Functional JavaScript

Advanced JavaScript

JS

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tl;dr

- Functions can be created in three ways, function statements, function expressions and arrow functions.
- They can always receive any number of parameters; too few or too many
- Default parameters can help with too few
- The rest operator can help with too many

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There are three ways to declare functions

1. Function statement
2. Function expression
3. Arrow function

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1. Function statement

```
function func(p1, p2) {
  /* Do things with p1 and p2 here. */
  return anythingYouWant;
}
```

- Note: Function statements are always hoisted.

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Consider ...

```
var x = 5;
var x = 'a string';
var x = new Date();
var x = ['Walt','Jesse','Skyler'];
var x = {};
```

What do you call the things on the right?

Expressions!!

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JavaScript has a *function* expression

```
function (params) {
  body here
}
```

- Keyword function
- Name is optional
- Zero or more parameters
  - Bound by parentheses
  - Separated by commas
- Body
  - Bound by curly braces
  - Zero or more statements

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2. Function expression

```
const func = function (p1, p2) {
 /* Do things with p1 and p2 here. */
  return anythingYouWant;
}
```

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Functions are objects! You can ...

```
// Assign to a variable
var x = function () { doSomething() };
// Pass them as arguments
doSomethingElse(x);
// Return them from other functions
function foo() {
  return function () { doThings(); };
}
// Put them in arrays
var arrayOfFunctions = [ x, foo, foo() ];
// ... and more!!
```

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3. Arrow operator

```
func = (p1, p2) => {
  /* Do things with p1 and p2 here. */
  return anythingYouWant;
}
```

- Parentheses can be omitted if # of parameters is one
- Curly braces can be omitted if # of lines is one
  - If you do, the function implicitly returns the value of your one line

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For example ...

```
const square = (x) => {
  return x * x;
};
let y = square(4);
```

- or more succinctly ...

```
const square = x => x * x;
```

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- Parameters that are primitives (string, number, bool) are passed by value.
  - There is a copy made.
  - If you change the copy, it doesn't change in the outside world.
- Parameters that are reference variables (objects, arrays) are passed by reference.
  - If you change the copy, it does change in the outside world.

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Functions are variadic

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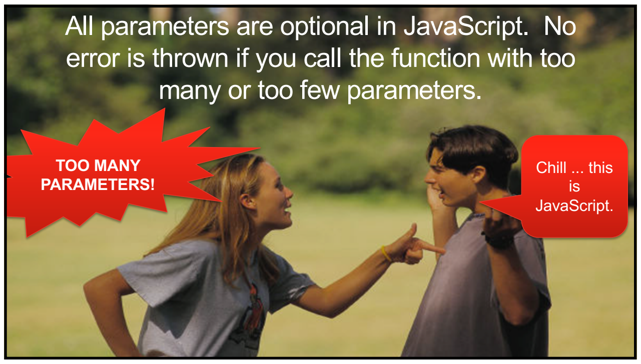
All parameters are optional in JavaScript. No error is thrown if you call the function with too many or too few parameters.
TOO MANY PARAMETERS!
Chill ... this is JavaScript.

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Rest parameters may help with too many arguments

```
function sum(x, y, ...nums) {
  let total = 0;
  nums.forEach(x => total += x);
  return total;
}
```

- In this example, nums is a real array.
- It's right there in the signature so other developers know what to expect.

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Default parameters may help with too few

- Just add default values in the function definition with an equal sign
- Syntax:

```
function (a="val1", b="val2" ...) { ... }
```

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Traditional way

```
function foo(first, last, age) {
  if (! first)
    first = "John";
  last = last || "Doe";
  age = age || getVotingAge();
  // Do stuff with first, last, and age here
}
```

- Note: if first is falsey in any way, it'll use "John".

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New way

```
function foo(first="John",
  last="Doe", age=getVotingAge()) {
  // Do stuff with first, last, and age here
}
```

- If you supply a value it'll be used. If not, the default value is.
- Allows you to pass in null, "", 0, or false as valid values and have them used.

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Some function theory

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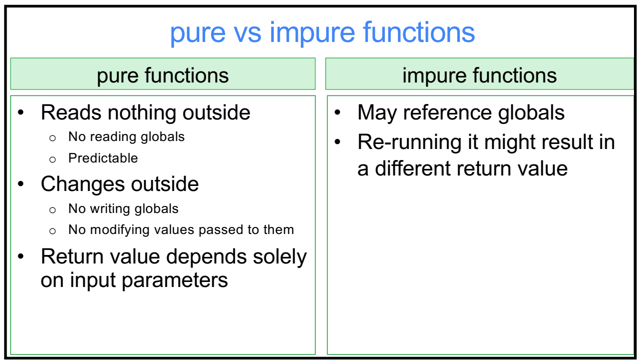

pure vs impure functions

pure functions	impure functions
• Reads nothing outside ○ No reading globals ○ Predictable • Changes outside ○ No writing globals ○ No modifying values passed to them • Return value depends solely on input parameters	• May reference globals • Re-running it might result in a different return value

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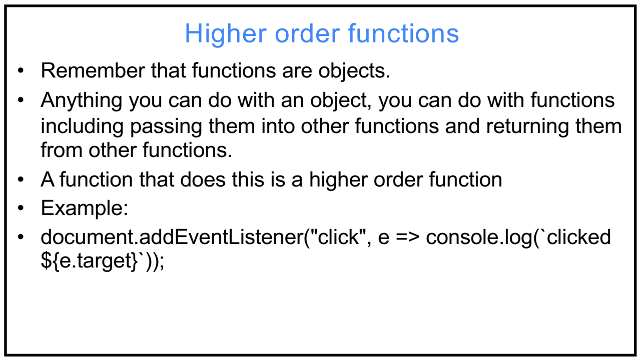

Higher order functions

- Remember that functions are objects.
- Anything you can do with an object, you can do with functions including passing them into other functions and returning them from other functions.
- A function that does this is a higher order function
- Example:
- document.addEventListener("click", e => console.log(`clicked ${e.target}`));

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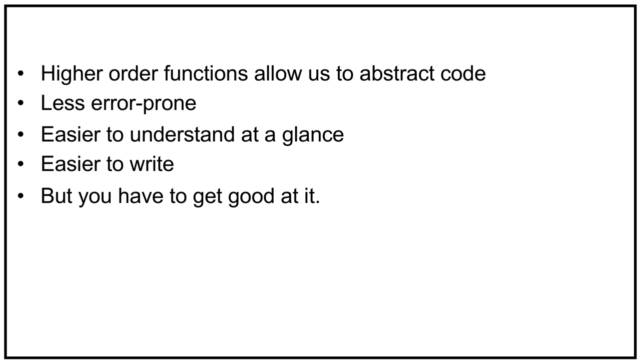

- Higher order functions allow us to abstract code
- Less error-prone
- Easier to understand at a glance
- Easier to write
- But you have to get good at it.

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utils.js

```
export getPeopleYoungerThan = age => {
 return fetch('/people')
  .then(res => res.json())
  .then(people => people.filter(p => p.age < age))
}
```

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store.js

```
import { createStore } from 'redux';

const reducer = (state,action) => ({
 ...mainReducer(state,action),
 person: personReducer(state.person,action),
 pic: picReducer(state.pic,action),
 addy: addyReducer(state.addy,action),
);
export default createStore(reducer, {});
```

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Currying

- Breaking complex functions into simpler ones that return a function.
- Basically allows you to turn f(a, b, c, d) into f(a)(b)(c)(d)
- The second has four smaller functions that are each simpler

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getTotal.js

```
export getTotal = cart => {
 let total = 0;
 for (row in cart) {
  total += row.qty * row.price;
 }
 return total;
}
```

getTotal.js

```
export getTotal = cart =>
 cart.reduce(row => row.qty * row.price, 0);
```

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loggingMiddleware.js

```
import { addEntry } from './logging';

export const loggingMiddleware =
 store => next => action =>
  addEntry(action.message)
```

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