

# JavaScript Testing 2019

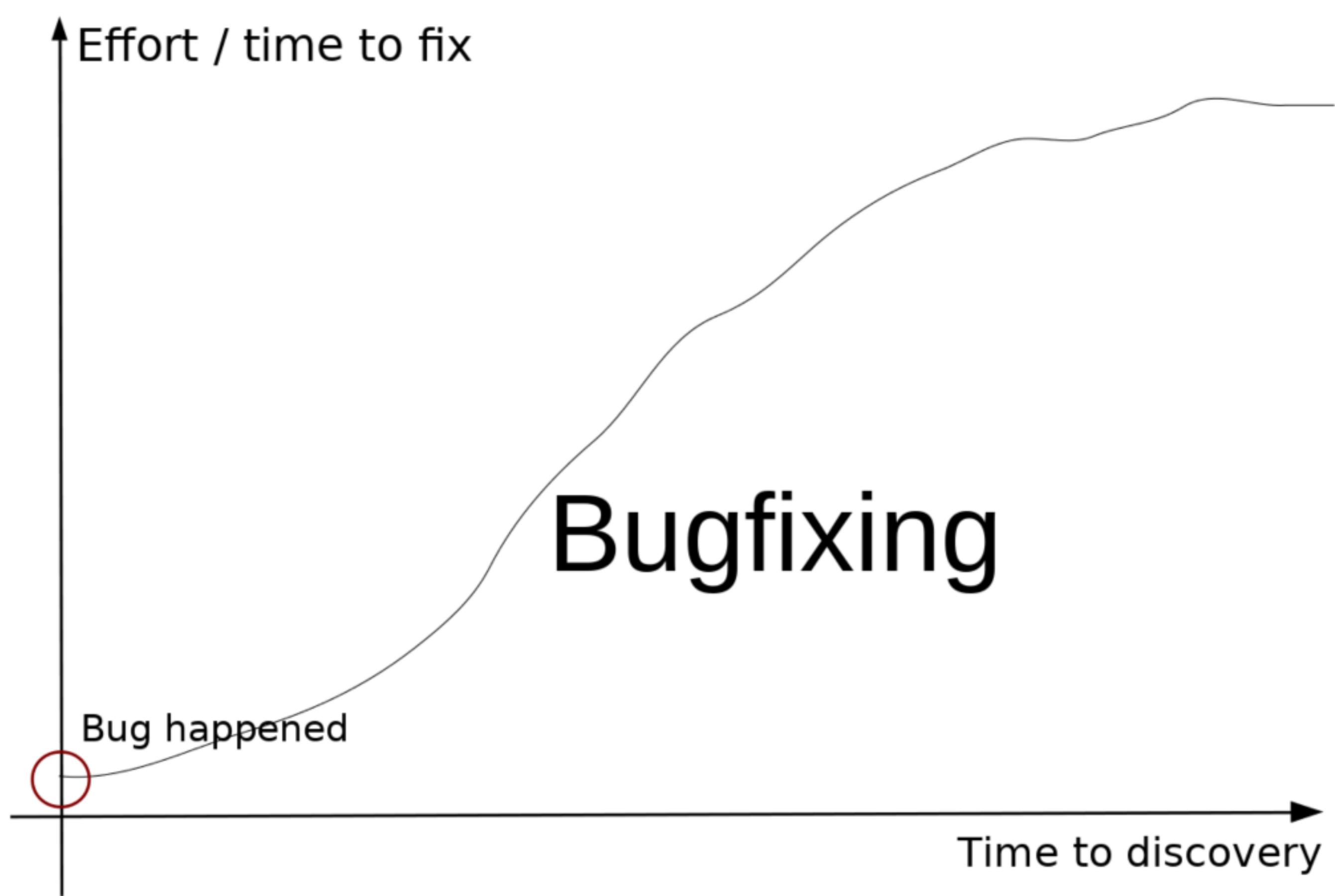
 codecentric

@MarcoEmrich

What is the most  
**time consuming activity**  
in programming?

- A** - New features
- B** - Refactoring
- C** - Hunt for bugs

- A - New features**
- B - Refactoring**
- C - Hunt for bugs**





SECRET  
OF  
TDD

QA?

# PRODUCTIVITY!



RESEARCH?

*The results [...] indicate that [...] the resulting quality was higher than teams that adopted a non-TDD approach by an order of at least **two times***

- *Evaluating the Efficacy of Test-Driven Development*  
Microsoft Research (2006)

*Test-first [...] did increase productivity probably because tests allow for better task understanding, better task focus, faster learning, and lower rework efforts*

— *On the Effectiveness of Test-first Approach to Programming*

Carnegie Mellon University (2005)

WHEN?

WHO?

1957

INVENTED



JOHN VON NEUMAN



1989



REDISCOVERED

KENT BECK

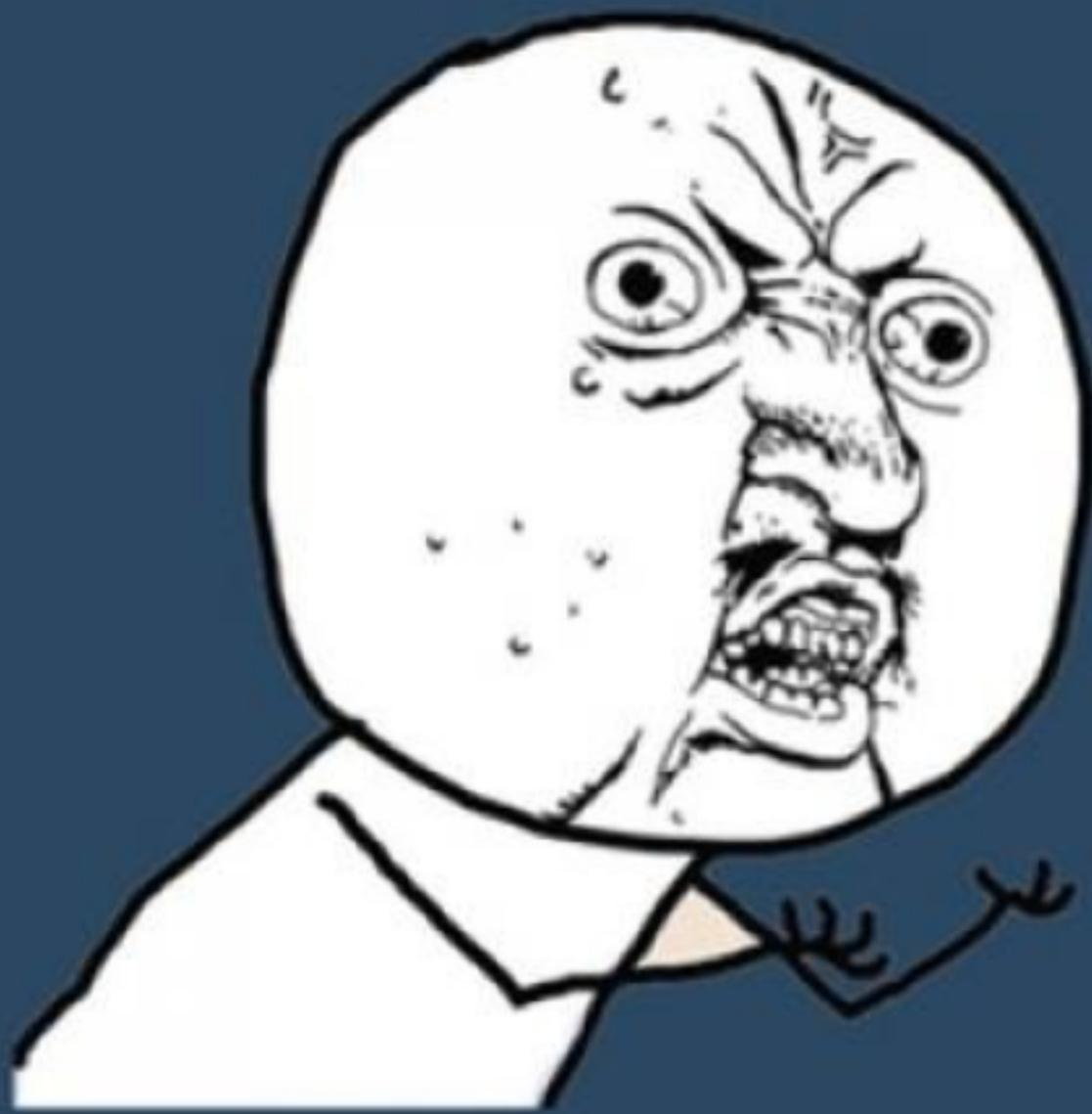
30 YEARS OF TDD

...OR 60 ?

FIRST JS TDD-  
FRAMEWORK?

# 2001 JSUNIT

**YUNO**

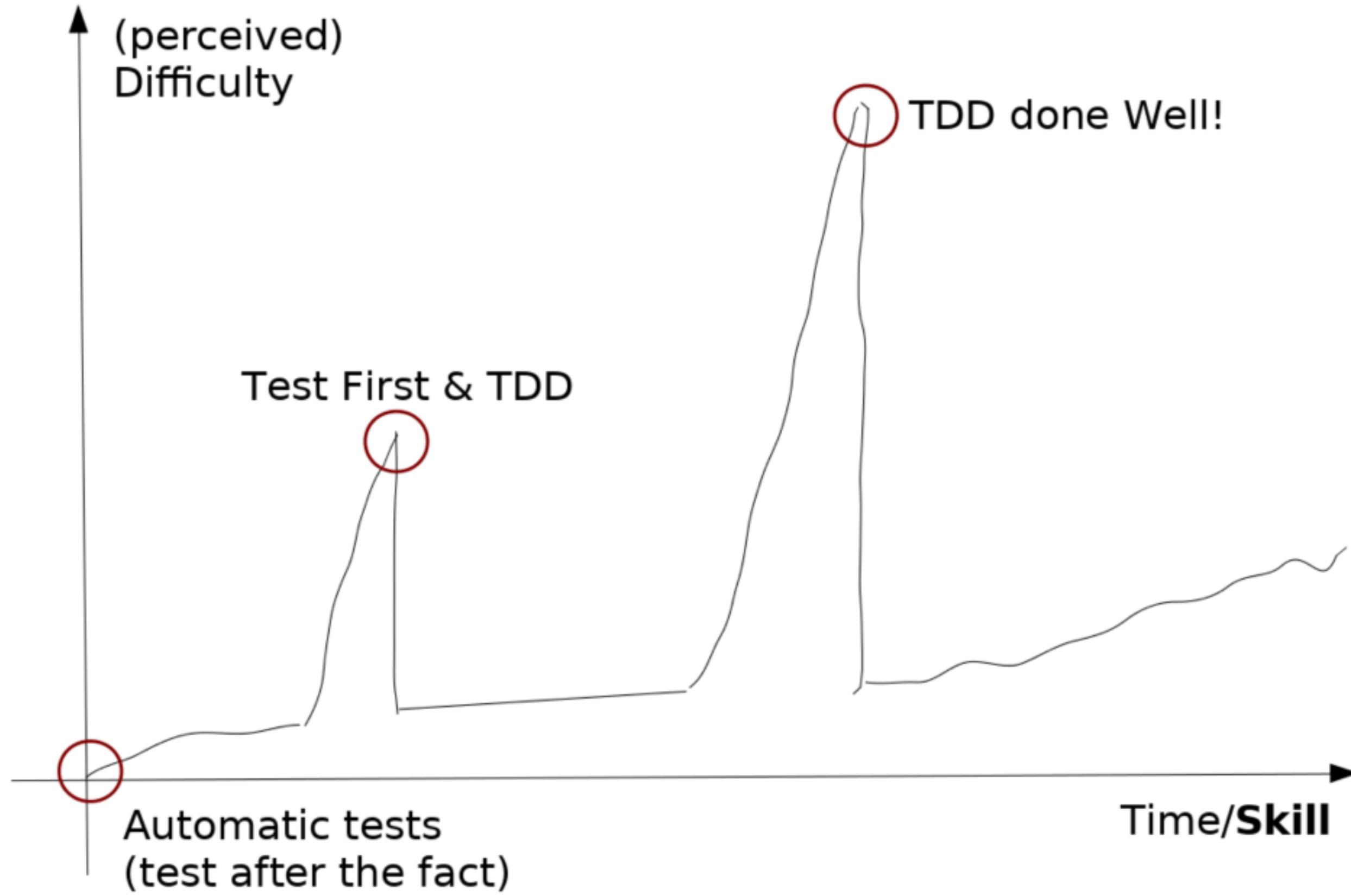


**TDD**











A woman with blonde hair tied up in a bun is lying face down on a red running track. She is wearing a black tank top and black shorts. Her arms are extended forward, and her head is resting on the track. In the background, there is a white wooden fence and several white and blue hurdles. The track has white lane lines.

SLOW  
HARD TO MAINTAIN

BUT WHY?



*TDD is not about Testing*  
— everywhere on the Internet

TDD == DESIGN

A still life photograph with a warm, golden-yellow tint. In the center is a vintage-style balance scale with two weights on the right pan and a small weight on the left. Behind the scale is a globe on a stand. To the left, there's a large, ornate book or map. The background is dark, making the objects stand out.

TESTS == SPECS

The background is a warm-toned still life photograph. It includes a globe with a detailed map of the world, a large, ornate oil lamp with a dark, textured base and a long neck, a stack of several thick, antique books with worn leather covers, and a quill pen resting on top of the books. The lighting is dramatic, casting deep shadows and highlighting the textures of the objects.

# LIVING DOCUMENTATION

# EXAMPLE

## LEAP YEAR

```
isLeapYear(2000); // => true
```

# A BAD TEST

```
testIsLeapYearIsCorrect()
```

from [Structure and Interpretation of Test Cases](#) by Kevlin Henney

# A SPEC DOCUMENT

- A year is a leap year if it is divisible by 4 but not by 100
- A year is a leap year if it is divisible by 400
- A year is NOT a leap year if it is not divisible by 4
- A year is NOT a leap year if it is divisible by 100 but not by 400

from [Structure and Interpretation of Test Cases](#) by Kevlin Henney

FLATTEN THE TDD  
LEARNING CURVE?

A close-up portrait of a smiling man with a beard and mustache, wearing a maroon cap and a striped shirt. He is looking directly at the camera against a dark background.

DAN  
NORTH

# BDD

## BEHAVIOUR DRIVEN DEVELOPMENT

2006 <https://dannorth.net/introducing-bdd>

# VOCABULARY

Specs describing behavior

# QUESTIONS

- Where to start?
- What should I (not) test?
- How to name the test?
- How can tests help me to locate bugs?

Ideas from

**BDD**

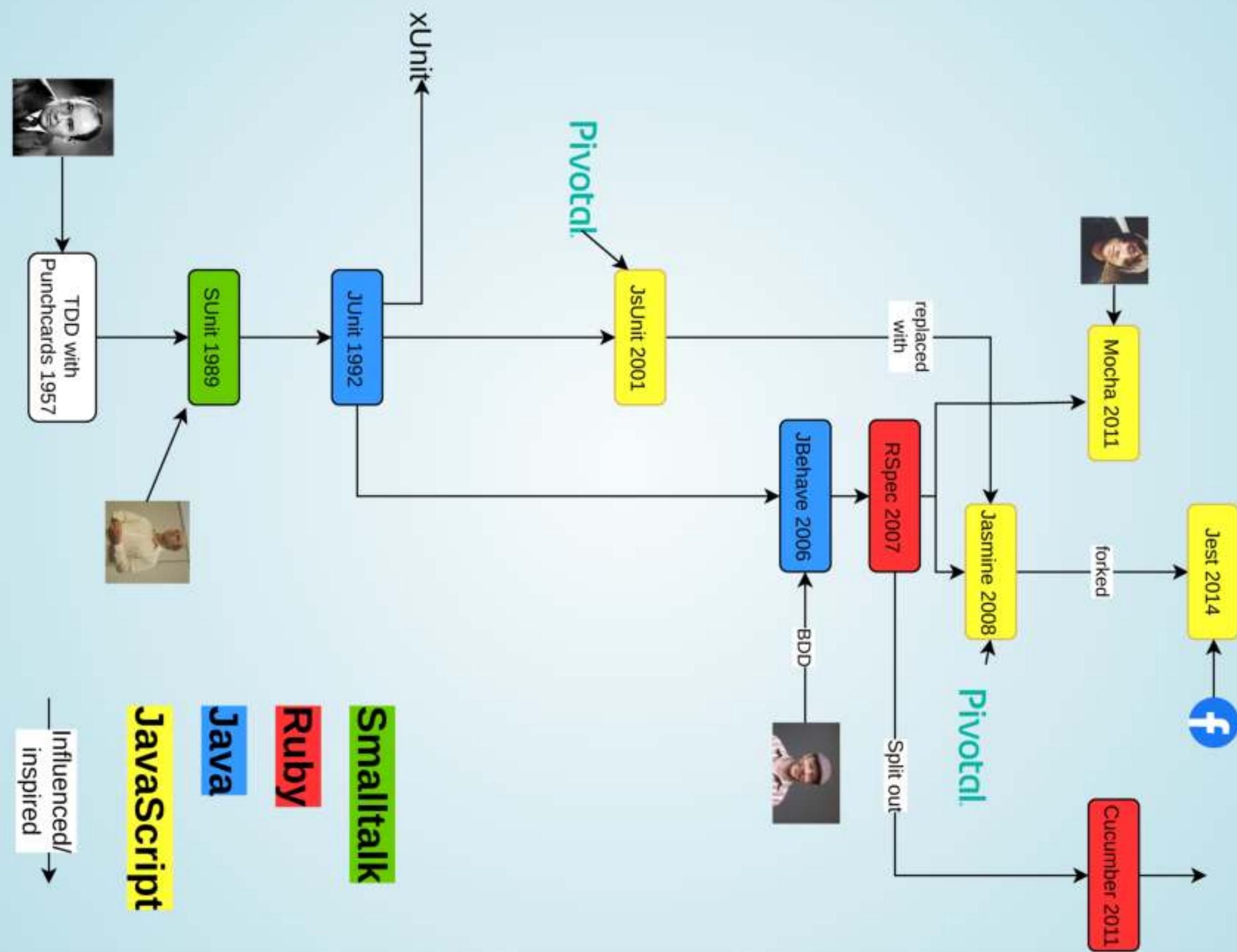


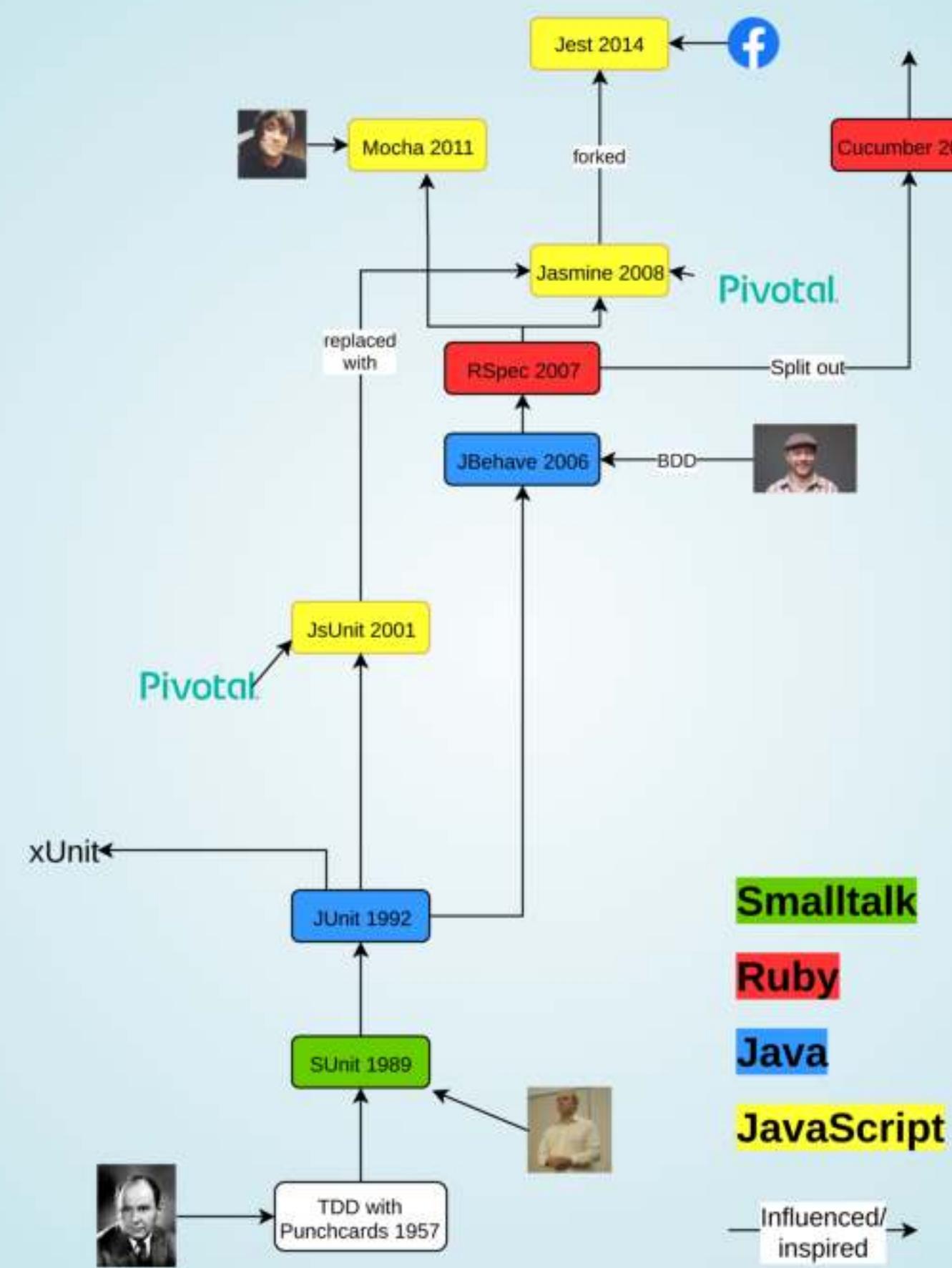
*BDD is TDD done right*

— J.B. Rainsberger

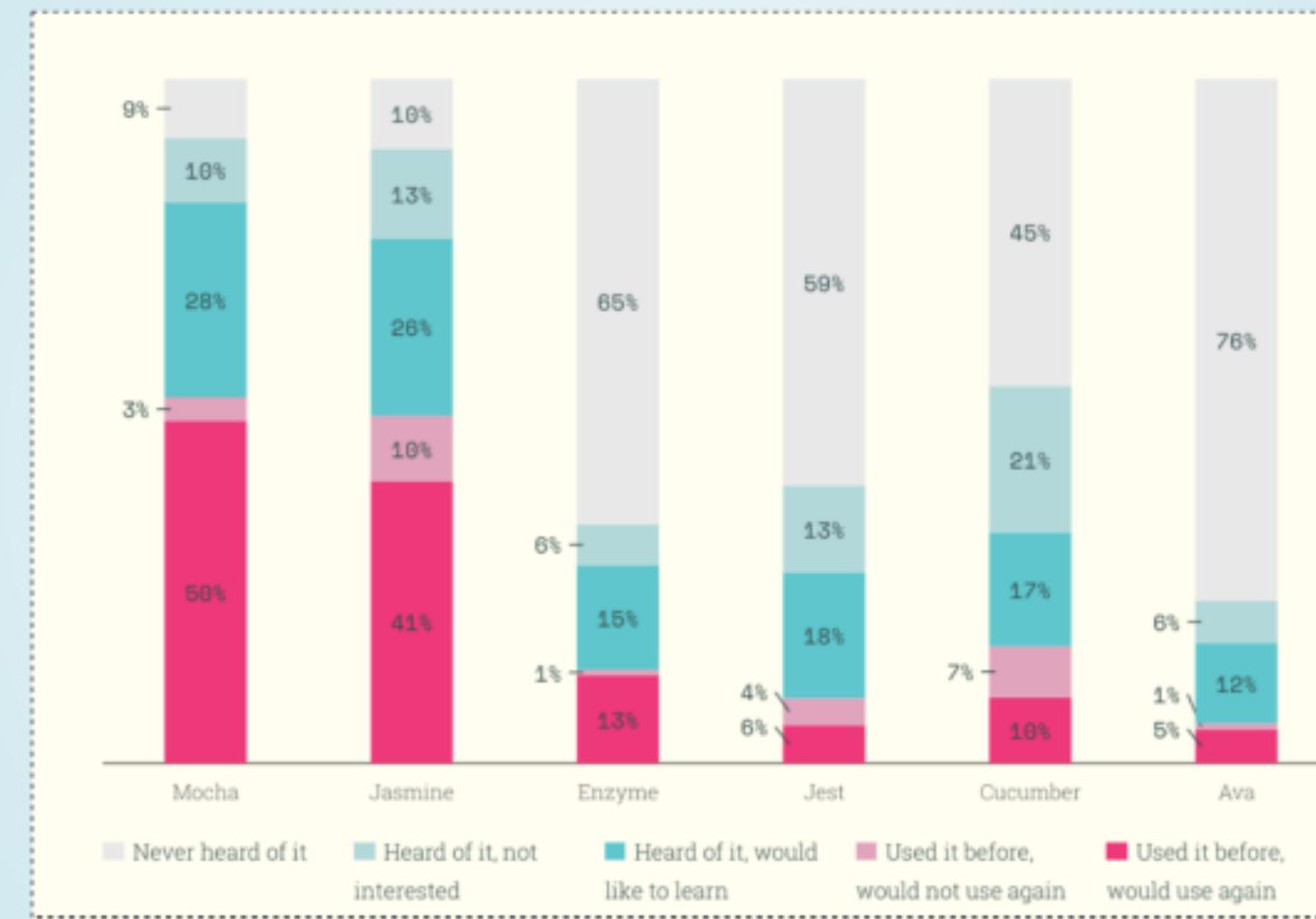
BDD-STYLE TDD  
TDD DONE RIGHT

modern JavaScript-Unit-Test-Frameworks  
are BDD Frameworks



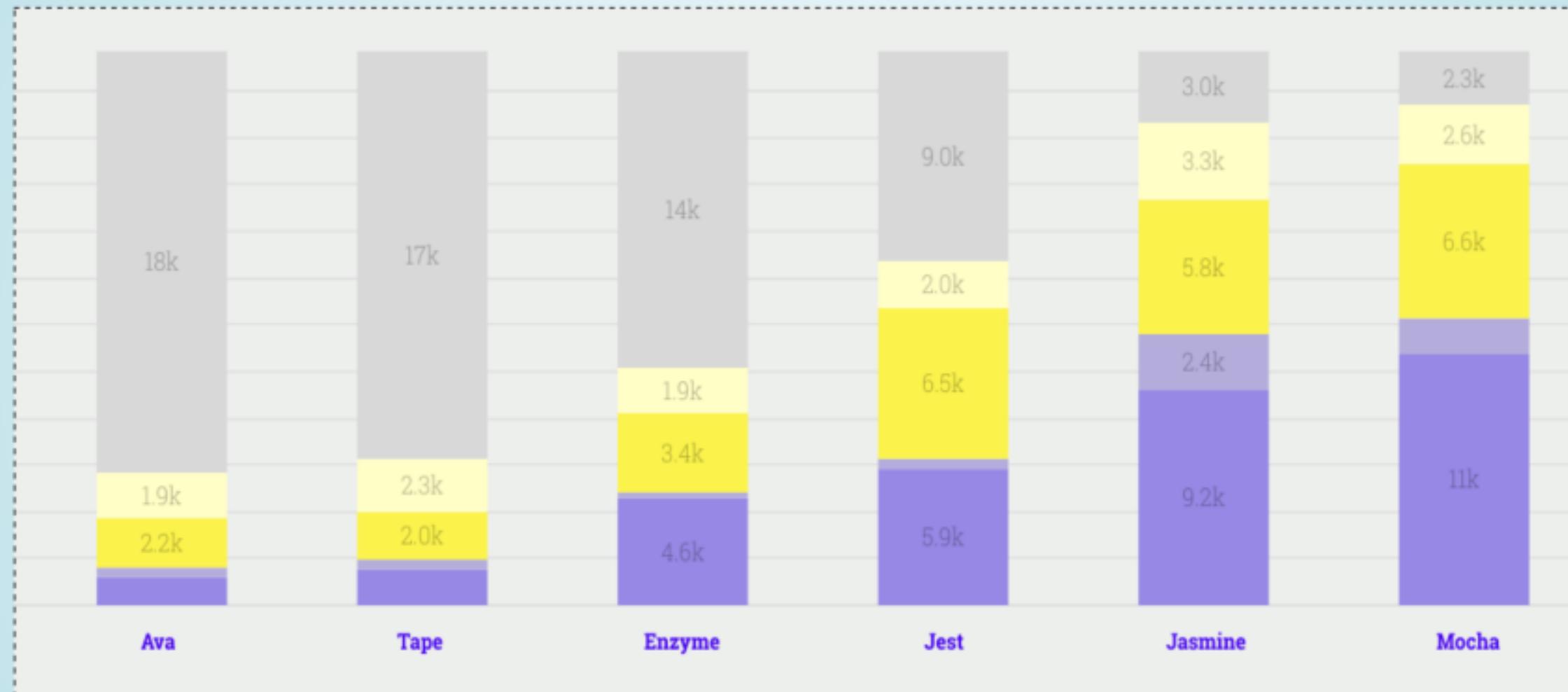


# STATE OF JS 2016



Jasmine: 41% - Mocha: 50% - Jest: 6%

# STATE OF JS 2017



Jasmine: 41% - Mocha: 49% - Jest: 25%

# STATE OF JS 2018



Jasmine: 29% - Mocha: 40% - Jest: 40%

# JS UNIT-TESTING 2019

- Mocha & Jest
- (Jasmine, Ava, Tape, ...)
- BDD family: describelt
- Autowatcher

MOCHA VS JEST  
LIGHTWEIGHT VS BATTERIES-INCLUDED



JEST

# STRING CALCULATOR

## KATA



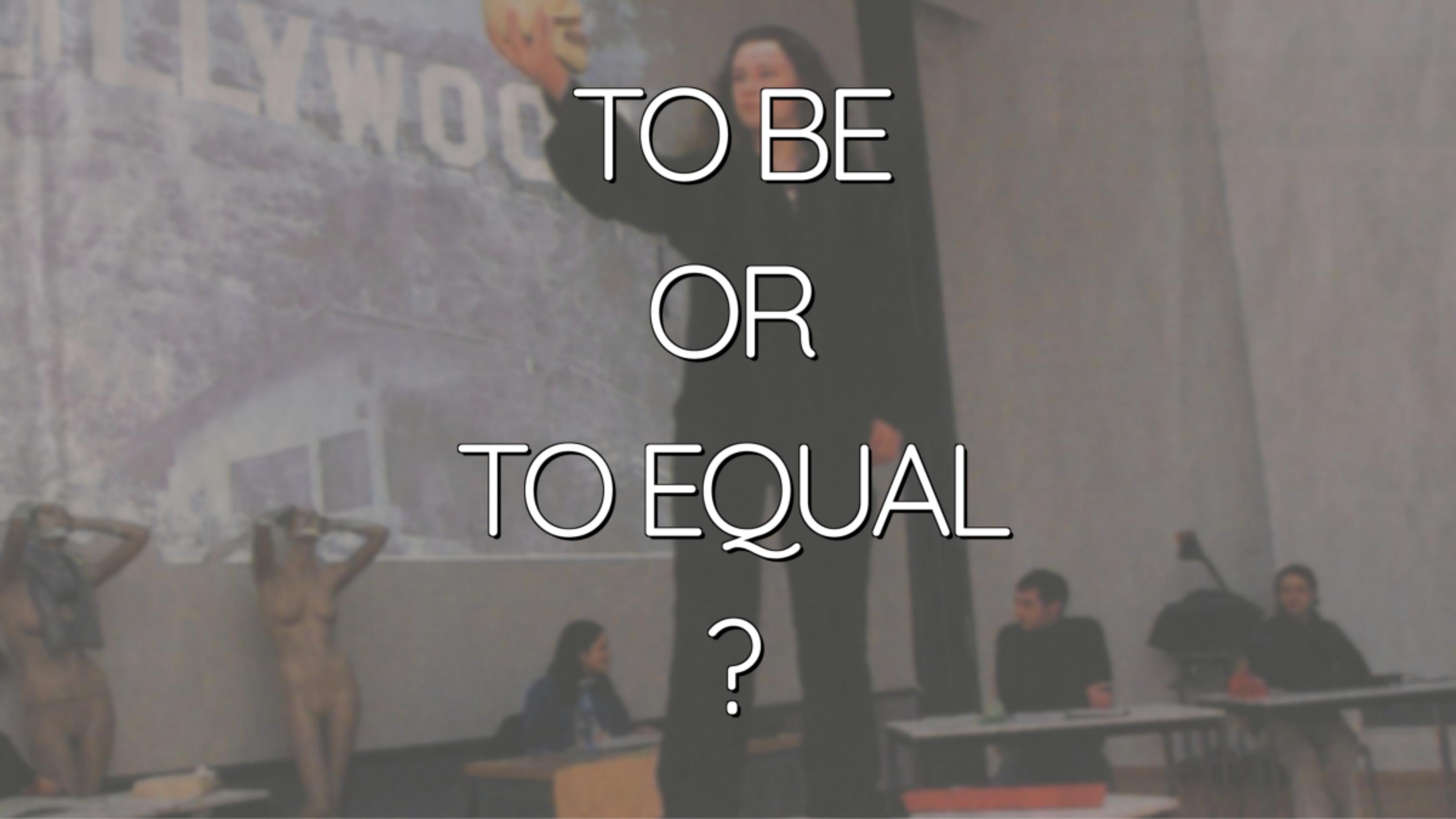
Roy Osherove

# STRING CALCULATOR

KATA

"1,2,3" => 6

=> DEMO: JEST 1,2

A classroom setting with several students at their desks in the foreground and middle ground. In the background, a teacher stands near a chalkboard that has "MANOR" written on it. The overall atmosphere is hazy and slightly dim.

TO BE  
OR  
TO EQUAL  
?

ASSERTIONS /  
EXPECTATIONS

```
const person1 = {
  name: "Schmidt",
  vorname: ["Stefanie", "Adelheit"]
}
const person2 = {
  name: "Schmidt",
  vorname: ["Stefanie", "Adelheit"]
}

expect( person1 ).toEqual( person2 ); // => true
expect( person1 ).toBe( person2 );   // => false
```

```
.toBe(value) / .toEqual(value) / .toStrictEqual(value)
.toBeCloseTo(number, numDigits?)
.toBeDefined() / .toBeUndefined()
.toBeInstanceOf(class)
.toBeNull() / .toBeNaN()
.toBeFalsy() / .toBeTruthy()
.toBeGreaterThan(number) / .toBeLessThan(number)

.toContain(item)
.toHaveLength(number)
.toHaveProperty(keyPath, value?)

.toMatch(regexOrString)
.toMatchObject(object)
.toThrow(error?)
```

```
.not  
.resolves  
.rejects
```

# ASSERTION FRAMEWORKS

- Chai, Must, Should,...
- Jest, jest-extended
- Unexpected
- PowerAssert
- HamJest

# ASSERTION FRAMEWORKS

=> Demo 3

# PARAMETERIZED TESTS

```
test.each(  
  [  
    [1, 1, 2],  
    [1, 2, 3],  
    [2, 1, 3]  
  ]  
)({  
  'add(%i, %i) => %i',  
  (a, b, expected) => {  
    expect(a + b).toBe(expected);  
  },  
});
```

# PARAMETERIZED TESTS

=> Demo 4

# TEST DOUBLES

- Dummies
- Stubs
- Fakes
- Mocks & Spies

# DOUBLES IN JEST

- jest.fn
- spyOn
- (native JS)

# DUMMIES, STUBS & FAKES IN JEST

- native JS
- mockReturnValue

# SPYS/MOCKS IN JEST

```
.toHaveBeenCalled()
.toHaveBeenCalledTimes(number)
.toHaveBeenCalledWith(arg1, arg2, ...)
.toHaveBeenCalledLastWith(arg1, arg2, ...)
.toHaveBeenCalledNthWith(nthCall, arg1, arg2, ...)
```

## toHaveBeenCalledTimes

```
test('drinkEach drinks each drink', () => {
  const drink = jest.fn();
  drinkEach(drink, ['lemon', 'octopus']);
  expect(drink).toHaveBeenCalledWith(2);
});
```

An aerial photograph of the London skyline during sunset. The sky is filled with warm orange and yellow hues. In the foreground, the River Thames flows from the bottom left towards the center, with the iconic Tower Bridge spanning it. To the right, the dense urban landscape of the City of London is visible, featuring numerous skyscrapers and modern buildings. In the far distance, the Canary Wharf business district is prominent. The overall scene captures the beauty of the city at dusk.

...LONDON SCHOOL  
OF TDD

# UNIT-TESTING THE UI

- JSDOM
- plain browser dom
- unexpected-dom
- unexpected-react
- Enzyme

# ENZYME FOR REACT

=> Demo

# MUTATION BASED TESTING

## STRYKER

DEMO: TICTACTOE

# END TO END

- Test-Pyramid
- Smoke-Tests
- NO MORE Selenium

## MODERN E2E/UI-TESTING FRAMEWORKS

- Cypress
- Puppeteer
- Test-Coffee

# CYPRESS

=> DEMO

# UNIT TESTING

- Domain: **Jest**
- UI: **Enzyme**

# IMAGE CREDITS

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# OTHER LINKS AND REFS

- TDD Origin: <https://arialdomartini.wordpress.com/2012/07/20/you-wont-believe-how-old-tdd-is>
- String Calculator by Roy Osherove: <http://osherove.com/tdd-kata-1/>
- Studies of TDD: <http://biblio.gdinwiddie.com/biblio/StudiesOfTestDrivenDevelopment>
- State of JS: <https://2018.stateofjs.com/testing/overview/>
- TJ. Holowaychuck: <https://medium.com/@kelas/how-is-tj-holowaychuk-so-insanely-productive-604818b4e9eb>

# Brown Paper Bag Lunches

 codecentric

<https://www.codecentric.de/leistungen/loesungen/brown-paper-bag-lunches>



# WORKSHOP

 codecentric

<https://www.codecentric.de/schulung/javascript-testing-2019>