Scooping the Loop Snooper

A proof that the Halting Problem is undecidable

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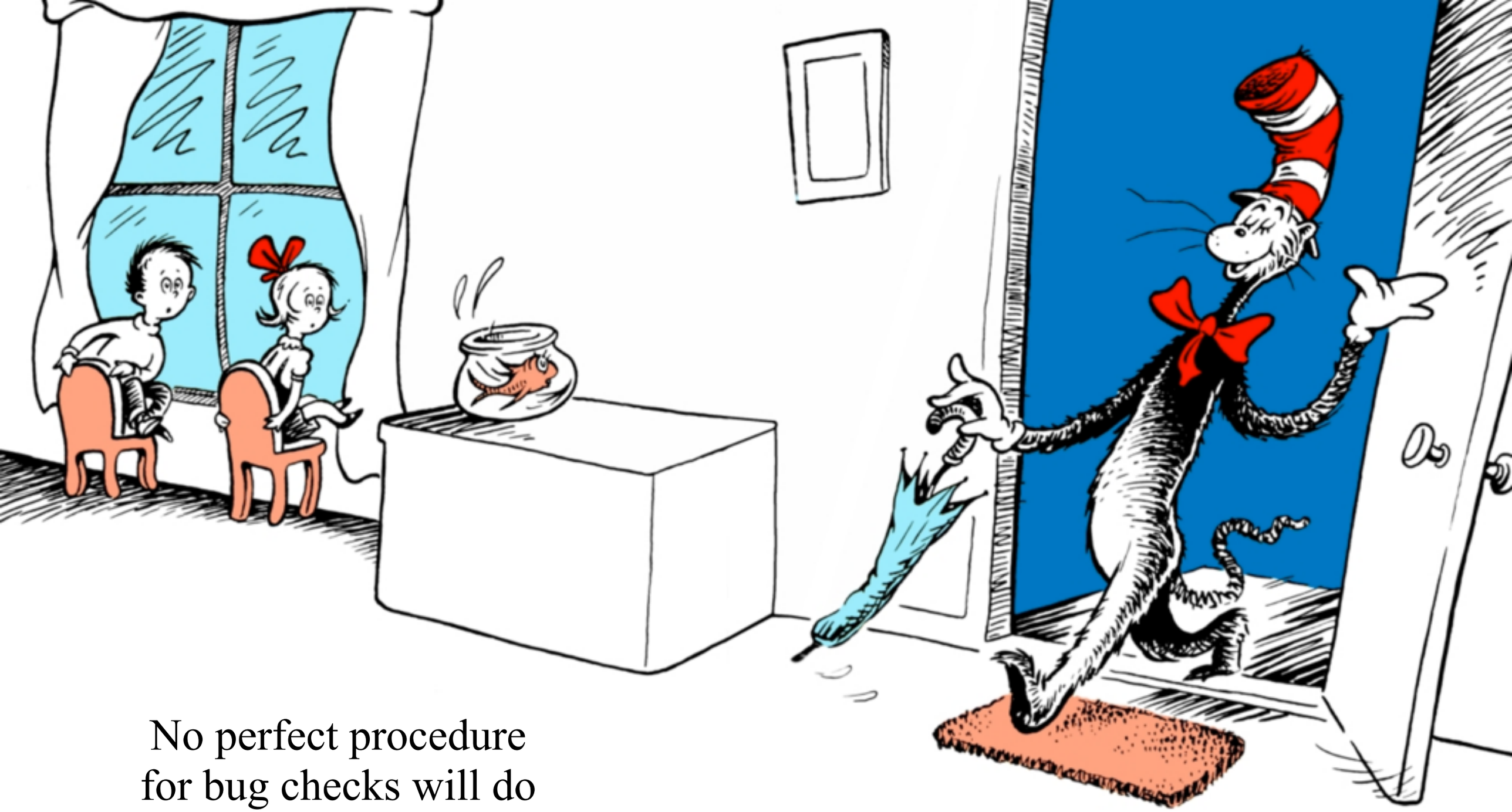
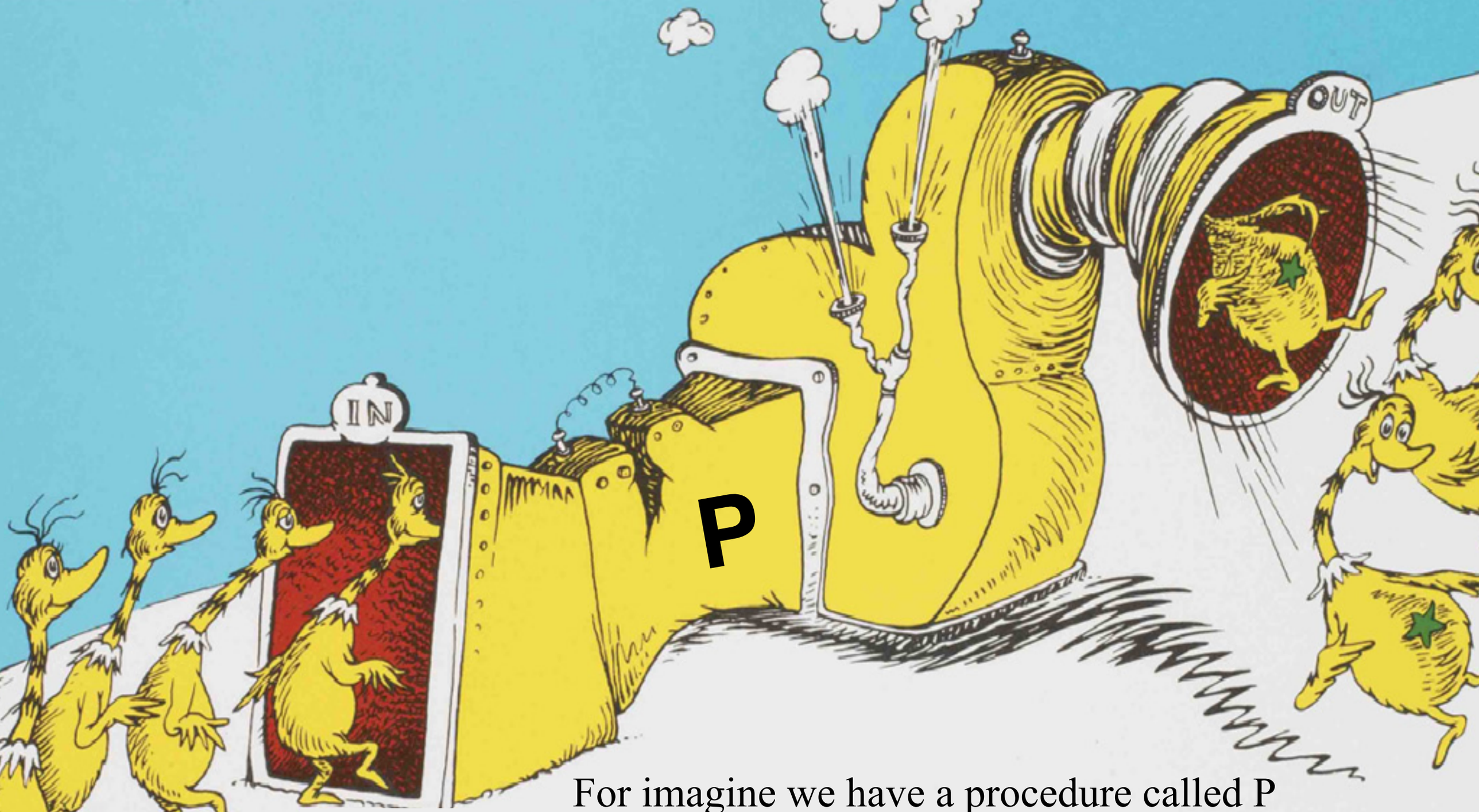


No perfect procedure
for bug checks will do

No I won't just assert it,
I'll prove it to you

I will prove that although you
might work til you drop

You cannot tell if comp-u-ta-tion will stop



For imagine we have a procedure called P

That for specified input permits you to see

Whether specified source code, with all of its faults,

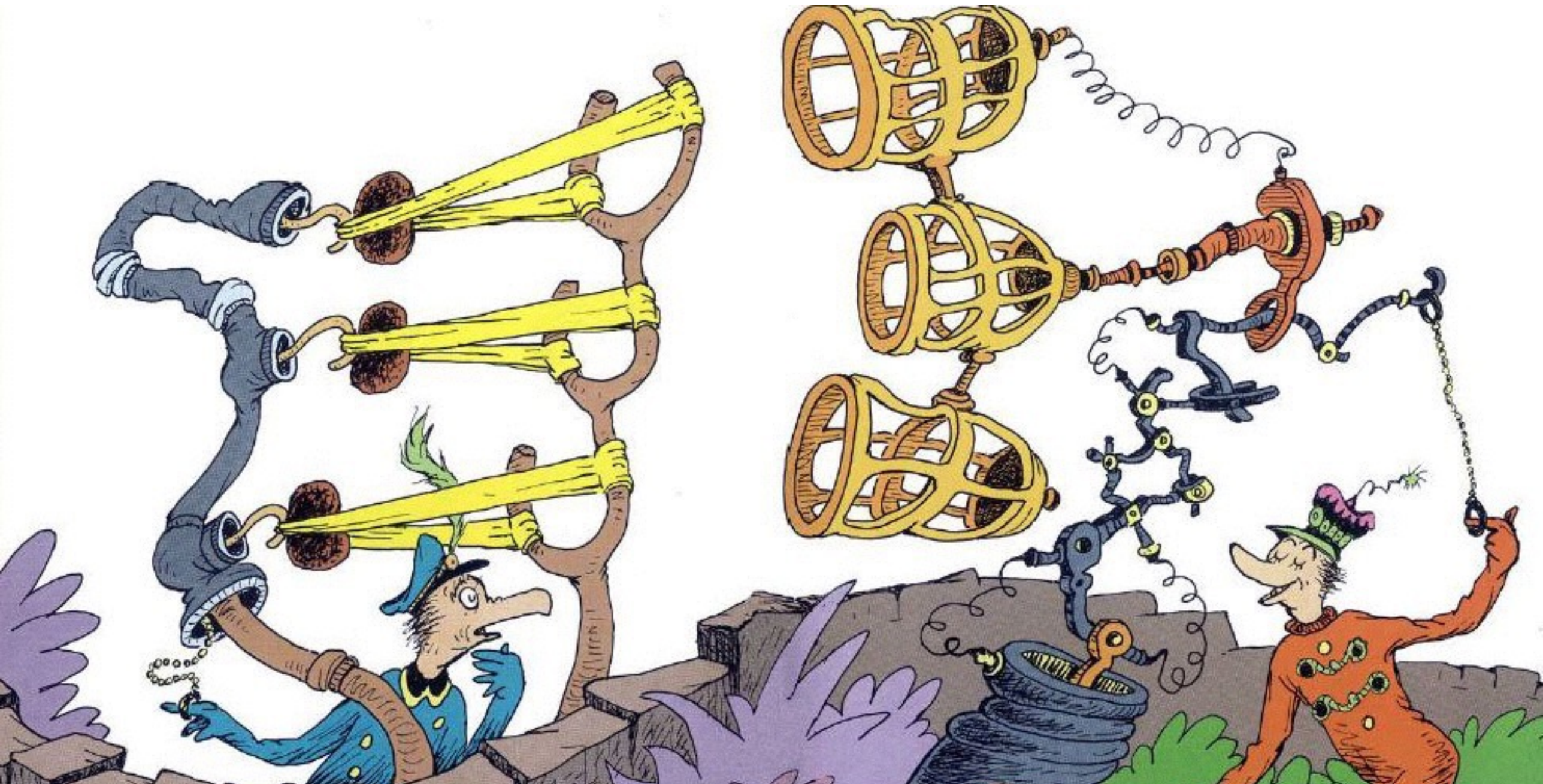
Defines a routine that e-vent-ually halts.

You *feed* in your program, with suitable data,

And P gets to work, and a little bit lata

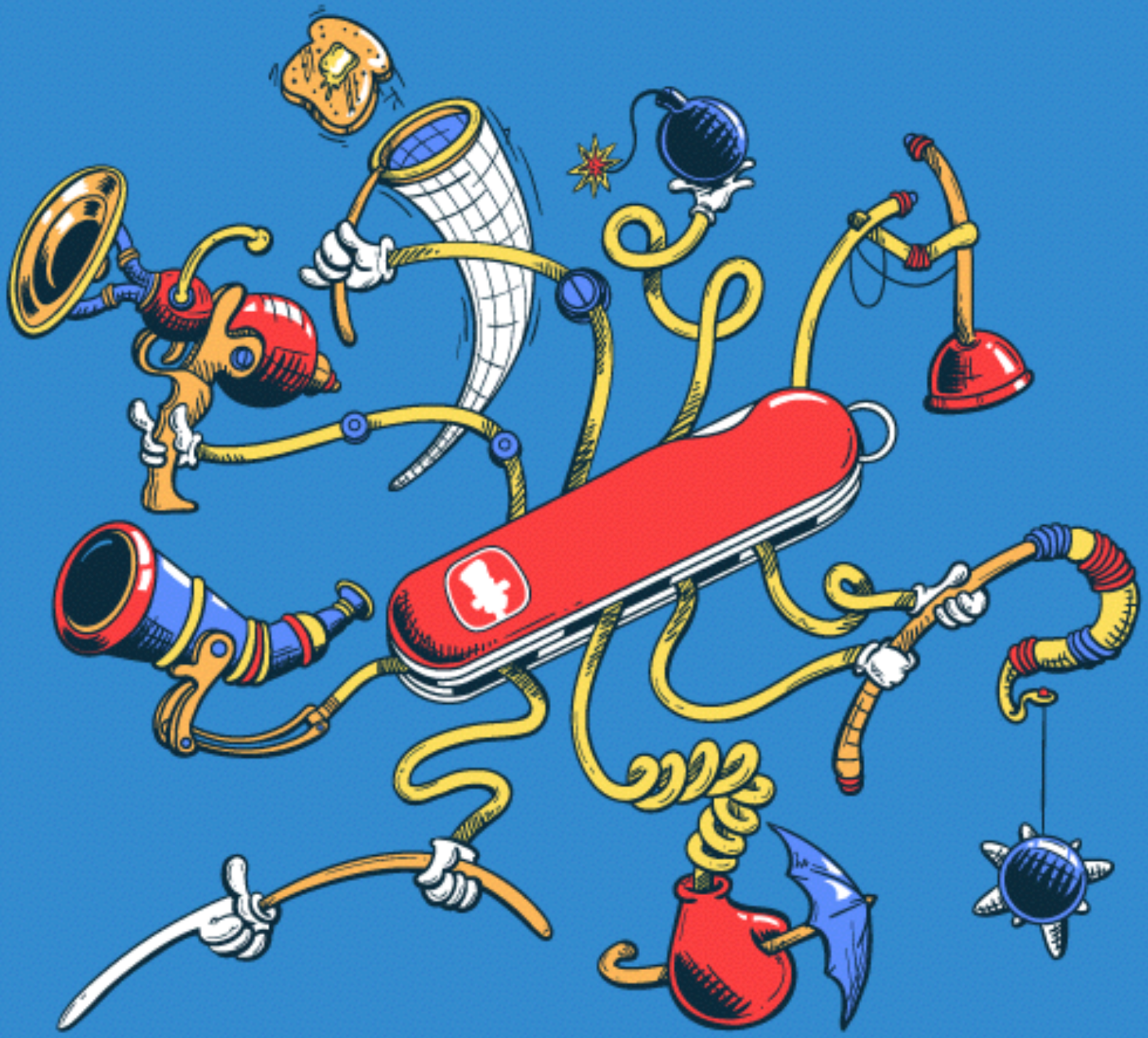
In finite compute time correctly infers

Whether infinite looping behavior occurs.



If there is no looping, then P prints out Good
That means on this input it halts, as it should.

But if it detects an unstoppable loop,
then P reports Bad! and you're *in the soup*.

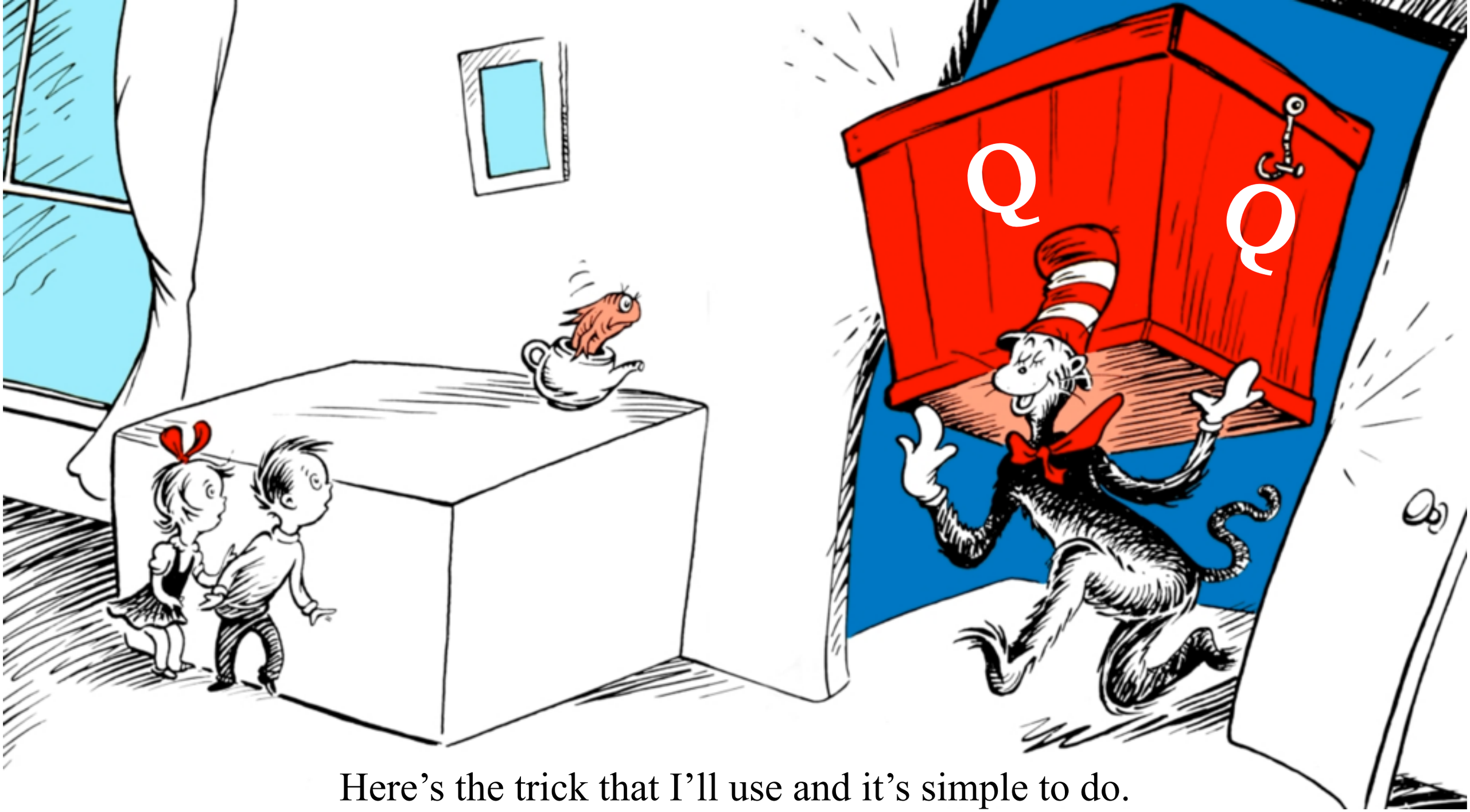


Well, the truth is that P cannot possibly be,

Because if you wrote it and gave it to me,

I could use it to set up a logical bind

That would *shatter your reason* and
scramble your mind.



Here's the trick that I'll use and it's simple to do.

I'll define a procedure, *which I will call Q*,

That will use P's predictions of halting success

To stir up a terrible logical mess.

For a specified program, say A, one supplies,

The first step of this program called Q I devise

Is to find out from P what's the right thing to say

Of the looping behavior of *A run on A*.

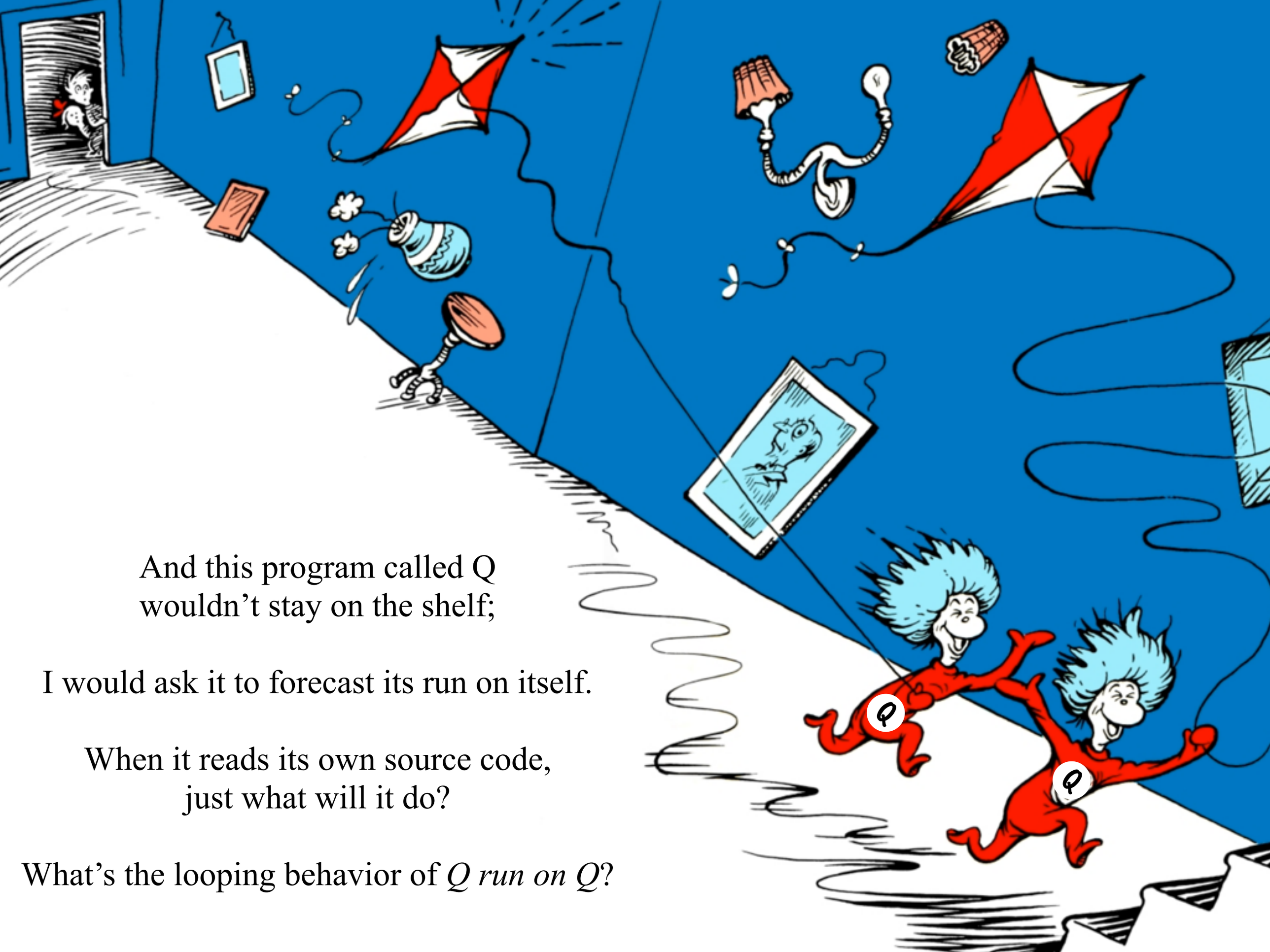
If the answer is Bad Q will suddenly stop.

But otherwise, Q will go back to the top,

And start off again, *looping endlessly back*,

Till the universe dies…

…and turns frozen and black.



And this program called Q
wouldn't stay on the shelf;

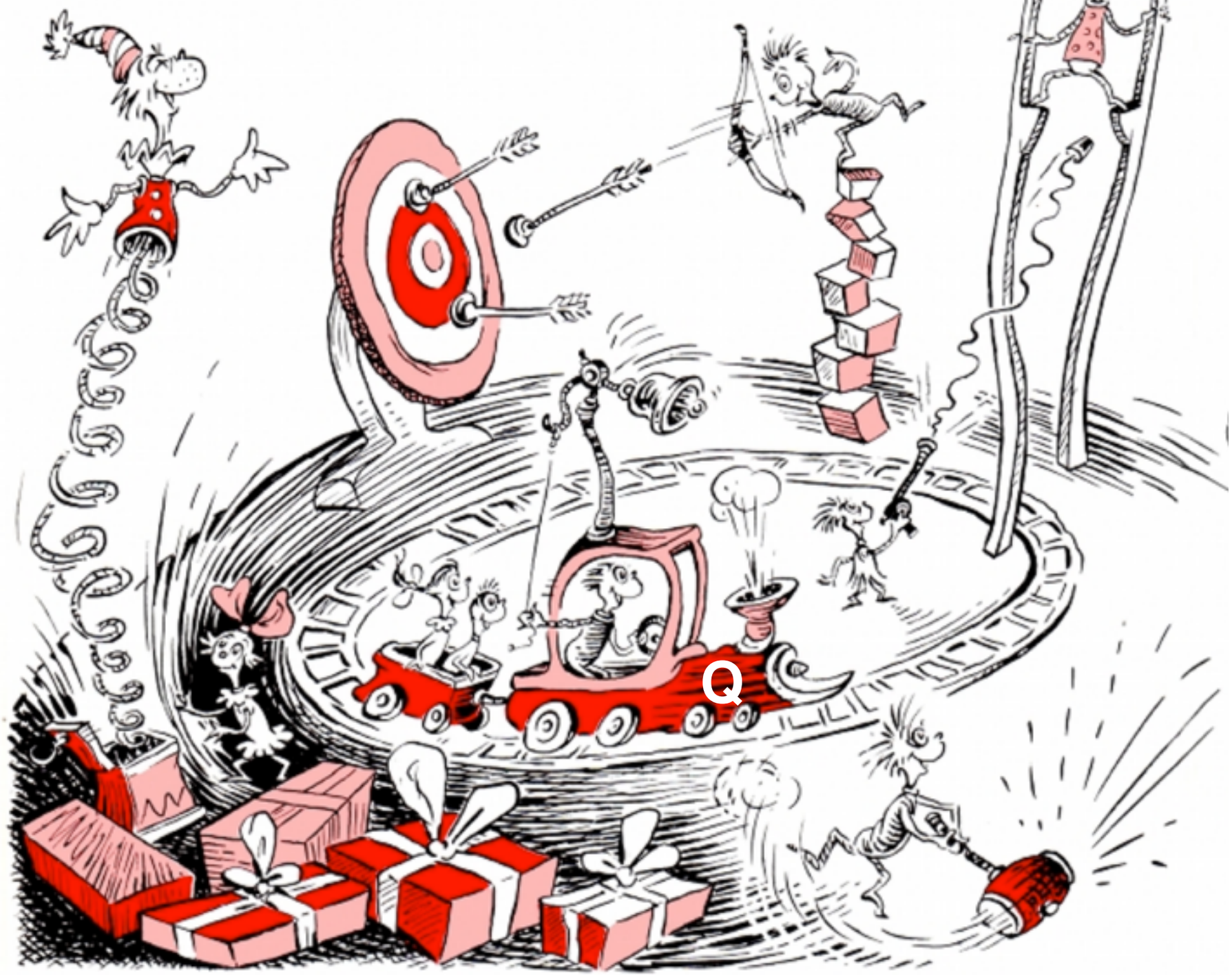
I would ask it to forecast its run on itself.

When it reads its own source code,
just what will it do?

What's the looping behavior of *Q run on Q*?

If P warns of loops then Q has to quit;
Yet P is supposed to speak truly of it!

And if Q's going to quit, then P should say Good!
Which makes *Q start to loop*! – P denied that it would!



No matter how P might perform, Q will *scoop it*:
Q uses P's output to make P look stupid.

Whatever P says, it cannot predict Q:
P is right when it's wrong, and is false when it's true!

PLOP

I've created a paradox,
neat as can be

And simply by using your putative P.

When you posited P you
stepped *into a snare*;

Your assumption has led
you right into my lair.

So where can this argument possibly go?

I don't have to tell you;
I'm sure you must know.

We now know there cannot possibly be

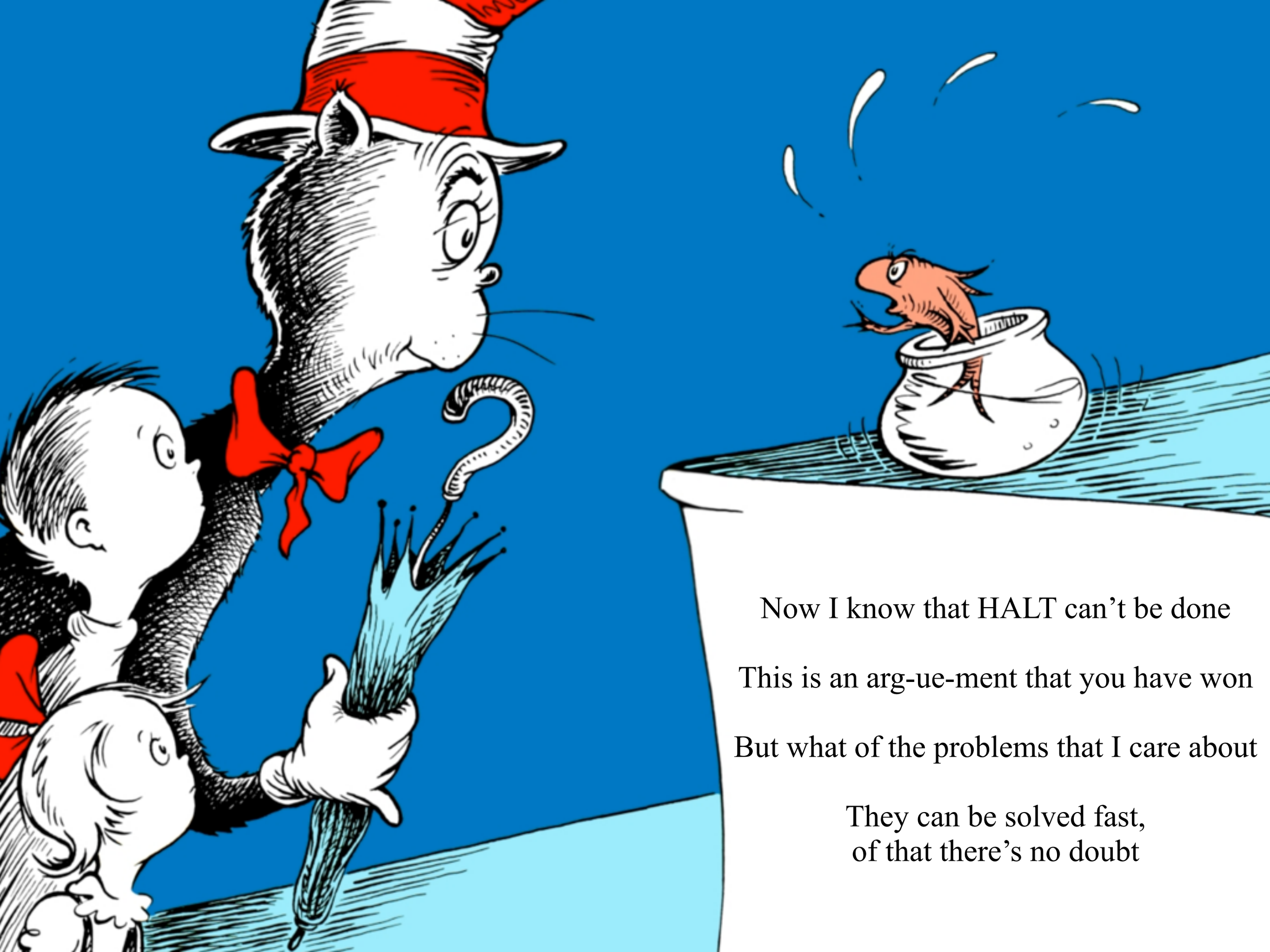
A procedure that acts like the *mythical P*.

So you can’t ever find a mechanical means

For predicting the acts of computing machines;

It’s something that cannot be done. So we users

Must *find our own bugs*. Our computers are losers!



Now I know that HALT can’t be done

This is an arg-ue-ment that you have won

But what of the problems that I care about

They can be solved fast,
of that there’s no doubt