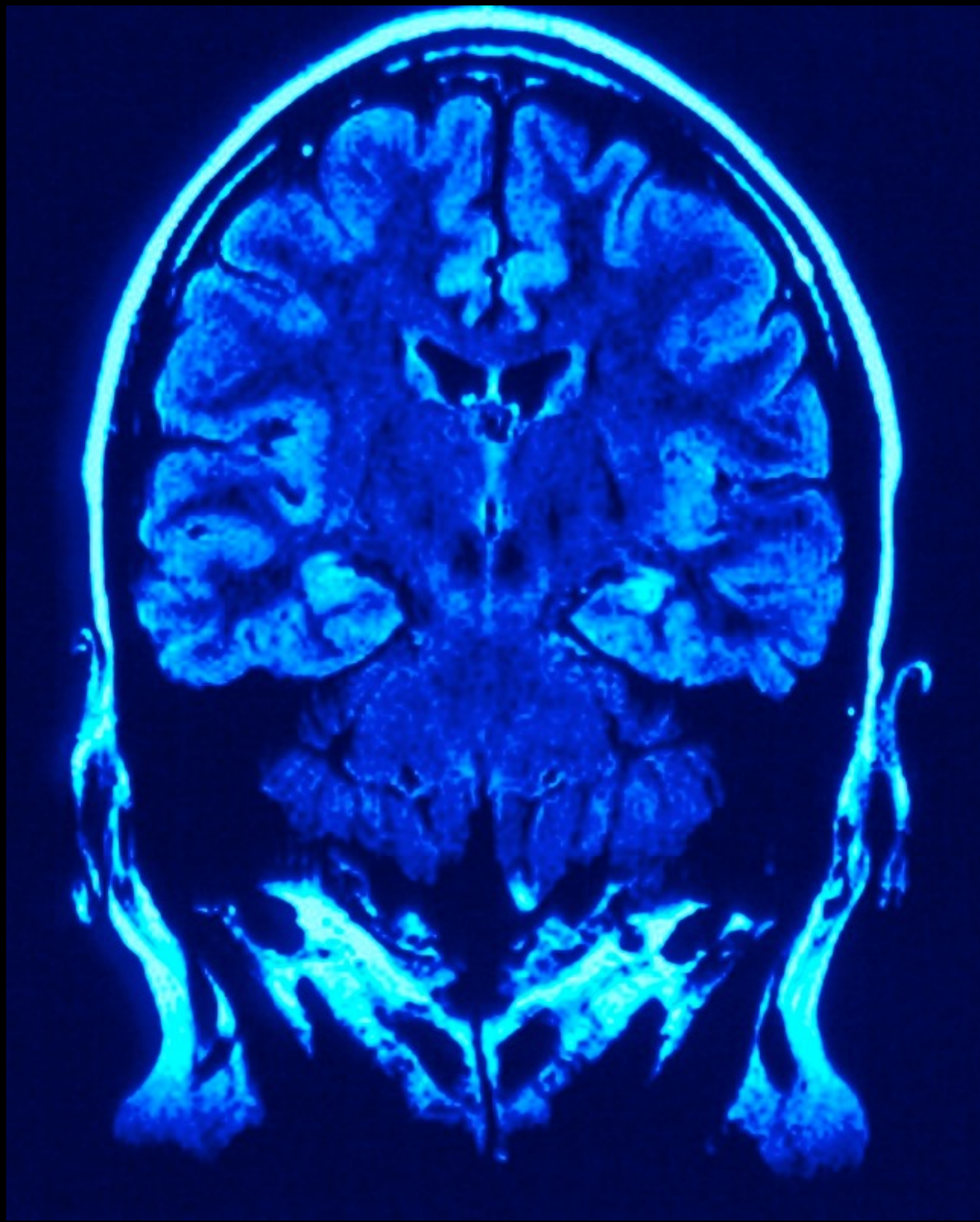
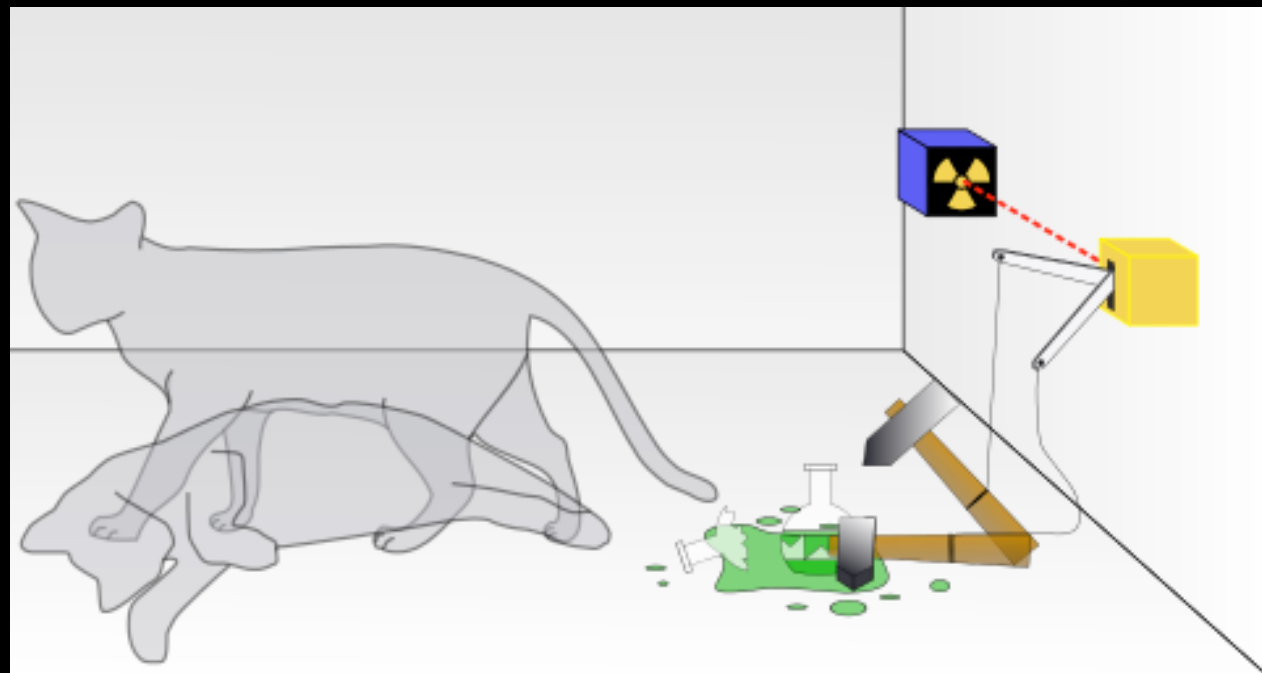


The Art of *Simplicity*

A photograph of a natural rock formation with a large circular opening and a smaller archway, overlooking a beach and the ocean. A person is standing on the beach for scale. The rock is a warm yellowish-brown color, and the water is a vibrant turquoise. The sky is blue with some clouds. The overall scene is a beautiful natural landscape.

Venkat Subramaniam
@venkat_s

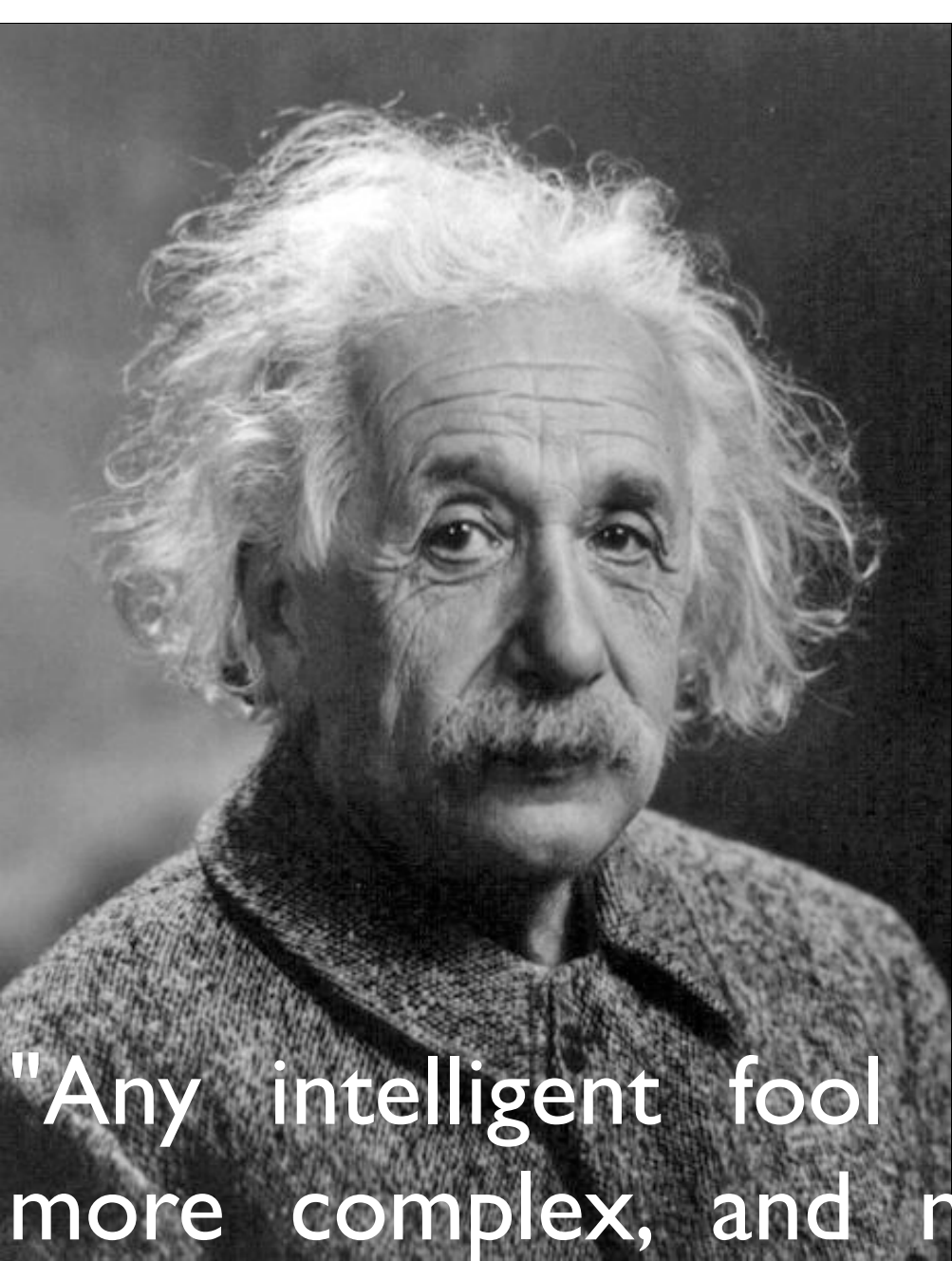






“Life is really simple, but we insist on making it complicated.”
—Confucius

Why?



"Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius—and a lot of courage—to move in the opposite direction."—Albert Einstein



If simple
was
sitting
next to
us, would
we
know?



not
What's [^]simple?

not
simple's [^]clever

```
public abstract class Enum<E> extends Enum<E>>  
    implements Comparable<E>, Serializable {
```

Clever code's Self-Obfuscated



```
float InvSqrt (float x){  
    float xhalf = 0.5f*x;  
    int i = *(int*)&x;  
    i = 0x5f3759df - (i>>1);  
    x = *(float*)&i;  
    x = x*(1.5f - xhalf*x*x);  
    return x;  
}
```

```

#include <math.h>
#include <sys/time.h>
#include <X11/Xlib.h>
#include <X11/keysym.h>
double L ,o ,P
, _=dt,T,Z,D=1,d,
s[999],E,h= 8,I,
J,K,w[999],M,m,0
,n[999],j=33e-3,i=
1E3,r,t, u,v ,W,S=
74.5,l=221,X=7.26,
a,B,A=32.2,c, F,H;
int N,q, C, y,p,U;
Window z; char f[52]
; GC k; main(){ Display*e=
XOpenDisplay( 0); z=RootWindow(e,0); for (XSetForeground(e,k=XCreateGC (e,z,0
; scanf("%lf%lf%lf",y +n,w+y, y+s)+1; y ++); XSelectInput(e,z= XCreateSimpleWi
0,0,WhitePixel(e,0) ),KeyPressMask); for(XMapWindow(e,z); ; T=sin(0)){ struct
; K= cos(j); N=1e4; M+= H*_; Z=D*K; F+=_*P; r=E*K; W=cos( 0); m=K*W; H=K*T; 0+
sin(j); a=B*T*D-E*W; XClearWindow(e,z); t=T*E+ D*B*W; j+=d*_*D-_*F*E; P=W*E*B-
*T*B,E*d/K *B+v+B/K*F*D)*_; p<y; ){ T=p[s]+i; E=c-p[w]; D=n[p]-L; K=D*m-B*T-H*
]== 0|K <fabs(W=T*r-I*E +D*P) |fabs(D=t *D+Z *T-a *E)> K)N=1e4; else{ q=W/K *4
*D; N-1E4&& XDrawLine(e ,z,k,N ,U,q,C); N=q; U=C; } ++p; } L+=_* (X*t +P*M+m*
XDrawString(e,z,k ,20,380,f,17); D=v/l*15; i+=(B *l-M*r -X*Z)*_; for(; XPend
XEvent z; XNextEvent(e ,&z);
++*((N=XLookupKeysym
(&z.xkey,0))-IT?
N-LT? UP-N?& E:&
J:& u: &h); --*(
DN -N? N-DT ?N==
RT?&u: & W:&h:&J
); } m=15*F/l;
c+=(I=M/ l,l*H

```

not necessarily
simple's ^ familiar

簡單

simple, uncomplicated, casual, common

A Simple Problem

Not a Simple Solution

May be Unfamiliar, but Simple

Don't confuse familiar
with simple

Lot of us are familiar
with imperative style,
but declarative is
simpler



Simple has
fewer
moving
parts

not
simple's [^]over-engineered



Rube Goldberg (rōob göld'berg), a comically involved, complicated invention, laboriously contrived to perform a simple operation — *Webster's New World Dictionary*

An Automatic Back Scratcher



not
simple's [^] terse

```
int l1, l2, l3, p1, p2, p3;
```

```
int l1, l2, l3, p1, p2, p3;  
// God, help me. I have no idea what this means.  
...
```

above was a comment left by a victim, I mean a developer,
who had to maintain this code years later.

VERBOSE

```
@Test public void VerboseExceptionTest() {
    rodCutter.setPrices(prices);
    try {
        rodCutter.maxProfit(0);
        fail("Expected exception for zero length");
    } catch(RodCutterException ex) {
        assertTrue("expected", true);
    }
}
resources — bash — 100x24
ra8/Book/code/resources>mate .
ra8/Book/code/resources>
```

TERSE

```
@Test(expected = RodCutterException.class)
public void TerseExceptionTest() {
    rodCutter.setPrices(prices);
    rodCutter.maxProfit(0);
}
```

CONCISE

@Test

```
public void ConciseExceptionTest() {  
    rodCutter.setPrices(prices);  
    assertThrows(RodCutterException.class,  
        () -> rodCutter.maxProfit(0));  
}
```

Don't confuse terse
with concise and simple



Keep it
simple

“There are two ways of constructing a software design. One way is to make it so simple that there are obviously no deficiencies. And the other way is to make it so complicated that there are no obvious deficiencies.”—Tony Hoare.



Well then,
what's
Simple?























simple keeps you focused



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New album reflects 'most poignant growth spurt'


Adele felt indescribable pressure to follow up the success of "21," until she heard "Hello" for the first time. [▶ Yahoo Music exclusive »](#)

1 - 5 of 80 ||


◀


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'Modern Family' Star Reid Ewing Casually Comes Out as Gay on Twitter: 'I Was Never In'

On Saturday, Ewing, best known for his role as Sarah Hyland's bumbly boyfriend Dylan on "Modern Family," was watching a "Good Morning The Wrap



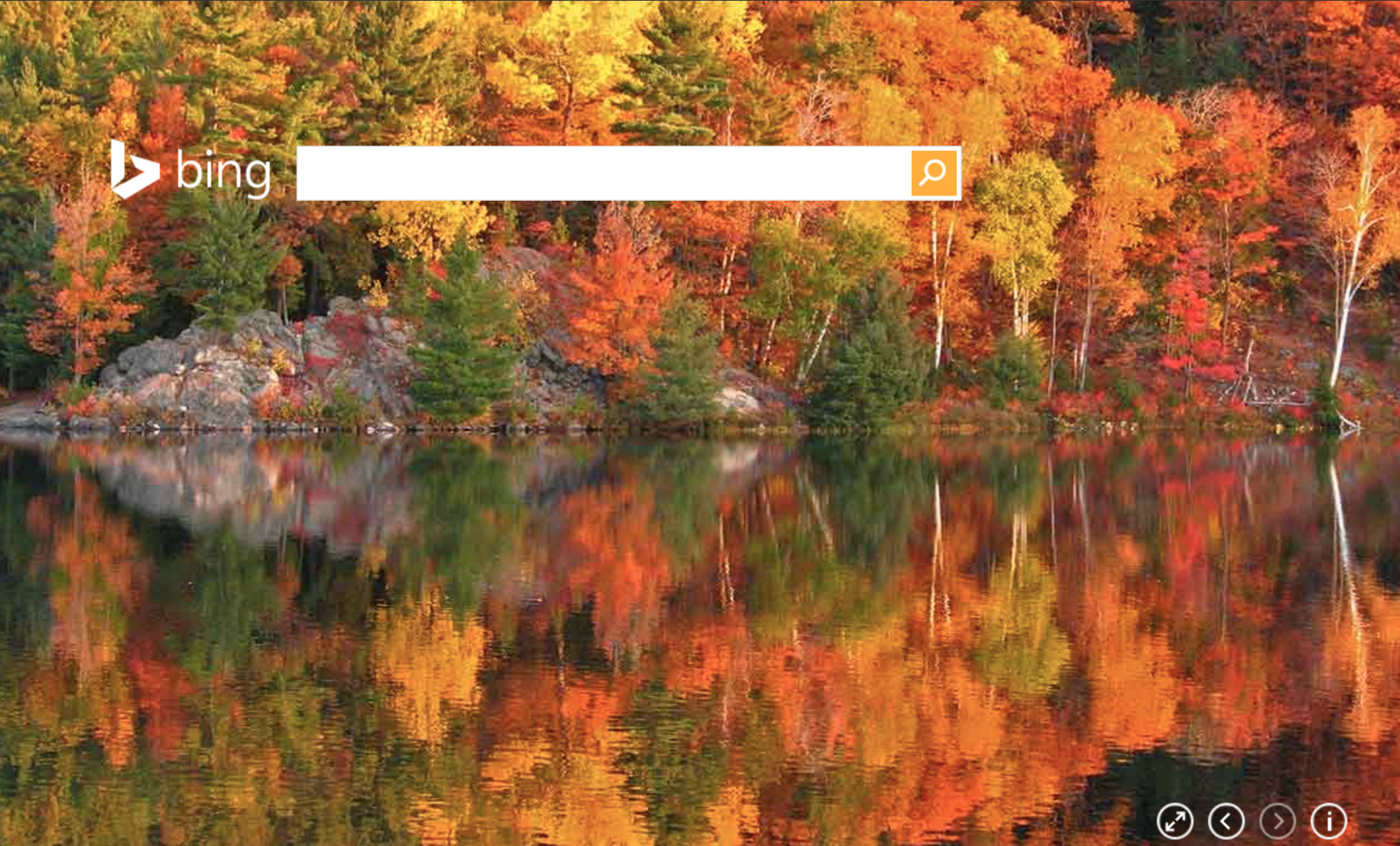
Ronda Rousey's yellow and purple feet are Internet mystery

If witnessing Ronda Rousey crash to the ground was not worrying enough, you should see the color of her feet. A Reddit debate has begun over an [New York Post](#)



Take That, Gavin Rossdale! Gwen Stefani Goes Pantless at the American Music Awards

The 46-year-old singer rocked one of the most outrageous looks of the night on the American Music Awards red carpet, stepping out in a sheer, black [ETonline](#)



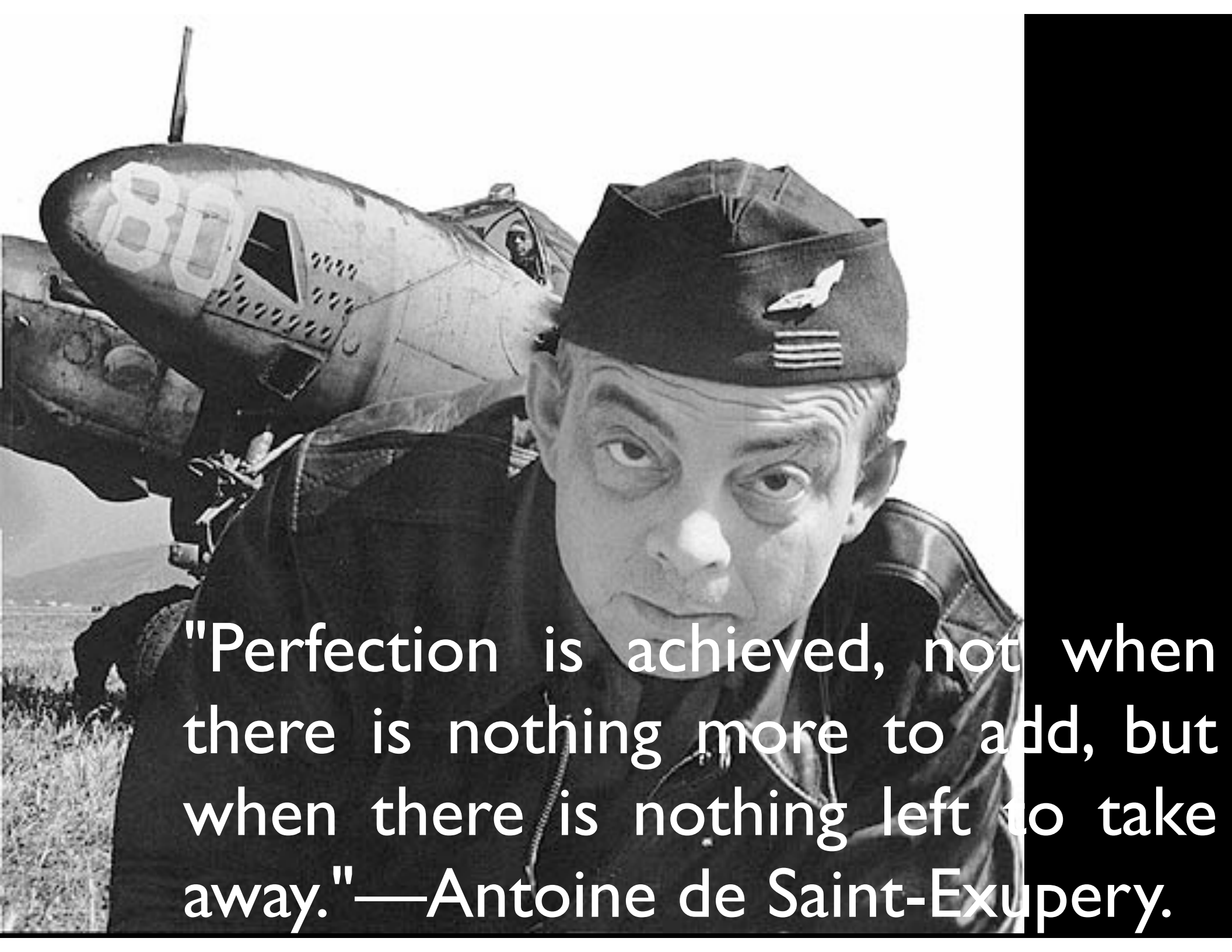
 bing 

Sign in

Google

Google Search

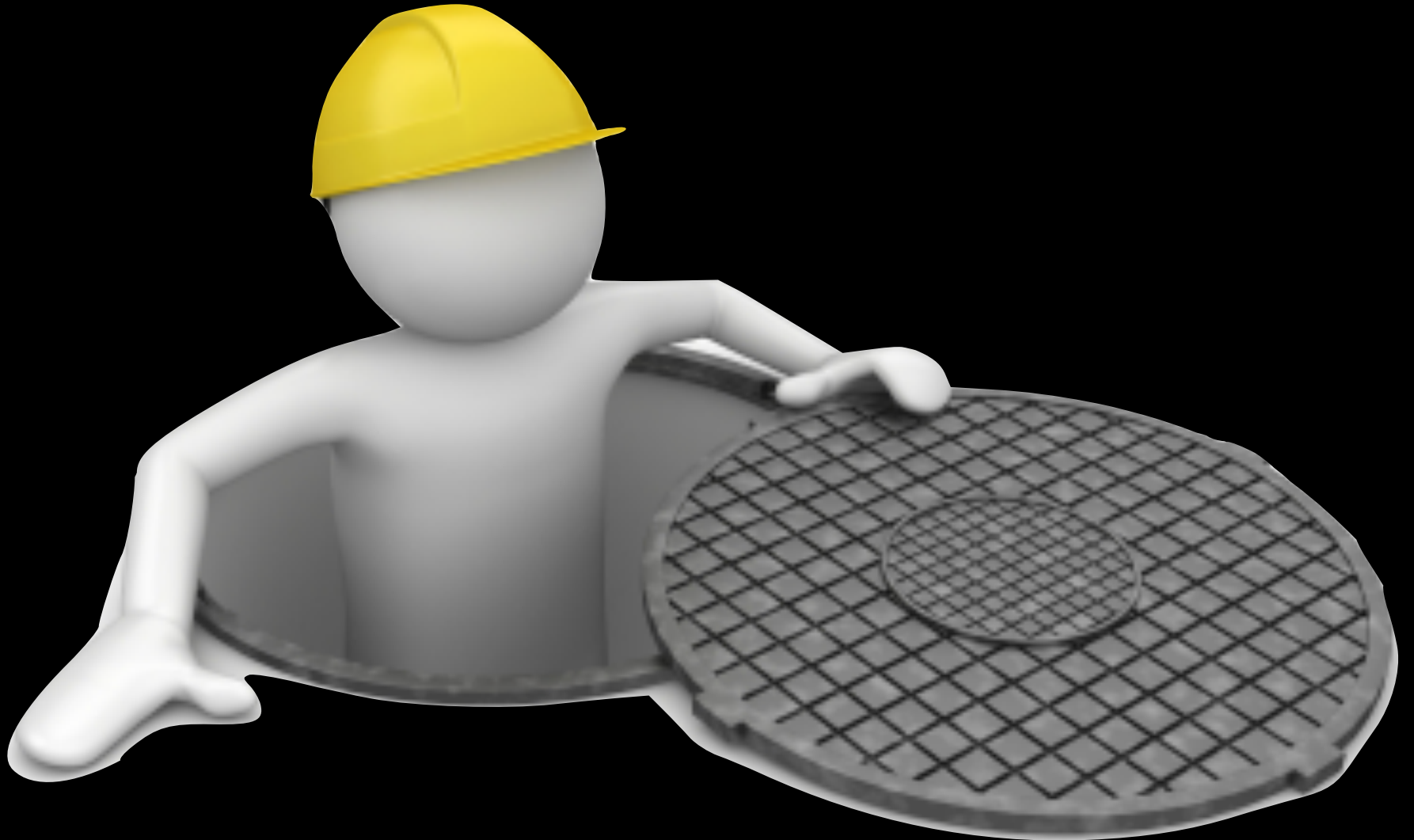
I'm Feeling Lucky

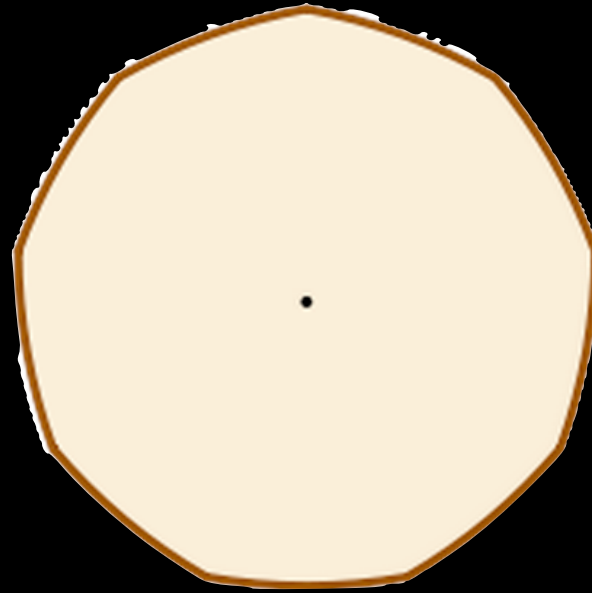
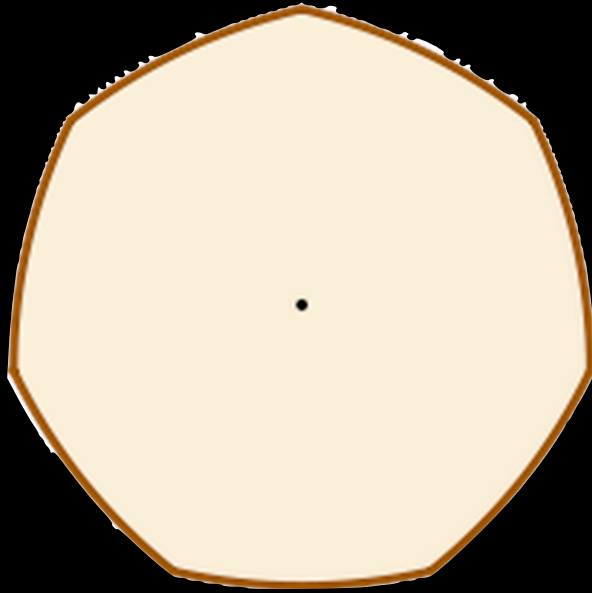
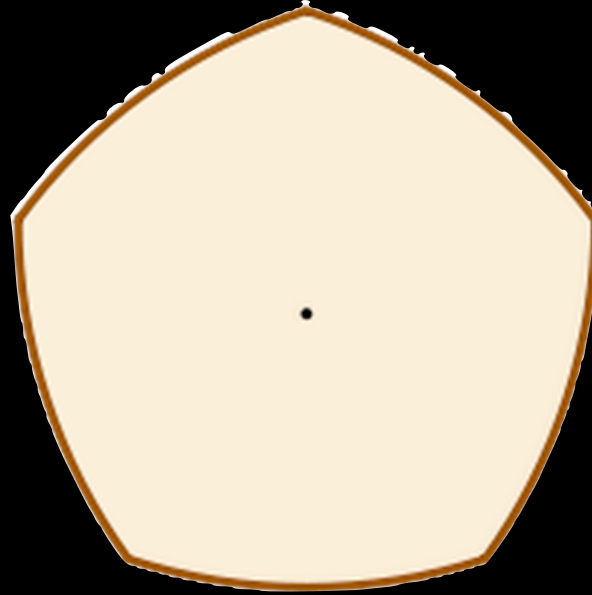
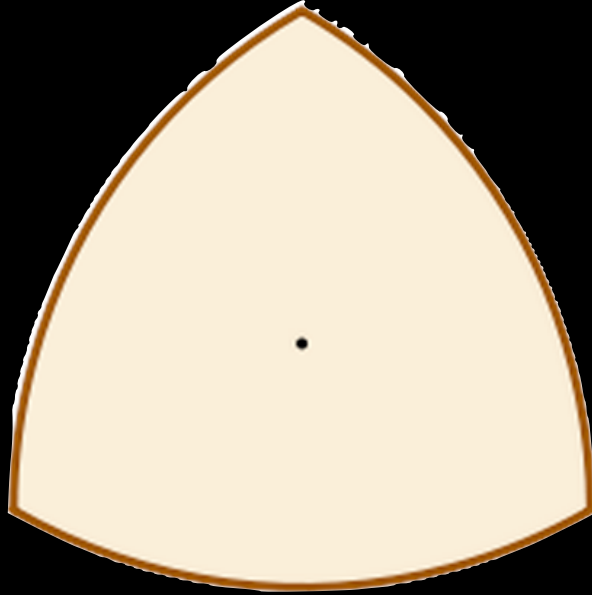


"Perfection is achieved, not when there is nothing more to add, but when there is nothing left to take away."—Antoine de Saint-Exupery.

simple eliminates accidental
complexity and hides
inherent complexity

simple fails less





simple's easier to understand
and work with

- 3** Mathematics (of a number) evenly divisible only by itself and one (e.g., 2, 3, 5, 7, 11).
- [predic.] (of two or more numbers in relation to each other) having no common factor but one.

```
public static boolean isDivisibleBy(int number, int divisor) {  
    return number % divisor == 0;  
}
```

```
public static boolean isPrime(int number) {  
    return number > 1 &&  
        Streams.intRange(2, (int) Math.sqrt(number) + 1)  
            .noneMatch(divisor -> isDivisibleBy(number, divisor));  
}
```

//Nice idea, expressive, but won't work!

```
public static List<Integer> primes(int starting) {  
    if(isPrime(starting))  
        return concat(starting, primes(starting + 1));  
    else  
        return primes(starting + 1);  
}
```

```
public static int nextPrime(int number) {
    if(isPrime(number + 1))
        return number + 1;
    else
        return nextPrime(number + 1);
}

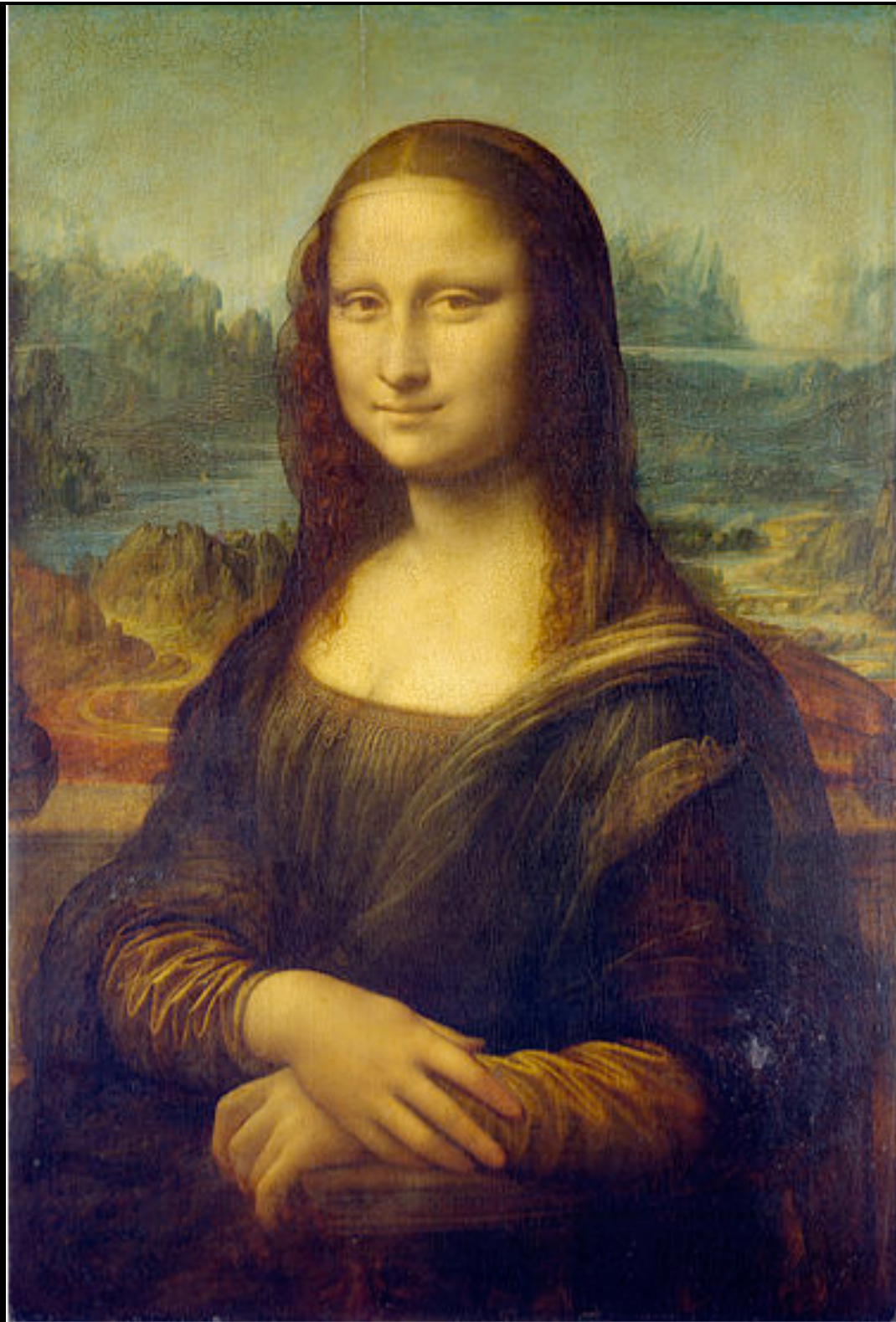
public static List<Integer> primes(int starting, int count) {
    return Streams.iterate(nextPrime(starting), Sample::nextPrime)
        .limit(count)
        .collect(Collectors.<Integer>toList());
}

public static void main(String[] args) {
    System.out.println(primes(0, 5));
    System.out.println(primes(100, 7));
}
```

```
[2, 3, 5, 7, 11]
```

```
[101, 103, 107, 109, 113, 127, 131]
```


simple is elegant



An Architect's Dilemma

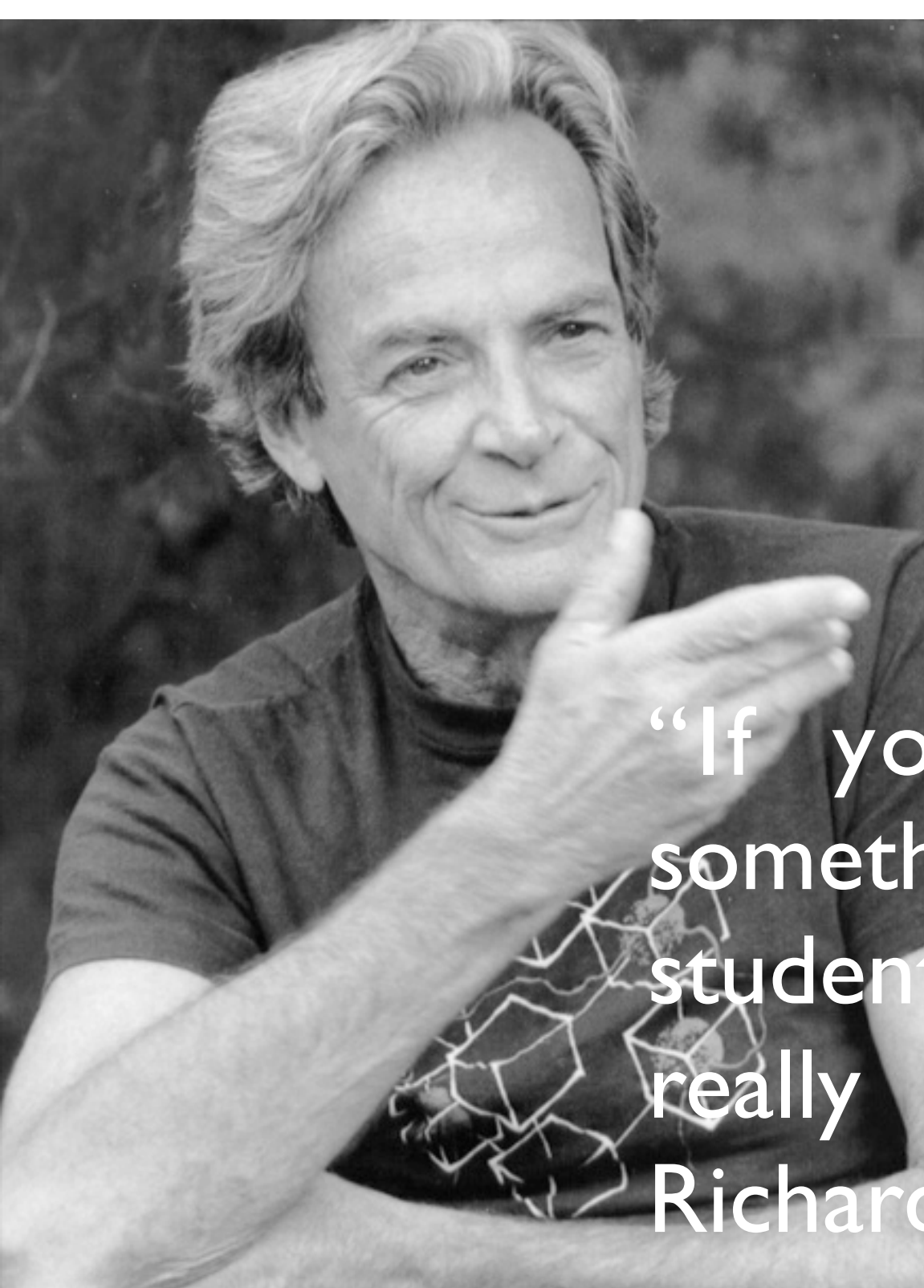






simplicity has to evolve





“If you can't explain something to a first year student, then you haven't really understood it.”—
Richard Feynman

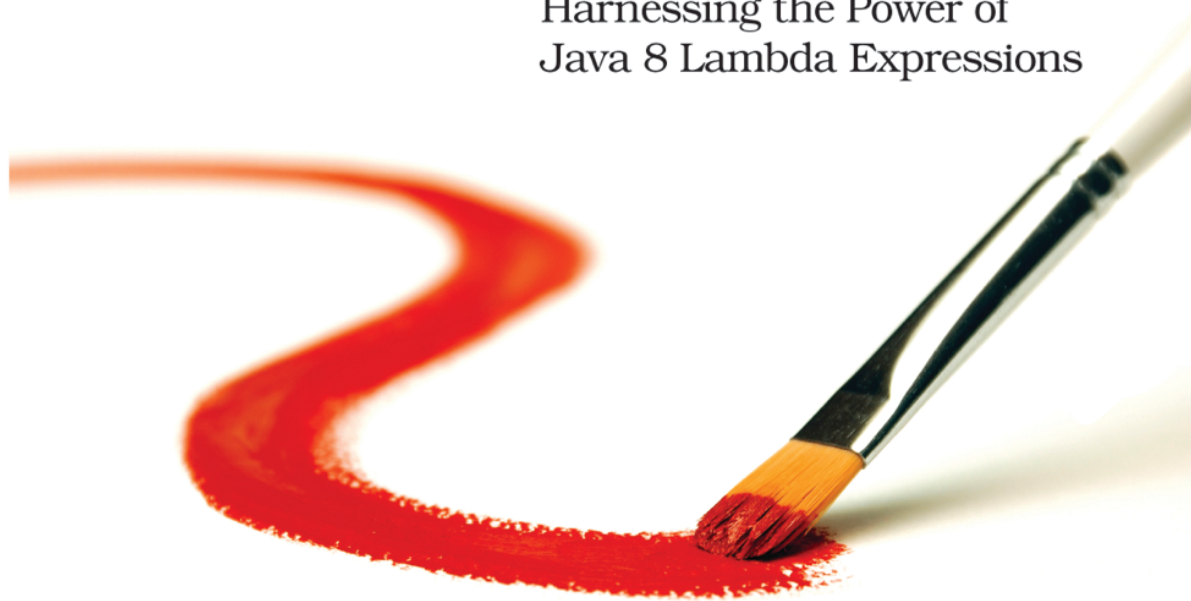


"If you have two equally likely solutions to a problem, choose the simplest."—Occam's Razor.

The
Pragmatic
Programmers

Functional Programming in Java

Harnessing the Power of
Java 8 Lambda Expressions



Venkat Subramaniam

Foreword by Brian Goetz

Edited by Jacquelyn Carter

```
public static int factorial(int number) {  
    if (number == 1)  
        return number;  
    else  
        return number * factorial(number - 1);  
}
```

```
public static void main(String[] args) {  
    System.out.println(factorial(10000));  
}
```

```
Exception in thread "main" java.lang.StackOverflowError
```

```
else  
> mate run  
> []
```

Second Edition

Structure and Interpretation of Computer Programs



Harold Abelson and Gerald Jay Sussman
with Julie Sussman



```
public static TailCall<BigInteger> factorial(BigInteger fact, int number) {
    if(number == 1)
        return done(fact);
    else
        return call(() -> factorial(Util.multiply(fact, number), number - 1));
}

public static void main(String[] args) {
    System.out.println(factorial(BigInteger.ONE, 10000).invoke());
}
```

After 10 hours of effort

```
public class TailCalls {  
    public static <T> TailCall<T> call(TailCall<T> nextCall) {  
        return nextCall;  
    }  
  
    public static <T> TailCall<T> done(T value) {  
        return new TailCall<T>() {  
            public boolean isComplete() { return true; }  
  
            public T result() { return value; }  
  
            public TailCall<T> apply() { return null; }  
        };  
    }  
}
```

```
public interface TailCall<T> {
    public abstract TailCall<T> apply();

    public default boolean isComplete() { return false; }
    public default T result() { return null; }

    public default T invoke() {
        boolean callComplete = isComplete();
        TailCall<T> current = this;

        while(!callComplete) {
            current = current.apply();
            callComplete = current.isComplete();
        }

        return current.result();
    }
}
```


My code simply sucks



```
public interface TailCall<T> {
    public abstract TailCall<T> apply();

    public default boolean isComplete() { return false; }
    public default T result() { return null; }

    public default T invoke() {
        return Streams.iterate(this, TailCall::apply)
            .filter(TailCall::isComplete)
            .findFirst()
            .get()
            .result();
    }
}
```




"Everything Should Be Made as Simple as Possible, But Not Simpler."—Einstein.

Is that simple
or
can it be simpler?

simple's like Schrödinger's cat



Simple makes things easy, but
it's certainly not easy

A portrait of Leonardo da Vinci, showing him from the chest up. He has a long, flowing white beard and is wearing a dark, textured cap. The background is a dark, mottled brown. The right side of the image is partially obscured by a black vertical bar.

“Simplicity is the ultimate sophistication.”—Leonardo da Vinci

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Thank You!