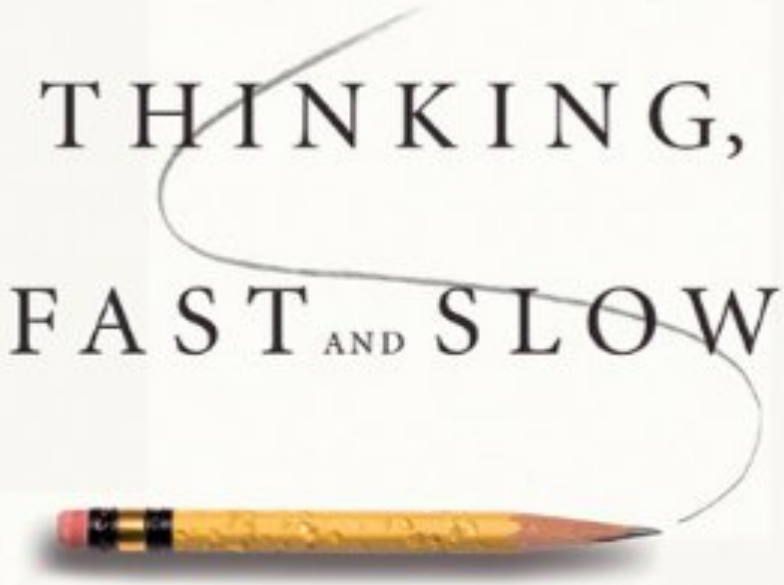
Section 8

Programming Style & Your Brain

Programming Style
&
Your Brain

Douglas Crockford

THINKING, FAST AND SLOW



DANIEL KAHNEMAN

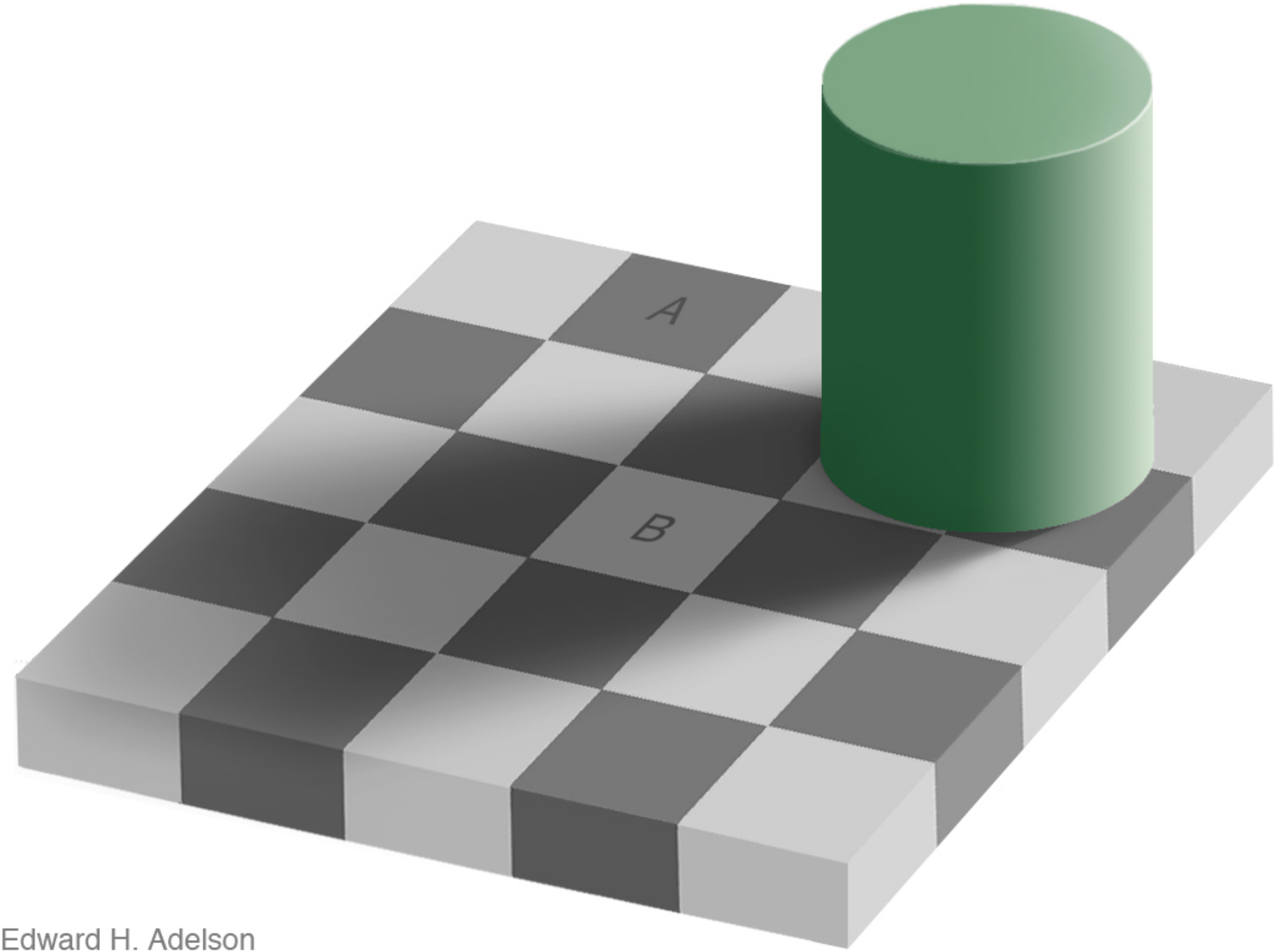
WINNER OF THE NOBEL PRIZE IN ECONOMICS

Head.
Gut.

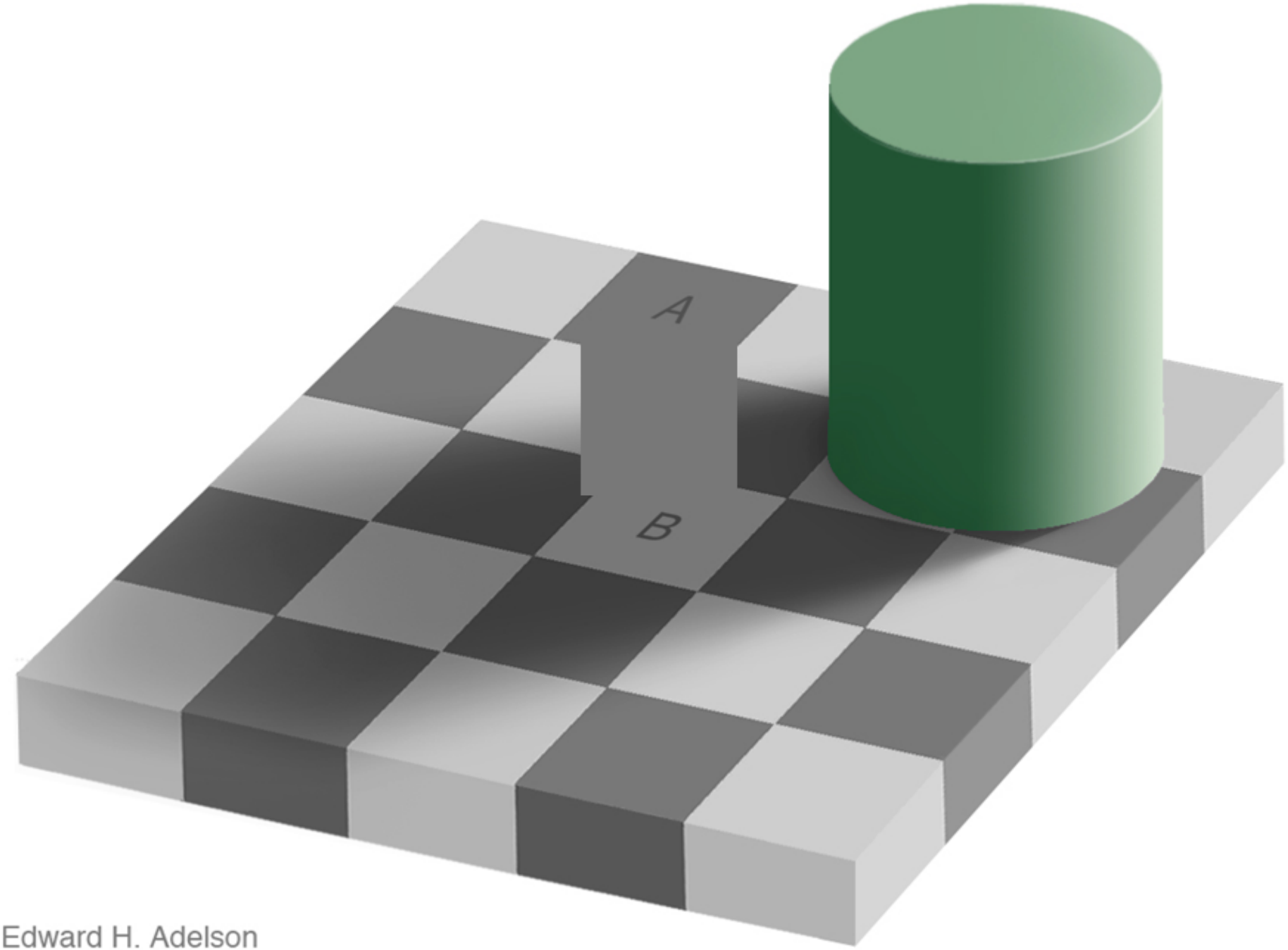
Two Systems.

Visual Processing.

An analogy.



Edward H. Adelson



Edward H. Adelson

Advertising.

Tobacco.

Computer Programs.

The most complicated things people make.

Artificial Intelligence.

Programming Language.

Perfection.

Hunters and Gatherers.

Programming uses
Head and Gut.

Tradeoffs.

JavaScript.

Good Parts.

Bad Parts.

JSLint.

JSLint defines a professional subset of JavaScript.

http://www.JSLint.com/

WARNING!

JSLint will hurt your feelings.

Left or Right?

```
block
{
    ....
}
```

```
block {
    ....
}
```

Left or Right?

```
block
{
    . . . .
}
```

- Be consistent.

```
block {
    . . . .
}
```

- Everyone should do it like I do.

Left or Right?

```
return
{
    ok: false
};
```

- SILENT ERROR!

```
return {
    ok: true
};
```

- Works well in JavaScript.

Prefer forms that are error resistant.

`switch` statement.

The fallthrough hazard.

“That hardly ever happens”

is another way of saying
“It happens”.

A good style can help produce better programs.

Style is should not be about personal preference and self-expression.

THEROMANSWROTELATIN ALLINUPPERCASEWITH NOWORDBREAKS ORPUNCTUATION

Medieval copyists introduced lowercase, word breaks, and punctuation.

These innovations helped reduce the error rate.

Good use of style can help reduce the occurrence of errors.

The Elements of Style
William Strunk

http://www.crockford.com/wrrrld/style.html

Programs must communicate clearly to people.

Use elements of good composition where applicable.

For example, use a space after a comma, not before.

Use spaces to disambiguate parens.

- No space between a function name and `(`.
- One space between all other names and `(`.
- Wrong:

```
foo (bar);

return(a+b);

if(a=== 0) {…}

function foo (b) {…}

function(x) {…}
```

Immediately Invocable Function Expressions

```
function () {

    ...

}();    // Syntax error!
```

Immediately Invocable Function Expressions

```
(function () {
    ...
})();
```

Immediately Invocable Function Expressions

```
(function () {
    ...
})()
```

Immediately Invocable Function Expressions

```
(function () {
    ...
}());     // Neatness counts.
```

The Heartbreak of Automatic Semicolon Insertion

```
x = y    // <-- Missing semicolon
(function () {
    ...
}());
```

- Never rely on automatic semicolon insertion!

`with` statement.

```
with (o) {
    foo = koda;
}
```

- `o.foo = koda;`
- `o.foo = o.koda;`
- `foo = koda;`
- `foo = o.koda;`

`with` statement.

```
with (o) {
    foo = koda;
}
```

- `o.foo = koda;`
- `o.foo = o.koda;`
- `foo = koda;`
- `foo = o.koda;`

I am not saying that it isn't useful.
I am saying that there is never a case where it isn't confusing.

Confusion must be avoided.

Transitivity? What's That?

```
0 == ''                 // true
0 == '0'                // true
'' == '0'               // false
false == 'false'        // false
false == '0'            // true
" \t\r\n " == 0         // true
```

Always use `===`, never `==`.

If there is a feature of a language that is sometimes problematic, and if it can be replaced with another feature that is more reliable, then always use the more reliable feature.

Multiline string literals

```
var long_line_1 = "This is a \
long line"; // ok

var long_line_2 = "This is a \
long line"; // syntax error
```

Avoid forms that are difficult to distinguish from common errors.

```
if (a = b) {…}
```

```
a = b;
if (a) {…}
```

```
if (a === b) {…}
```

Make your programs look like what they do.

Scope.

Block scope v function scope.

`var` statement.

- It gets split into two parts:

  The declaration part gets hoisted to the top of the function, initializing with **`undefined`**.

  The initialization part turns into an ordinary assignment. So

```
function foo() {
    ...
    var myVar = 0, myOtherVar;
```

- Expands into

```
function foo() {
    var myVar = undefined,
        myOtherVar = undefined;
    ...
    myVar = 0;
```

Declare all variables at the top of the function.

Declare all functions before you call them.

```
for (var i …) {…}
```

Variable `i` is not scoped to the loop.

Write in the language
you are writing in.

Let there be `let`.

Global variables.

- Global variables are evil.
- Avoid global variables.
- When using global variables, be explicit.

`UPPER_CASE`

- Global variables should be as rare as hens teeth and stick out like a sore thumb.

`new` prefix

Forgetting `new` causes a constructor to clobber global variables without warning.

Fixed in ES5/strict.

Constructor functions should be named with InitialCaps.

Nothing else should be named with InitialCaps.

```
var a = b = 0;
```

```
var a = 0, b = 0;
```

```
b = 0;
var a = b;
```

Write in a way that clearly communicates your intent.

++

```
++
```

```
x += 1
```

```
++

x += 1

x++
```

```
++
```

```
x += 1
```

~~x++~~

```
++x
```

```
++x;
++x;
```

```
x += 2;
```

For no cost, by adopting a more rigorous style, many classes of errors can be automatically avoided.

```
if (a) b(); c();
```

```
if (a) b(); c();
```

```
if (a) {b(); c();}
```

```
if (a) {b();} c();
```

As our processes become more agile, our coding must be more resilient.

Bad stylists

- Under educated.
- Old school.
- Thrill seeker.
- Exhibitionist.

“That was intentional.”

“I know what I’m doing.”

Programming is the most complicated thing that humans do.

Computer programs must be perfect.

Humans are not good at perfect.

Designing a programming style demands discipline.

It is not selecting features
because they are liked, or pretty,
or familiar.

The Abyss

The JSLint style was driven by the need to automatically detect defects.

Forms that can hide defects are considered defective.

Language Subsetting.

Only a madman would use all of C++.

Performance.

- Performance specific code is usually crufty.
- Clean code is easier to reason about.
- Premature optimization is the root of all evil. DONALD KNUTH
- Most of the code has a negligible impact on performance. Only optimize the code that is taking the time.
- Algorithm replacement is vastly more effective than code fiddling

There will be bugs.

Do what you can to move the odds to your favor.

Good style is good for your gut.

;

The Analytical Language of John Wilkins
Jorge Luis Borges

These ambiguities, redundancies and deficiencies remind us of those which doctor Franz Kuhn attributes to a certain Chinese encyclopedia entitled The Celestial Emporium of Benevolent Knowledge. In its remote pages it is written that the animals are divided into

a. belonging to the Emperor
b. embalmed
c. trained
d. piglets
e. sirens
f. fabulous
g. stray dogs
h. included in this classification
i. trembling like crazy
j. innumerables
k. drawn with a very fine camelhair brush
l. et cetera
m. just broke the vase
n. from a distance look like flies