

JavaScript: The World's Most Misunderstood Programming Language

The State of the Misunderstanding

“Another software technology will come along and kill off the Web, just as *it* killed News, Gopher, et al. And that judgment day will arrive very soon -- in the next two to three years”

George F. Colony

Chairman of the Board and CEO

Forrester Research, Inc. [2000]

2001

- **Name**
- **More in common with Scheme than Java**
- **Blunders**
- **Amateurs**
- **Books**
- **Standard**

The purpose of a programming language is to aid programmers in producing error-free programs.

Foot Guns

Brendan Eich

**Syntax is the least important
aspect of programming language
design.**

**Syntax is the least important
aspect of programming language
design.**

**Fashion is the least important
aspect of clothing design.**

Minimal Syntax

Lisp

(fname arg1 arg2)

Smalltalk 80

`object name1: arg1 name2: arg2`

```
// BCPL
```

```
IF A > B {  
    A := B  
}
```

```
/* B */
```

```
if (a > b) {  
    a = b;  
}
```

¢ Algol 68 ¢

if a > b then

 a := b

fi

"Smalltalk 80"

(a > b) ifTrue: [a := b]

Emotional Style

**Fashionable Tolerance
of Syntactic Ambiguity**

a  b  c

((a  b)  c)

(a  (b  c))

Binding Power

10	=	+=	-=			
20	?					
40	&&					
50	===	<	>	<=	>=	!==
60	+	-				
70	*	/				
80	<i>unary</i>					
90	.	[(

word

variable?

statement keyword?

operator?

special form?

()

Function definition and invocation

Grouping

Separation

A Bug Story

```
private int index;
```

int

- **Overflow and wraparound**
- **Complement: saving gates in subtraction**
- **Memory used to be really expensive and scarce**

Number types

Java:

byte short int long float double

JavaScript:

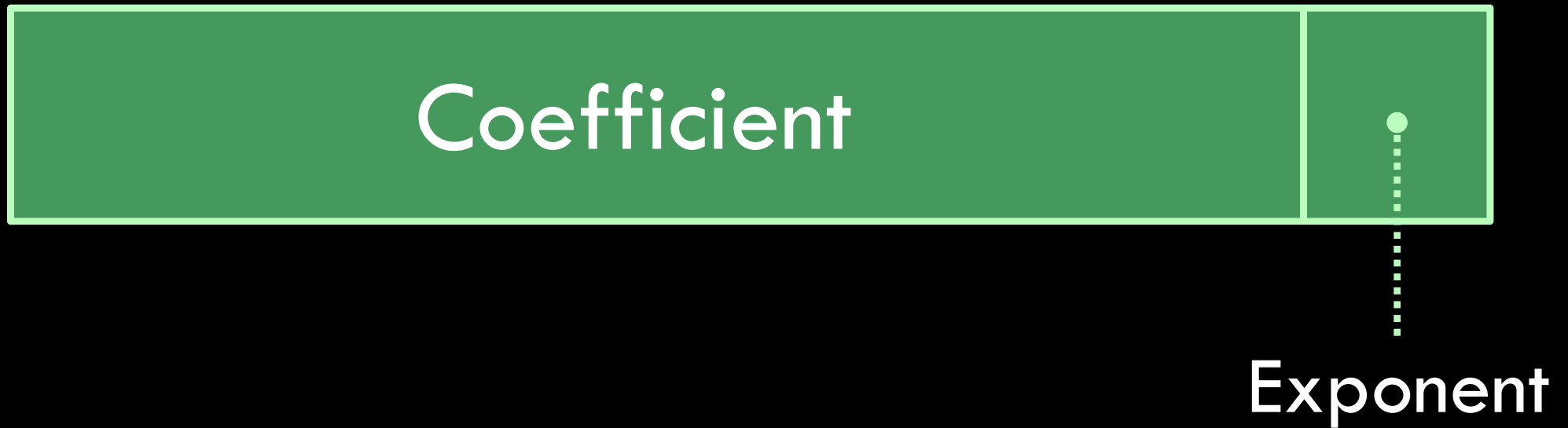
number (same as double)

Binary Floating Point

Made a lot of sense in the 1950s.

Scientific | Business

DEC64



$$\text{Number} = \text{Coefficient} * 10^{\text{Exponent}}$$

+

+	3	'7'	NaN	true
3	6	'37'	NaN	4
'7'	'73'	'77'	'7NaN'	'7true'
NaN	NaN	'NaN7'	NaN	NaN
true	4	'true7'	NaN	2



+	3	'7'	NaN	true
3	6	'37'	NaN	4
'7'	'73'	'77'	'7NaN'	'7true'
NaN	NaN	'NaN7'	NaN	NaN
true	4	'true7'	NaN	2

- Introduce the ~ concatenation operator.
- JSLint and IDEs warn when + is used with strings.
- A future edition redefines + to add only.

**Programs must be proven to be
correct**

**Testing can only prove the
existence of bugs, not the absence.**

**Well typed programs
cannot go wrong.**

Robin Milner (1978)

Classical Inheritance

Prototypal Inheritance

Classification Taxonomy

Prototypal Inheritance

- May have made sense in 1995.
- Memory conservation.
- Confusing: Own vs inherited.
- Retroactive heredity.
- Performance inhibiting.

Prototypal Inheritance

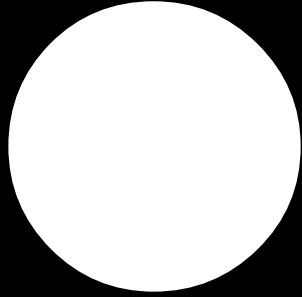
Class Free


```
function constructor(init) {  
    var that = other_constructor(init),  
        member,  
        method = function () {  
            // init, member, method  
        };  
    that.method = method;  
    return that;  
}
```

Milner's Promise

**Will static typing ever
be worth the freight?**

Danger Driven Development



Thank you and good night.

JavaScript:

The Universal Virtual Machine