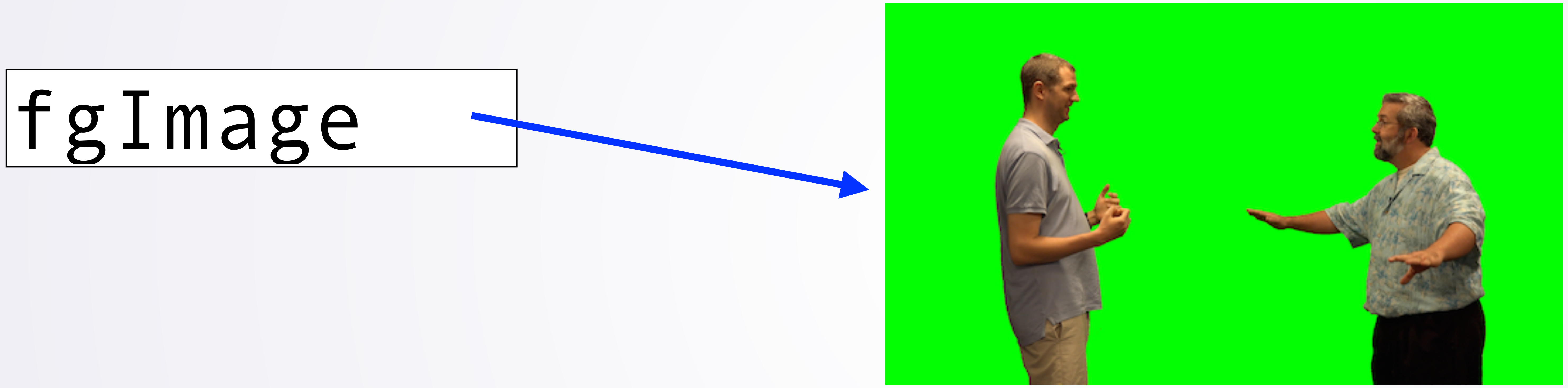


My answer is 480

(Code for getWidth() in DLTP Library)

# Calling Methods: Semantics

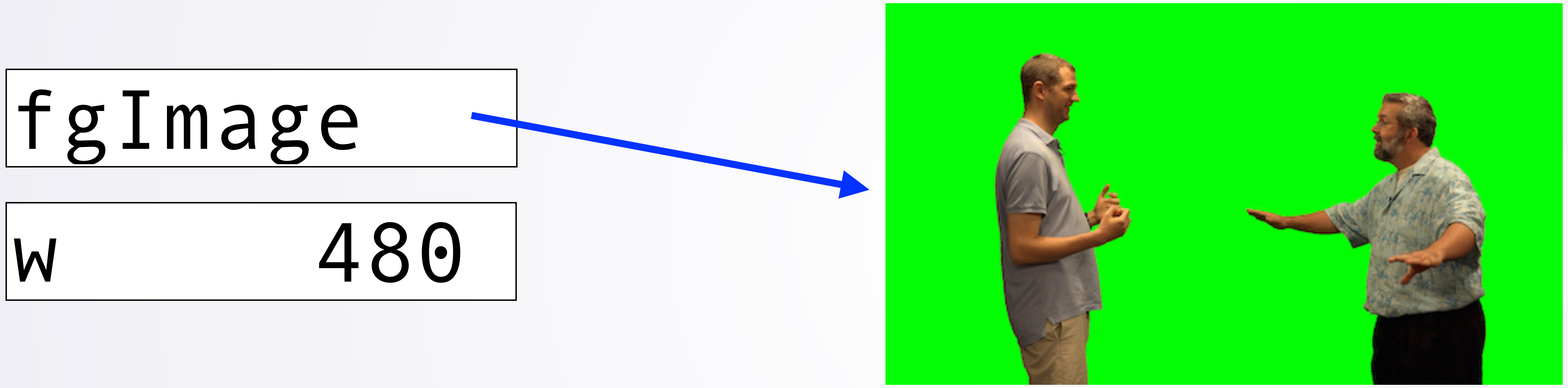
```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();  = 480
var h       = fgImage.getHeight();
```



fgImage

# Calling Methods: Semantics

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```



fgImage

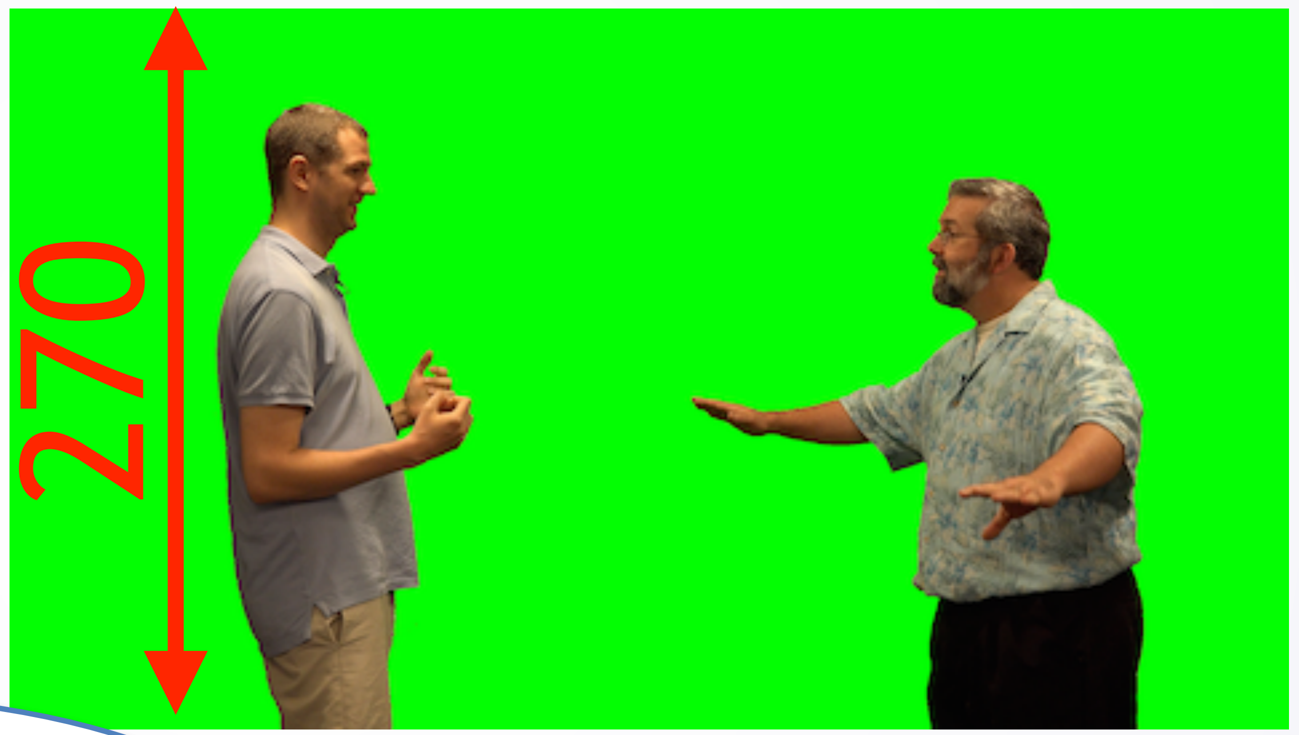
w 480

# Calling Methods: Semantics

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();  = 270
```

fgImage

w 480

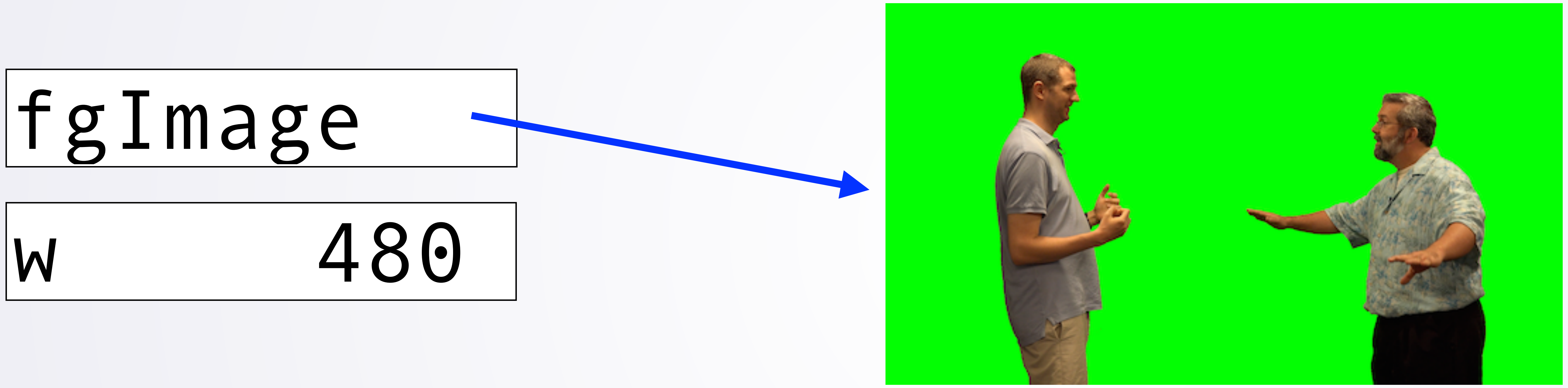


My answer is 270

(Code for getHeight() in DLTP Library)

# Calling Methods: Semantics

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();  = 270
```

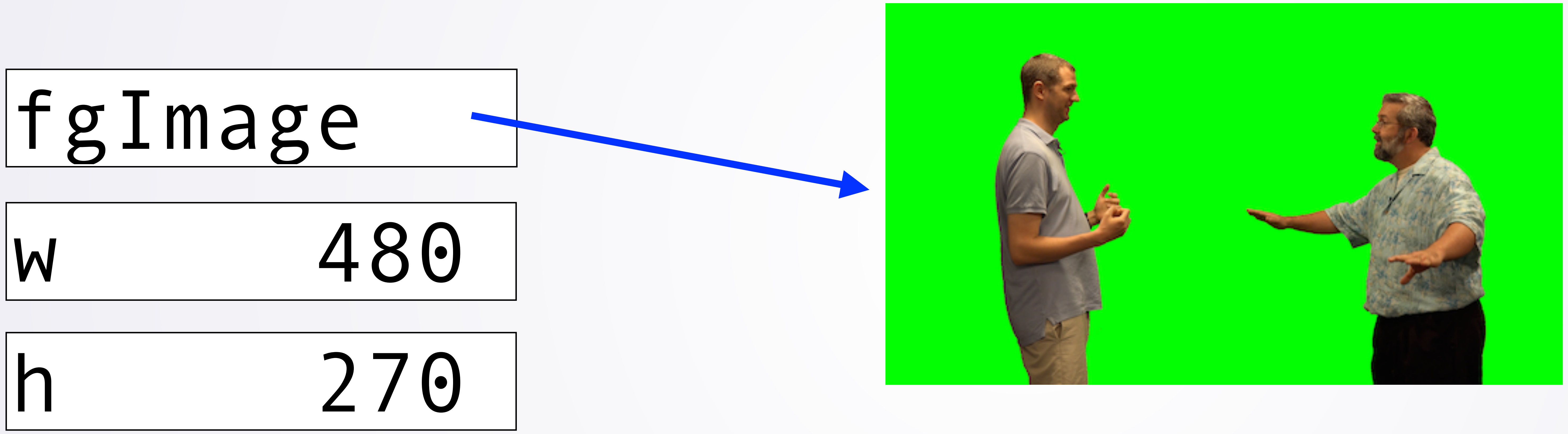


fgImage

w 480

# Calling Methods: Semantics

```
var fgImage = new SimpleImage("drewRobert.png");
var w       = fgImage.getWidth();
var h       = fgImage.getHeight();
```

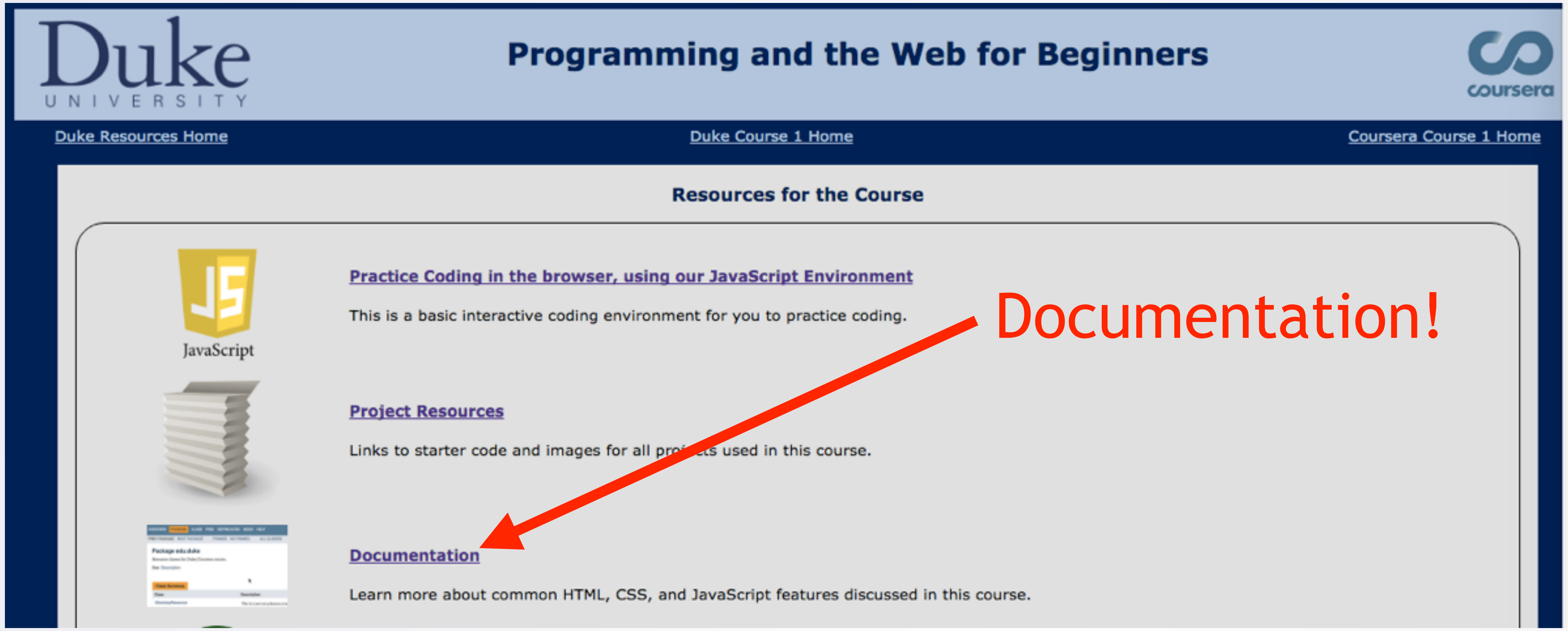


fgImage

w 480

h 270

# How Do You Know What a Method Does?



Programming and the Web for Beginners

Duke Resources Home | Duke Course 1 Home | Coursera Course 1 Home

Resources for the Course

Practice Coding in the browser, using our JavaScript Environment

This is a basic interactive coding environment for you to practice coding.

Project Resources

Links to starter code and images for all projects used in this course.

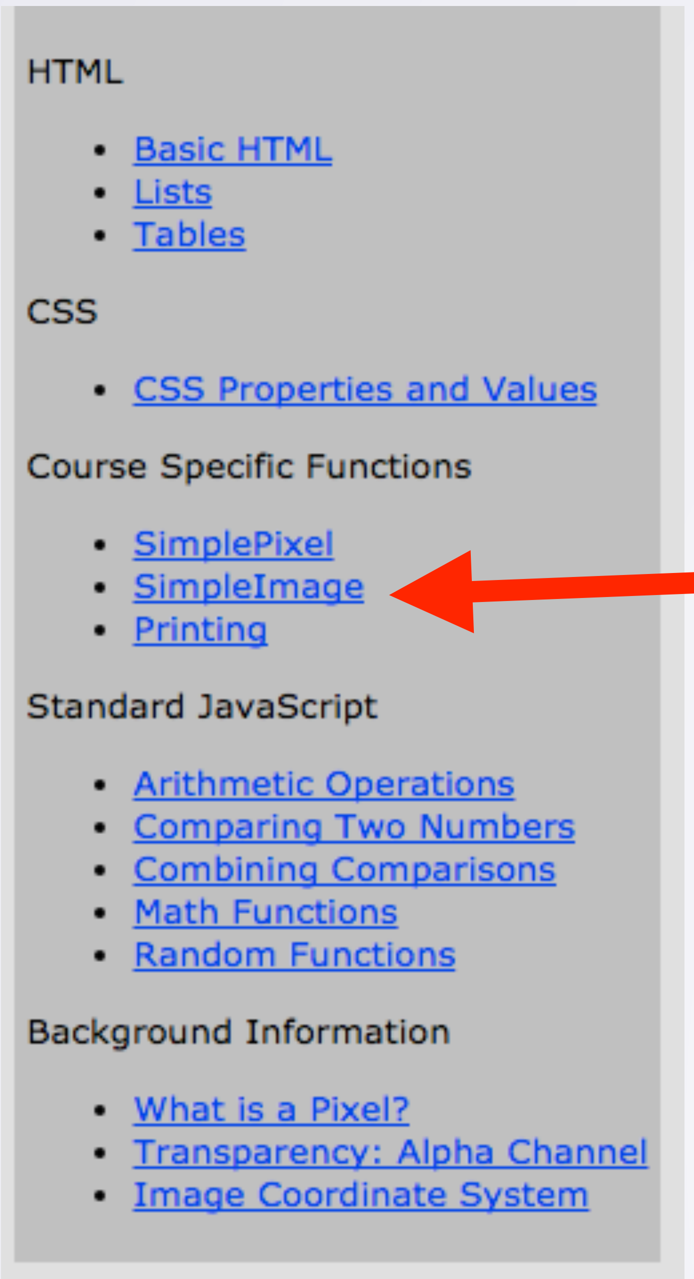
Documentation

Learn more about common HTML, CSS, and JavaScript features discussed in this course.

Documentation!

- If you have code: can see what it does
- If not, then…?
    - Documentation! Tells you what it does
    - For SimpleImage: on dukelearntoprogram.com

# How Do You Know What a Method Does?



HTML

- Basic HTML
- Lists
- Tables

CSS

- CSS Properties and Values

Course Specific Functions

- SimplePixel
- SimpleImage
- Printing

Standard JavaScript

- Arithmetic Operations
- Comparing Two Numbers
- Combining Comparisons
- Math Functions
- Random Functions

Background Information

- What is a Pixel?
- Transparency: Alpha Channel
- Image Coordinate System

SimpleImage

- If you have code: can see what it does
- If not, then…?
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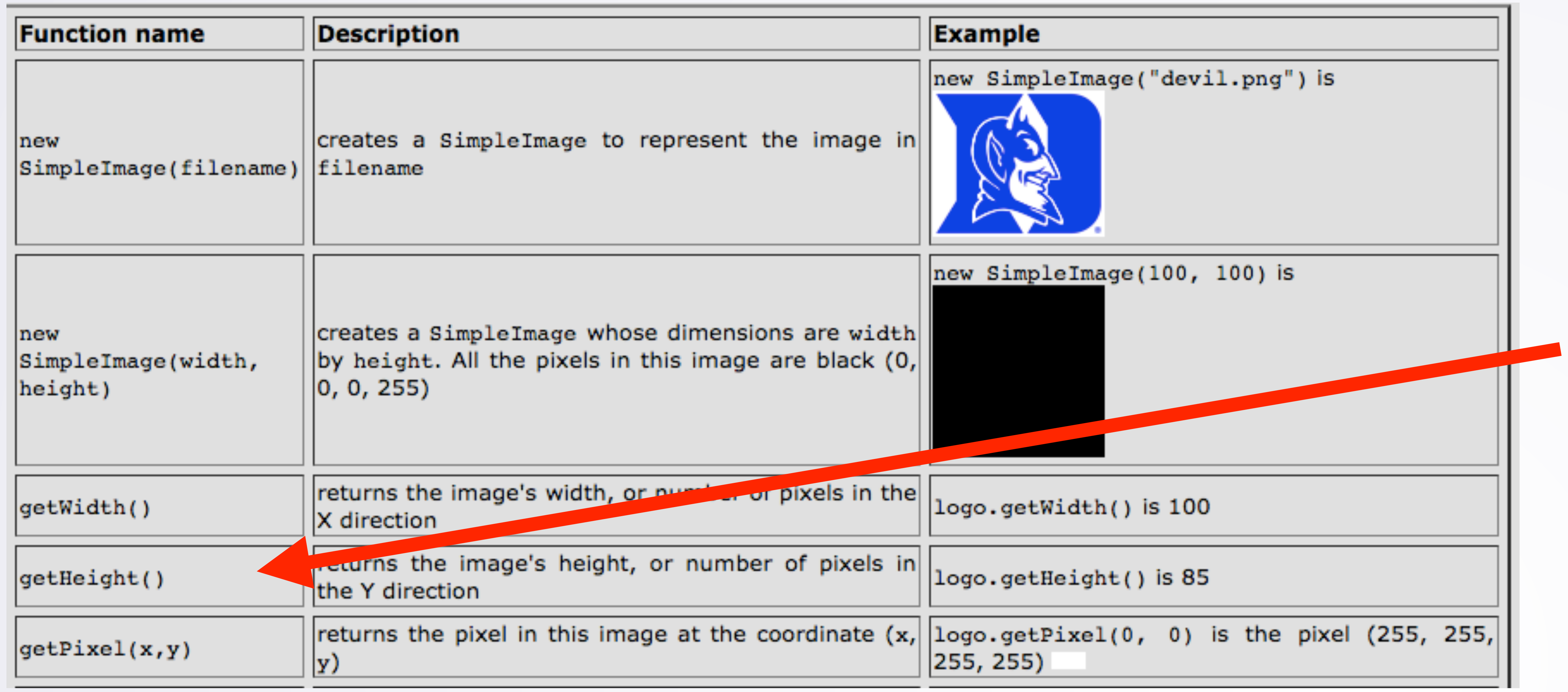
# How Do You Know What a Method Does?



| Function name | Description | Example |
|---|---|---|
| new SimpleImage(filename) | creates a SimpleImage to represent the image in filename | new SimpleImage("devil.png") is |
| new SimpleImage(width, height) | creates a SimpleImage whose dimensions are width by height. All the pixels in this image are black (0, 0, 0, 255) | new SimpleImage(100, 100) is |
| getWidth() | returns the image's width, or number of pixels in the X direction | logo.getWidth() is 100 |
| getHeight() | returns the image's height, or number of pixels in the Y direction | logo.getHeight() is 85 |
| getPixel(x,y) | returns the pixel in this image at the coordinate (x, y) | logo.getPixel(0, 0) is the pixel (255, 255, 255, 255) |

getHeight()

- If you have code: can see what it does
- If not, then…?
    - Documentation! Tells you what it does
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# Method: Invoked on an Object

```
var fgImage = new SimpleImage("drewRobert.png");
var dImage  = new SimpleImage("hilton.jpg");
var w       = fgImage.getWidth();
var w2      = dImage.getWidth();
```

# Method: Invoked on an Object

```
var fgImage = new SimpleImage("drewRobert.png");
var dImage  = new SimpleImage("hilton.jpg");
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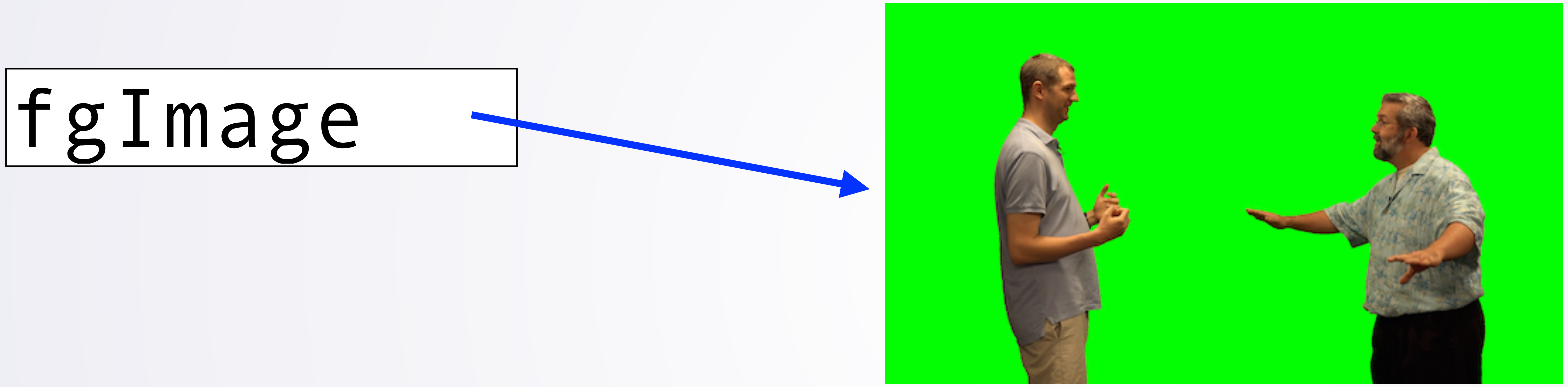

fgImage

# Method: Invoked on an Object

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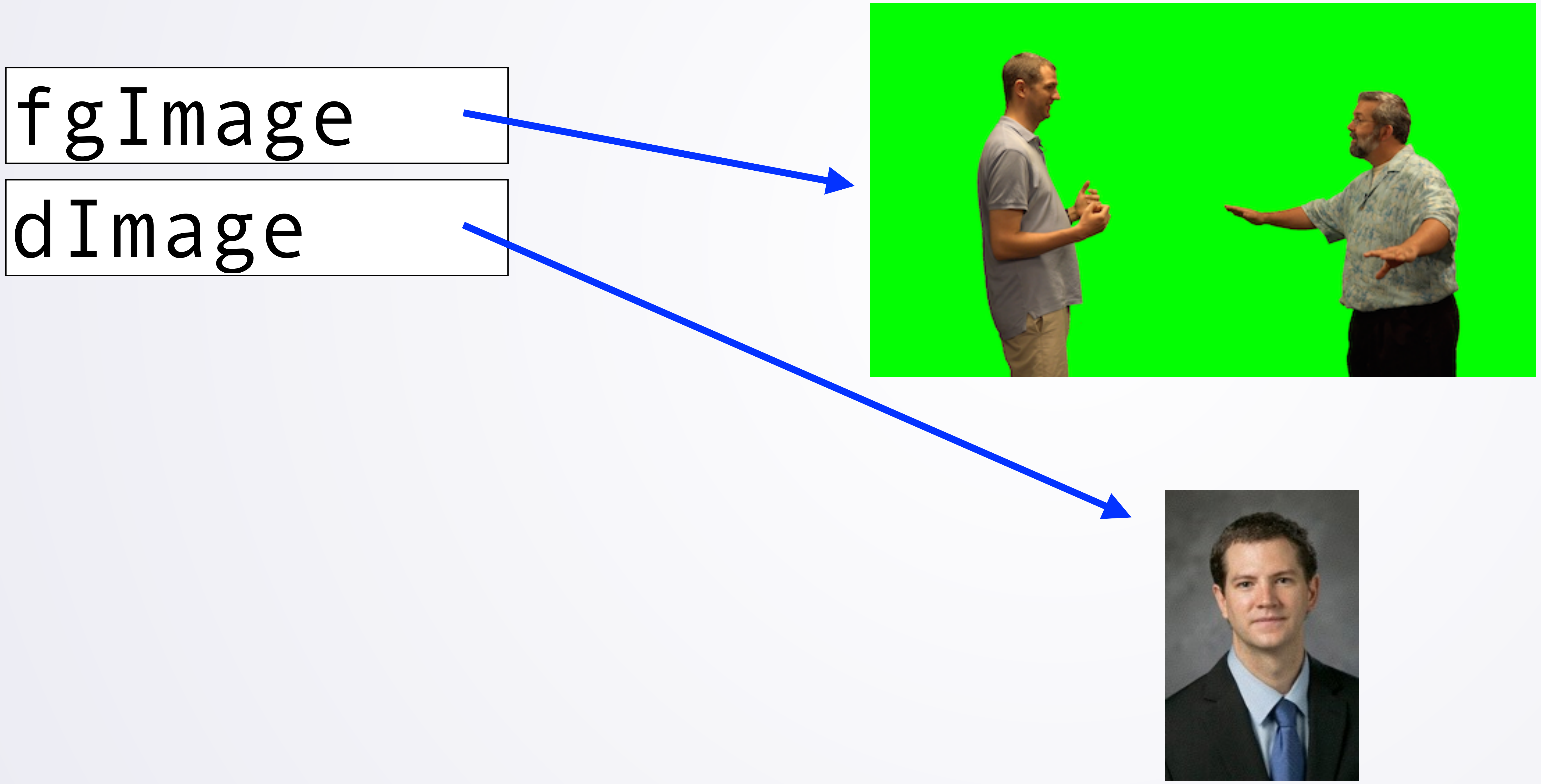

fgImage

dImage

# Method: Invoked on an Object

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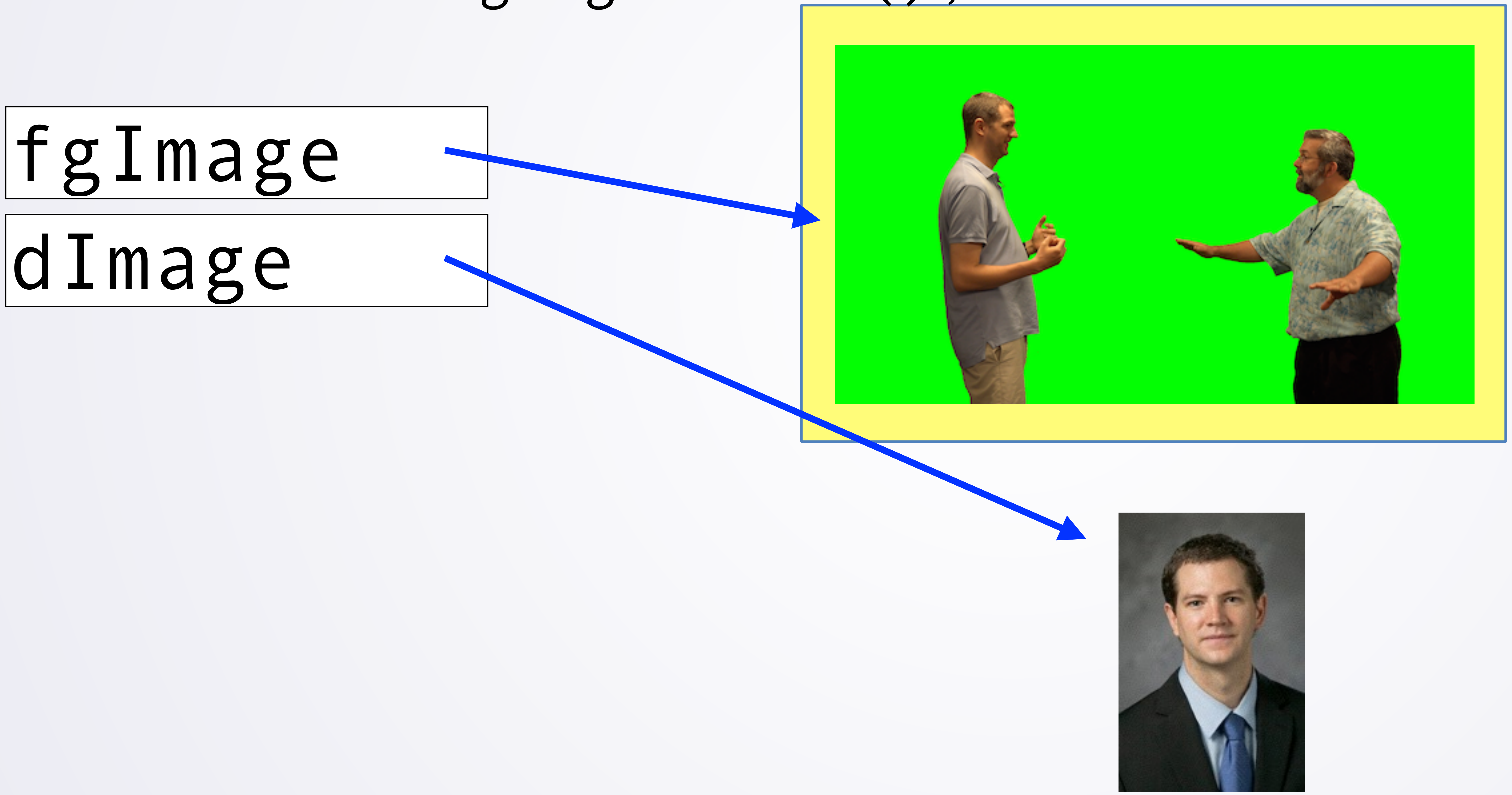

fgImage

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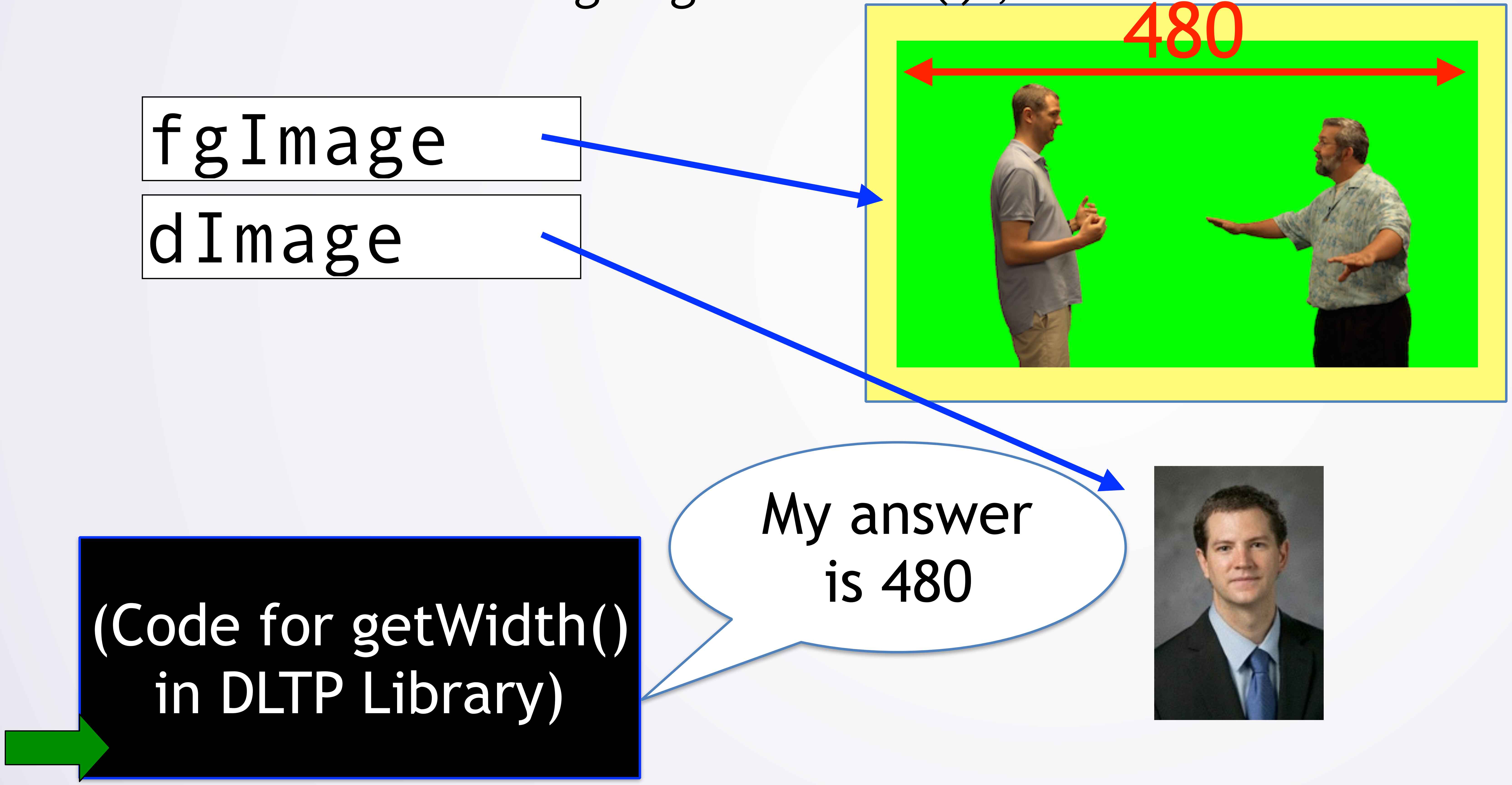


fgImage

dImage

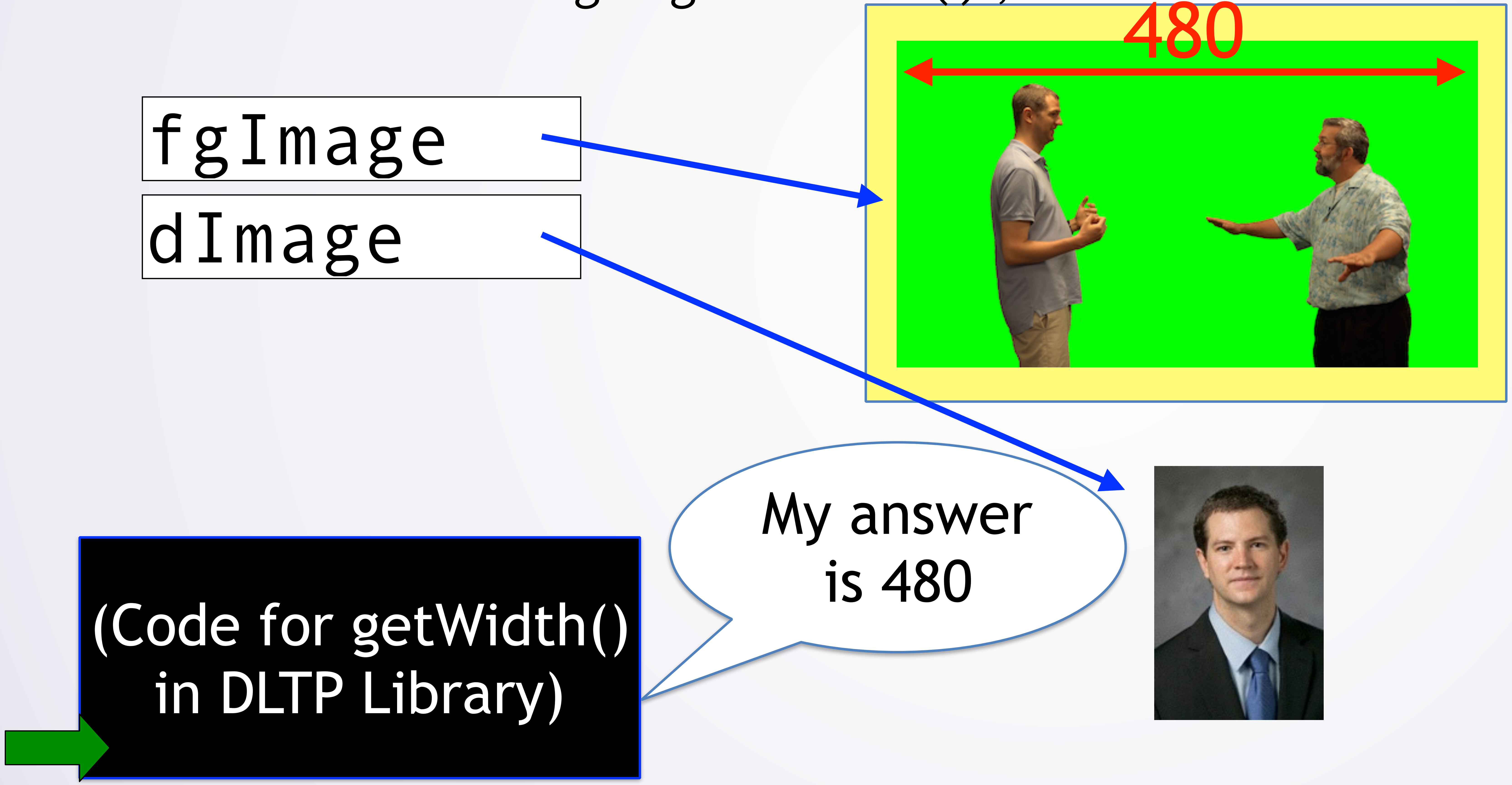
480

My answer is 480

(Code for getWidth() in DLTP Library)

# Method: Invoked on an Object

```
var fgImage = new SimpleImage("drewRobert.png");
var dImage  = new SimpleImage("hilton.jpg");
var w       = fgImage.getWidth(); = 480
var w2      = dImage.getWidth();
```



fgImage

dImage

My answer is 480

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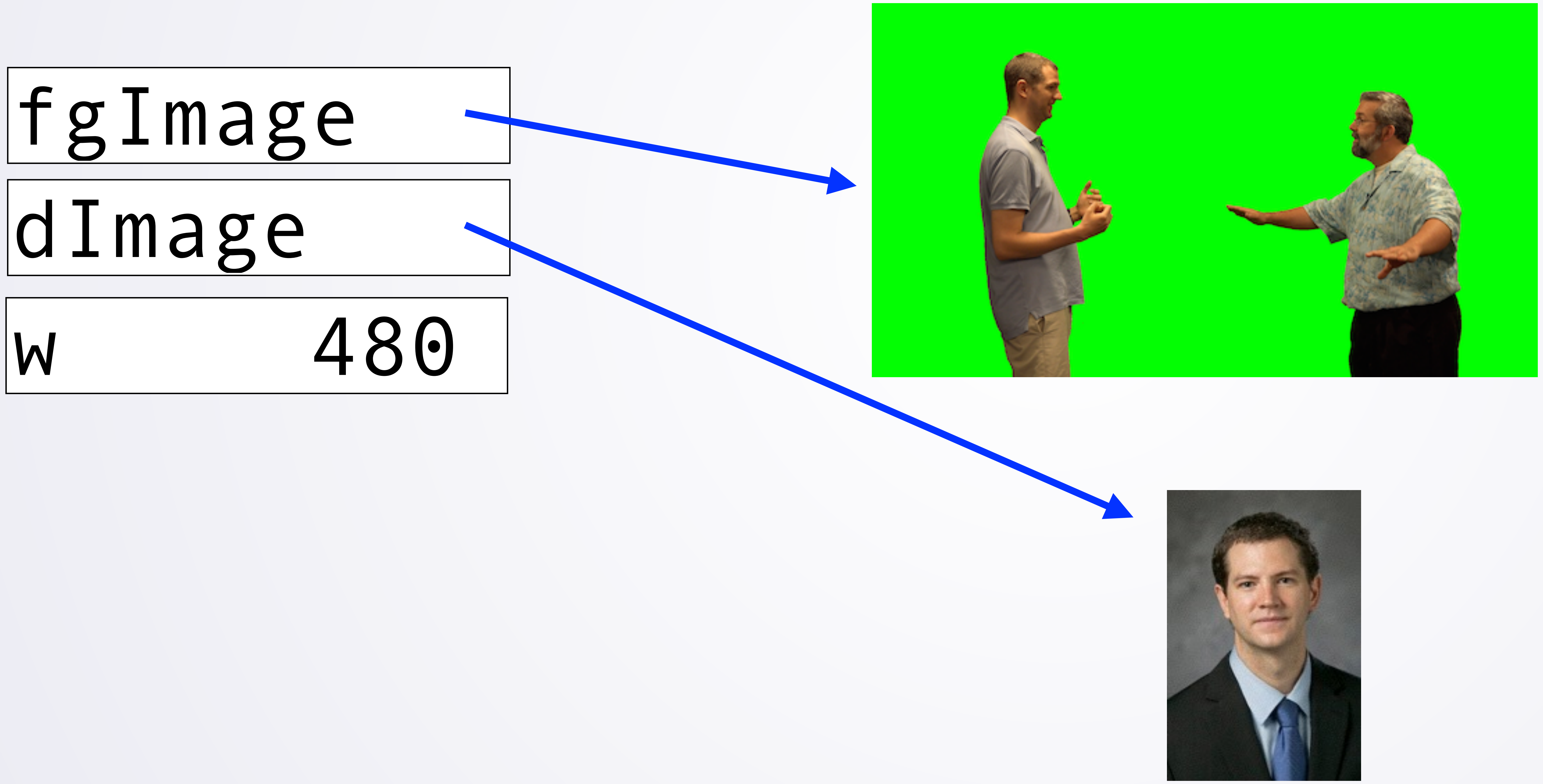

fgImage

dImage

w 480

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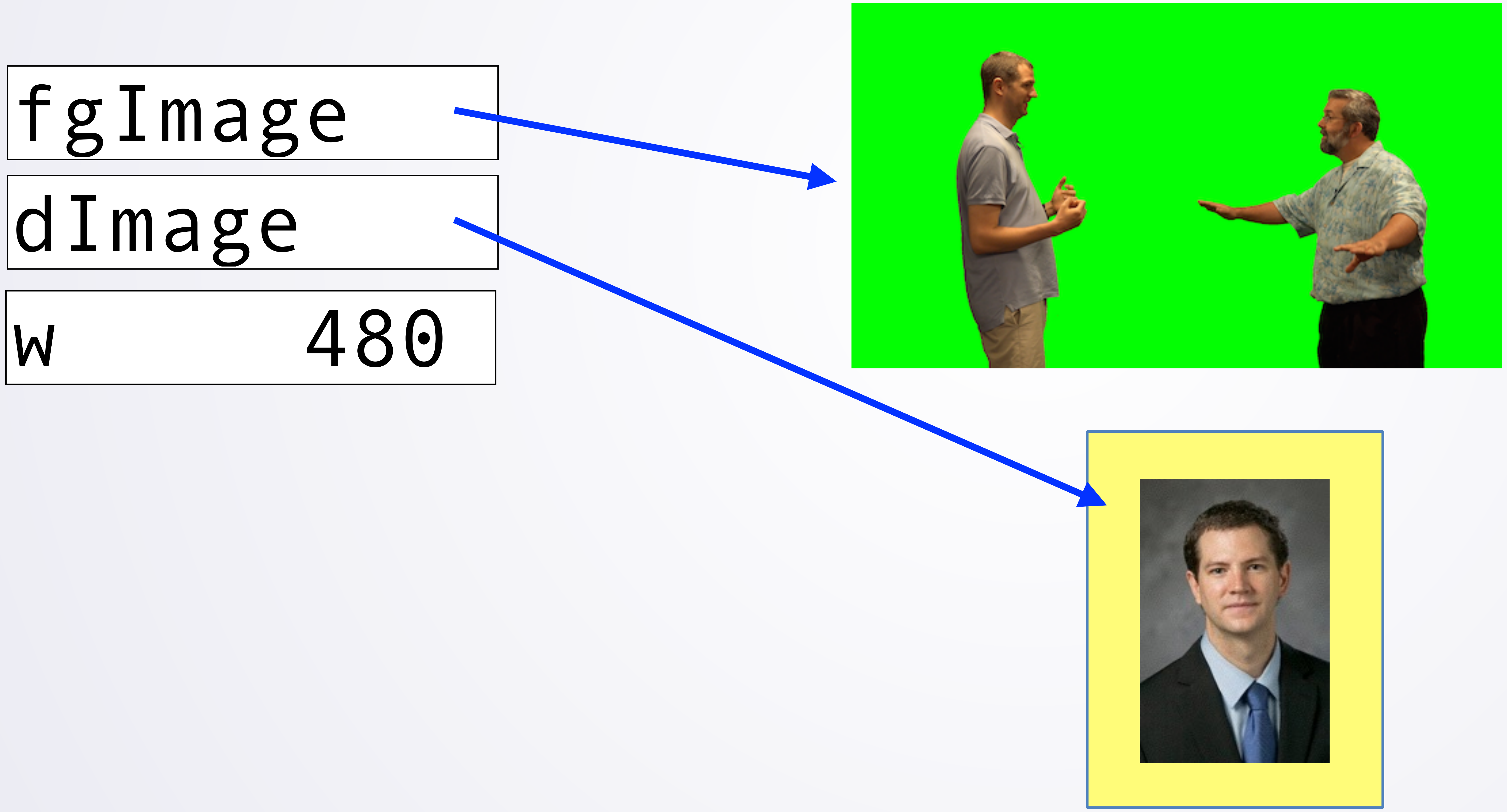


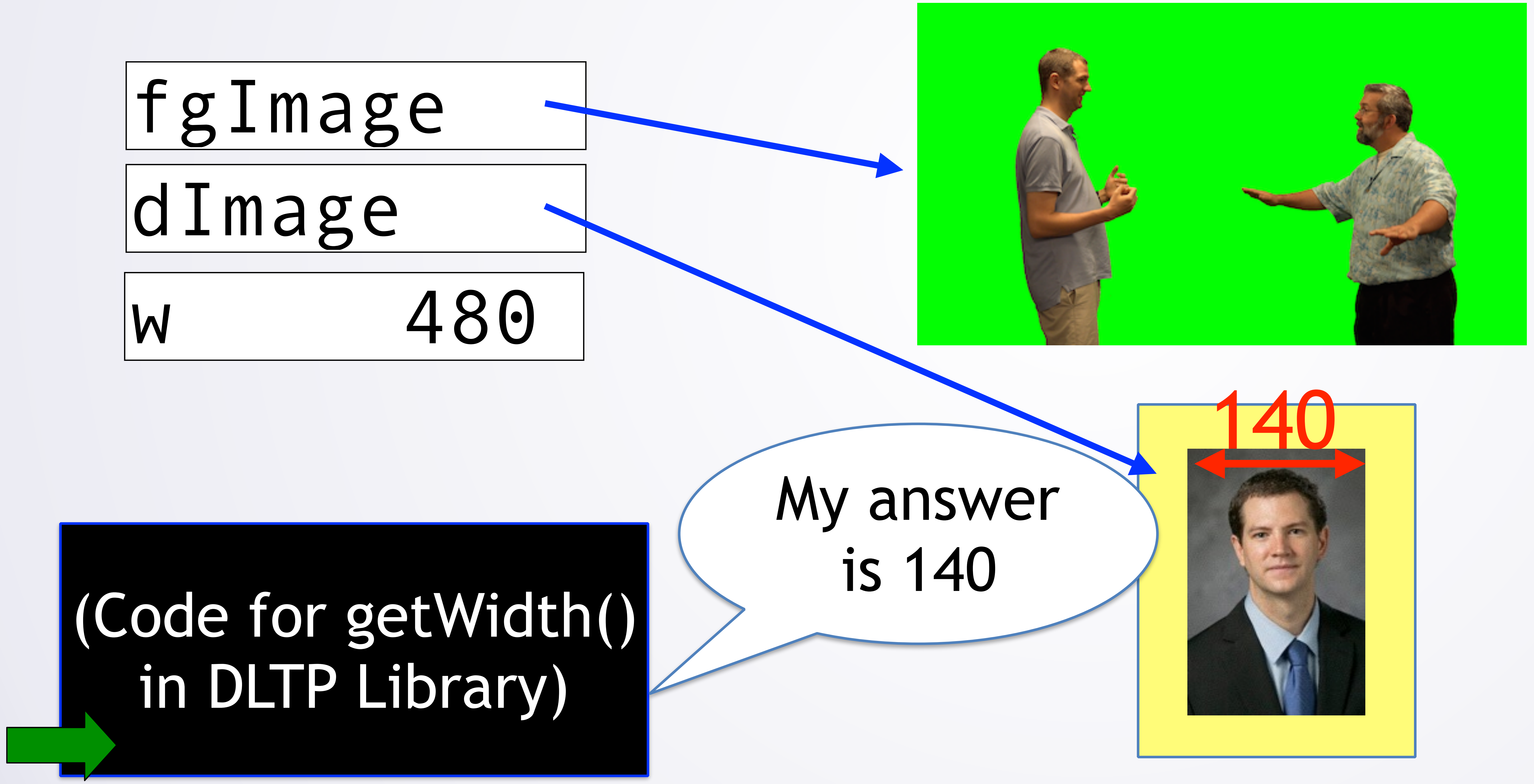
fgImage

dImage

w 480

# Method: Invoked on an Object

```
var fgImage = new SimpleImage("drewRobert.png");
var dImage  = new SimpleImage("hilton.jpg");
var w       = fgImage.getWidth();
var w2      = dImage.getWidth();  = 140
```



fgImage

dImage

w 480

My answer is 140

(Code for getWidth() in DLTP Library)

# Method: Invoked on an Object

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var fgImage = new SimpleImage("drewRobert.png");
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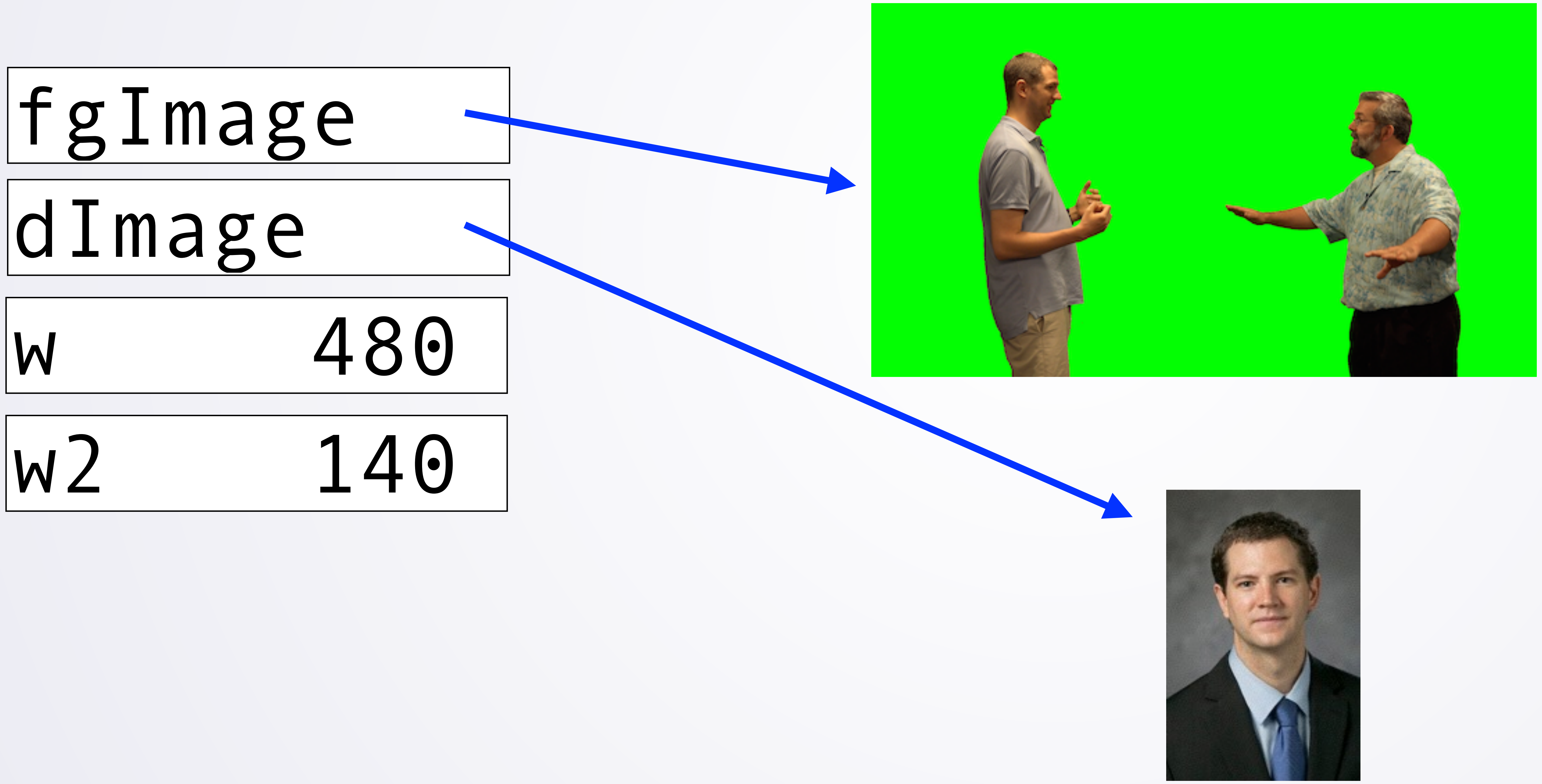

fgImage

dImage

w 480

w2 140

# Some Methods Have Parameters

```
var fgImage = new SimpleImage("drewRobert.png");

var pixel = fgImage.getPixel(0,0);
```

- Calls method `getPixel` on `fgImage`
  - What are the 0,0 in the parentheses?

# Some Methods Have Parameters

```
var fgImage = new SimpleImage("drewRobert.png");

var pixel = fgImage.getPixel(0,0);
```

???

- Calls method `getPixel` on `fgImage`
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# Some Methods Have Parameters

```
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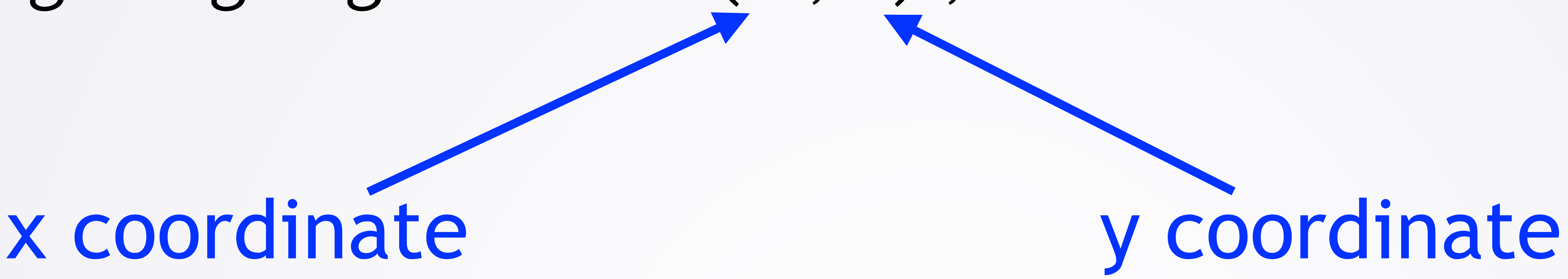

x coordinate

y coordinate

- Parameters
  - Specifics of what method should do
  - `getPixel`: which pixel to get, as (x,y)

# Summary

- Methods
  - Perform some (complex) operation
  - Act **on** an object
  - Can have parameters
  - Example: `fgImage.getWidth();`
- Functions
  - Similar to methods
  - Up next!