Unit 2: Programming

Dave Abel

February 10th, 2016

Logic: Reflection

1. There is a correct notion of reasoning (logic)

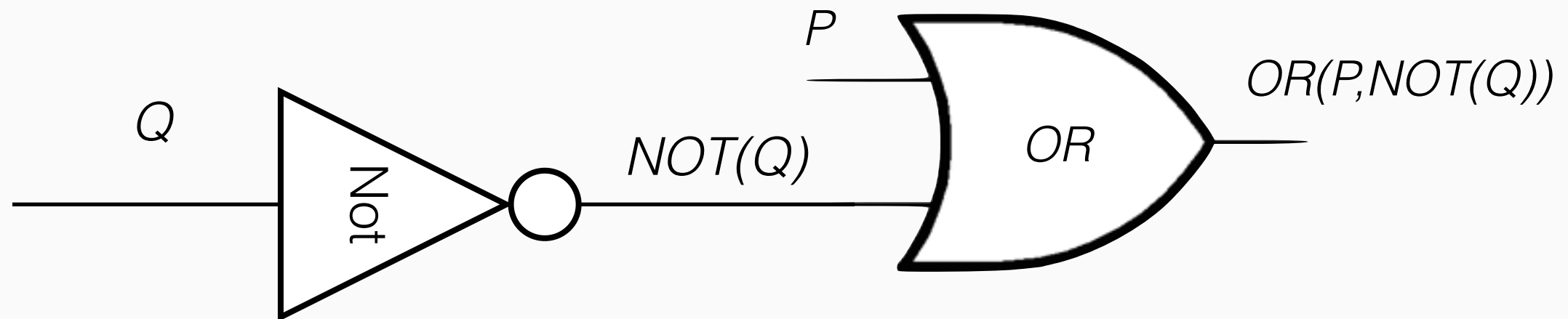2. At their core, computer's are doing logic via gates and electrical pulses.

Programming: Takeaway

1. Physical gates are inflexible.

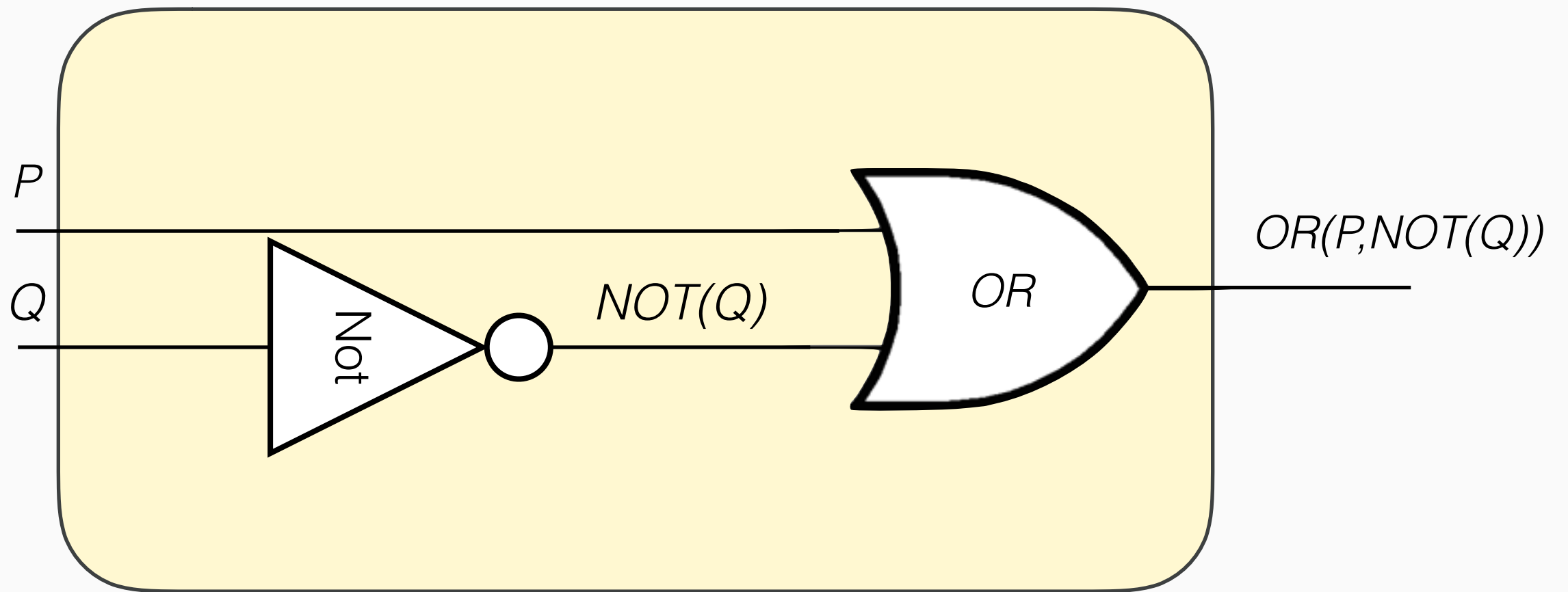2. Programming lets us reconfigure what a computer does!

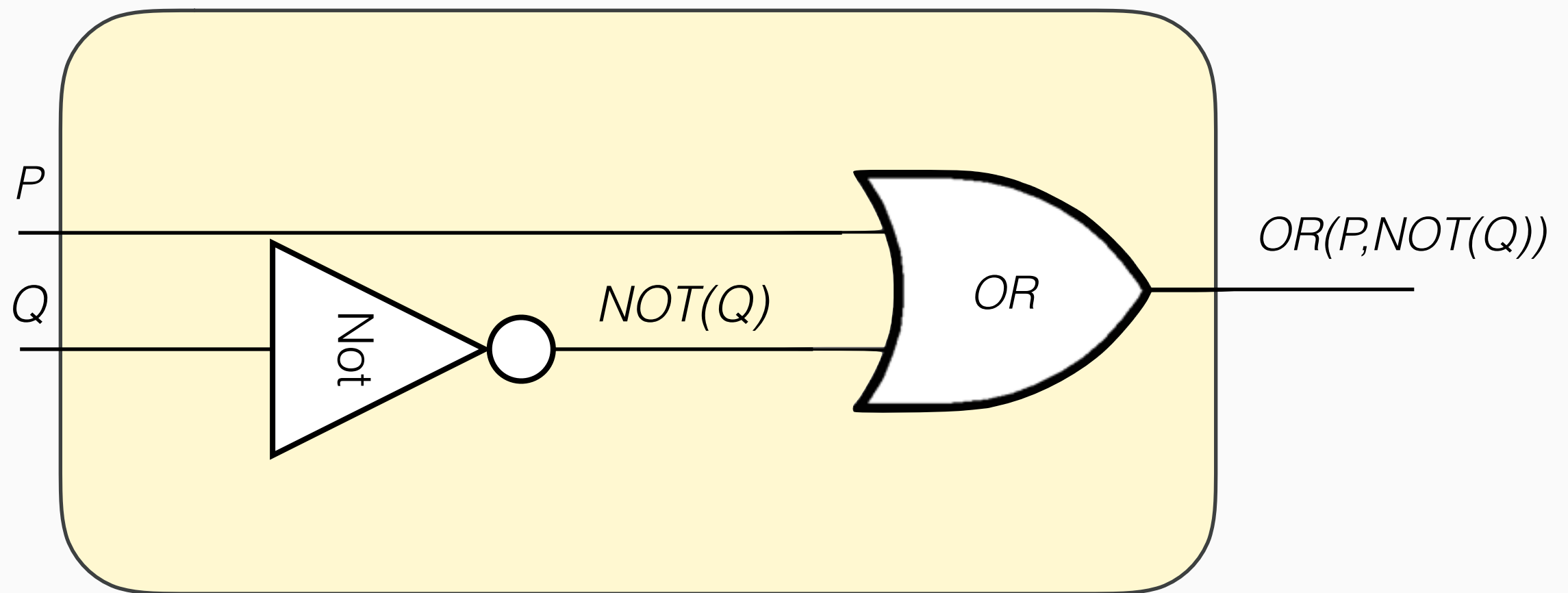# Trouble in Gateland?

OR(P,NOT(Q))

_Q_   Not   *NOT(Q)*   _P_   *OR*   *OR(P,NOT(Q))*

Trouble in Gateland?

Physically represents *OR(P,NOT(Q))*

P

Q

Not

NOT(Q)

OR

OR(P,NOT(Q))

Trouble in Gateland?

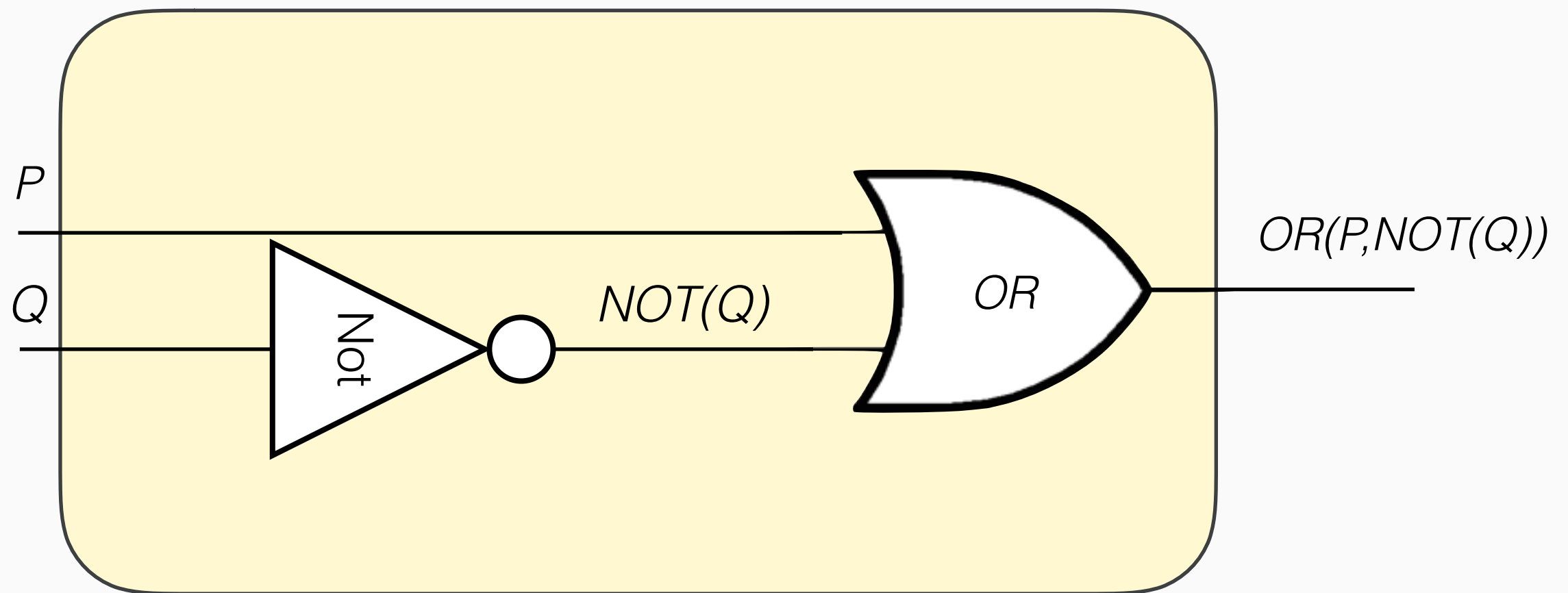Physically represents *OR(P,NOT(Q))*

"Hardware" logic. **Extremely fast.**

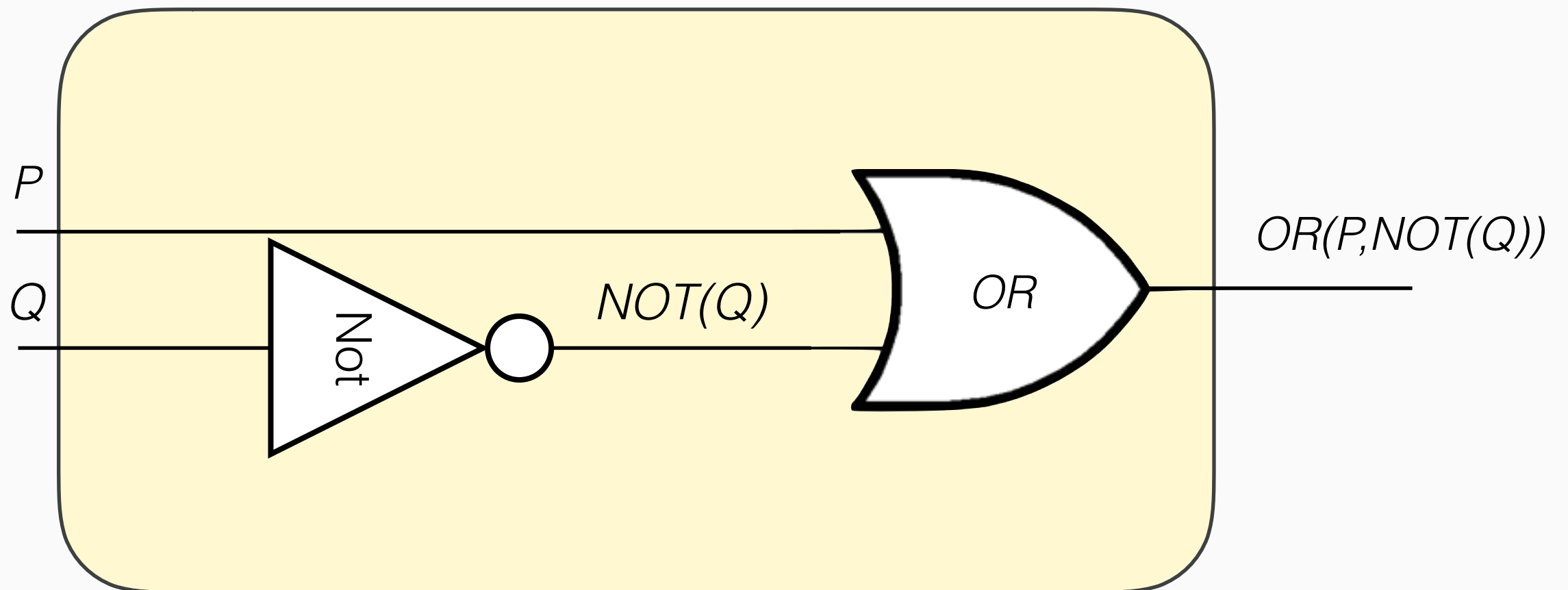# Trouble in Gateland?

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Q: What if we want to reconfigure things?

Trouble in Gateland?

OR(P,NOT(Q))

Q: What if we want to reconfigure things?

A: Programming.

Programs

Central Idea: the hardware does not have to change for a computer to change its behavior.
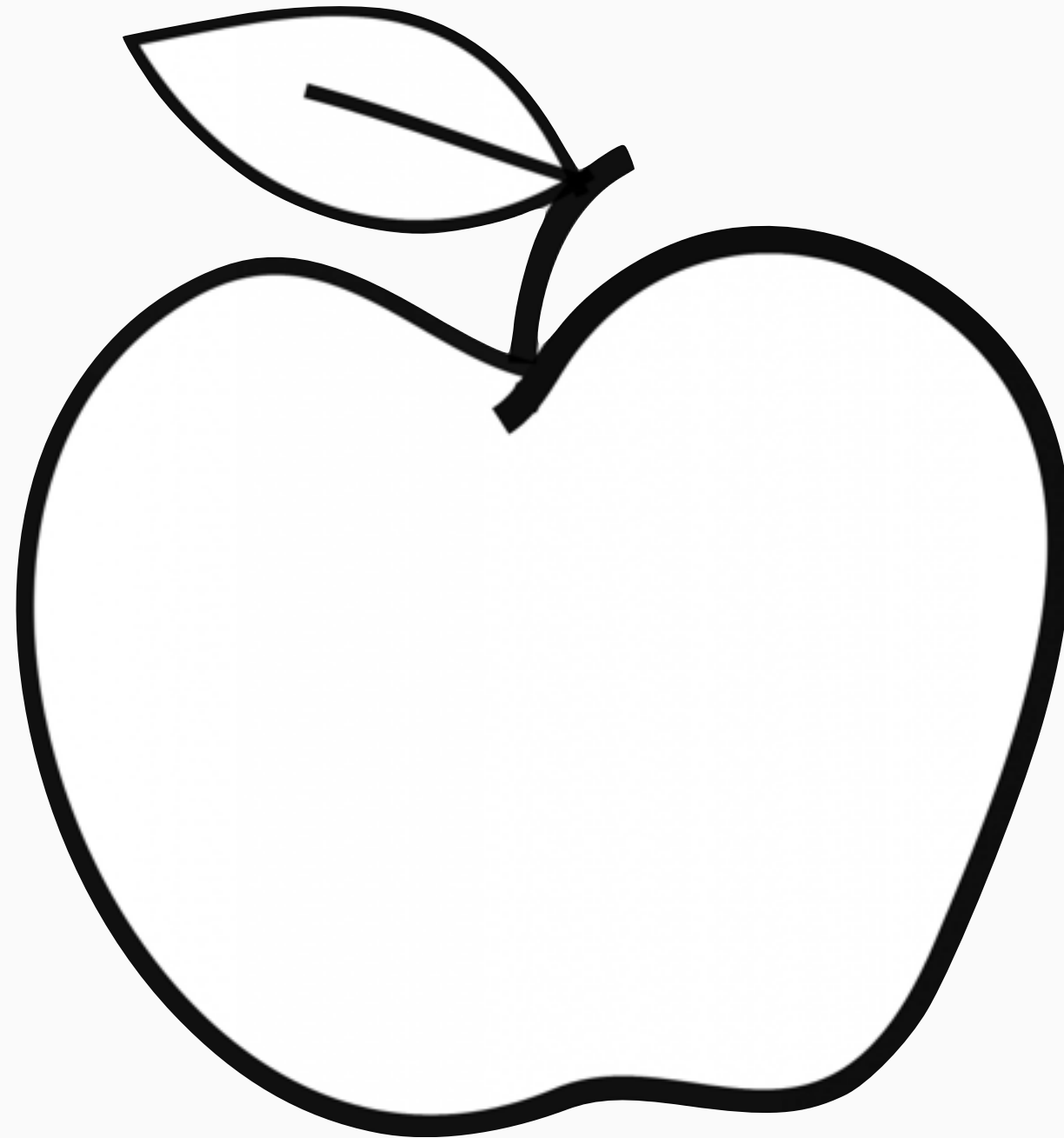
Programs

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A fixed set of circuits can *change its behavior* to represent any desired function! Build one, **reprogram** into anything.

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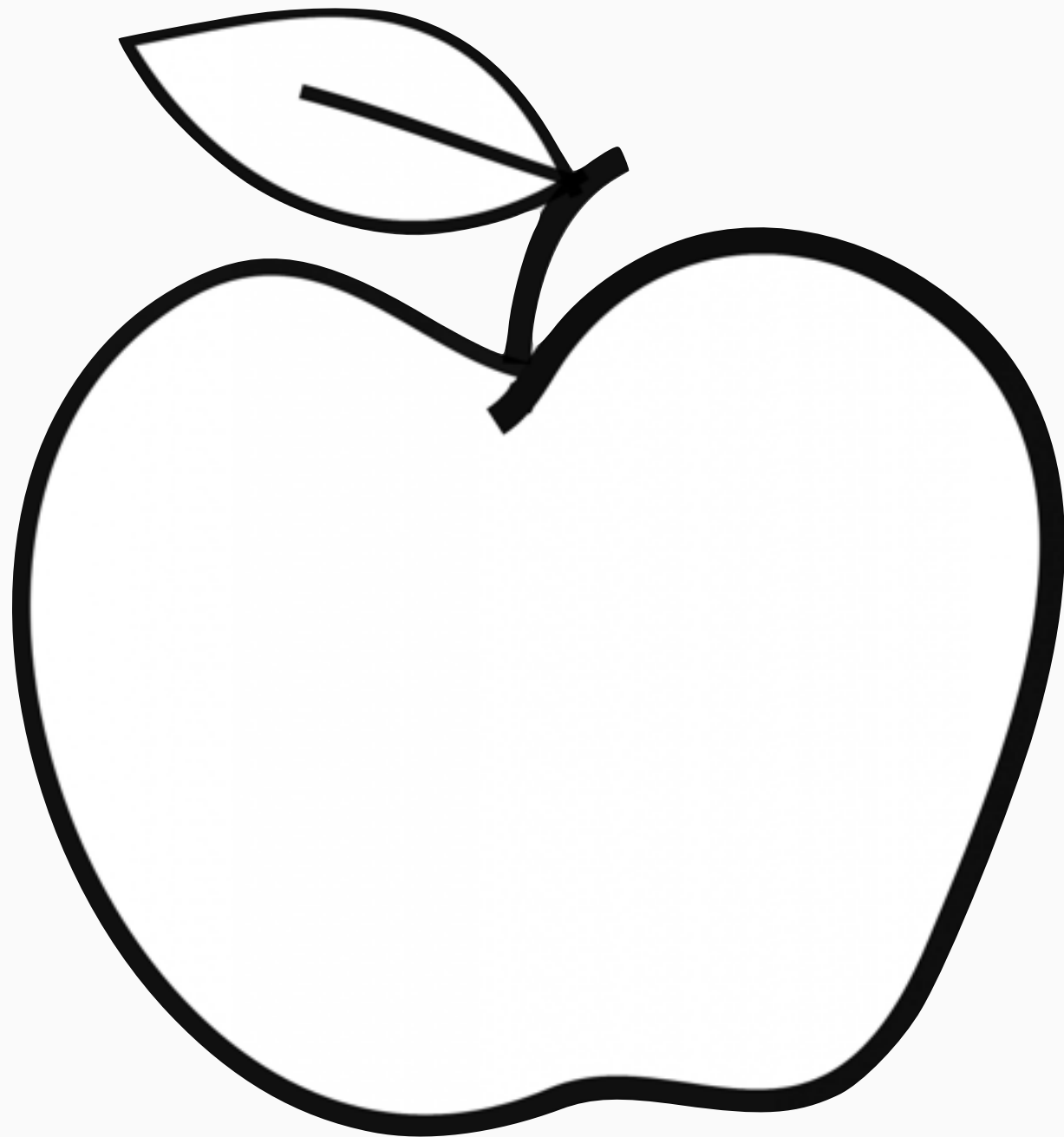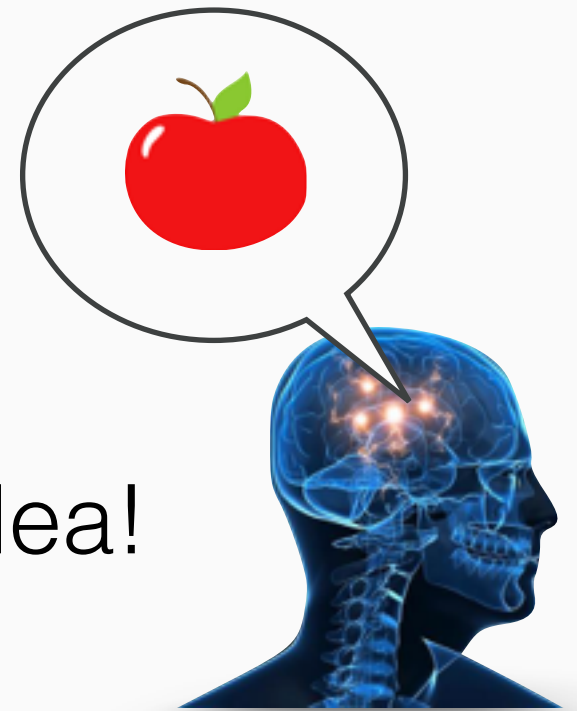
Drawback: **much slower.**

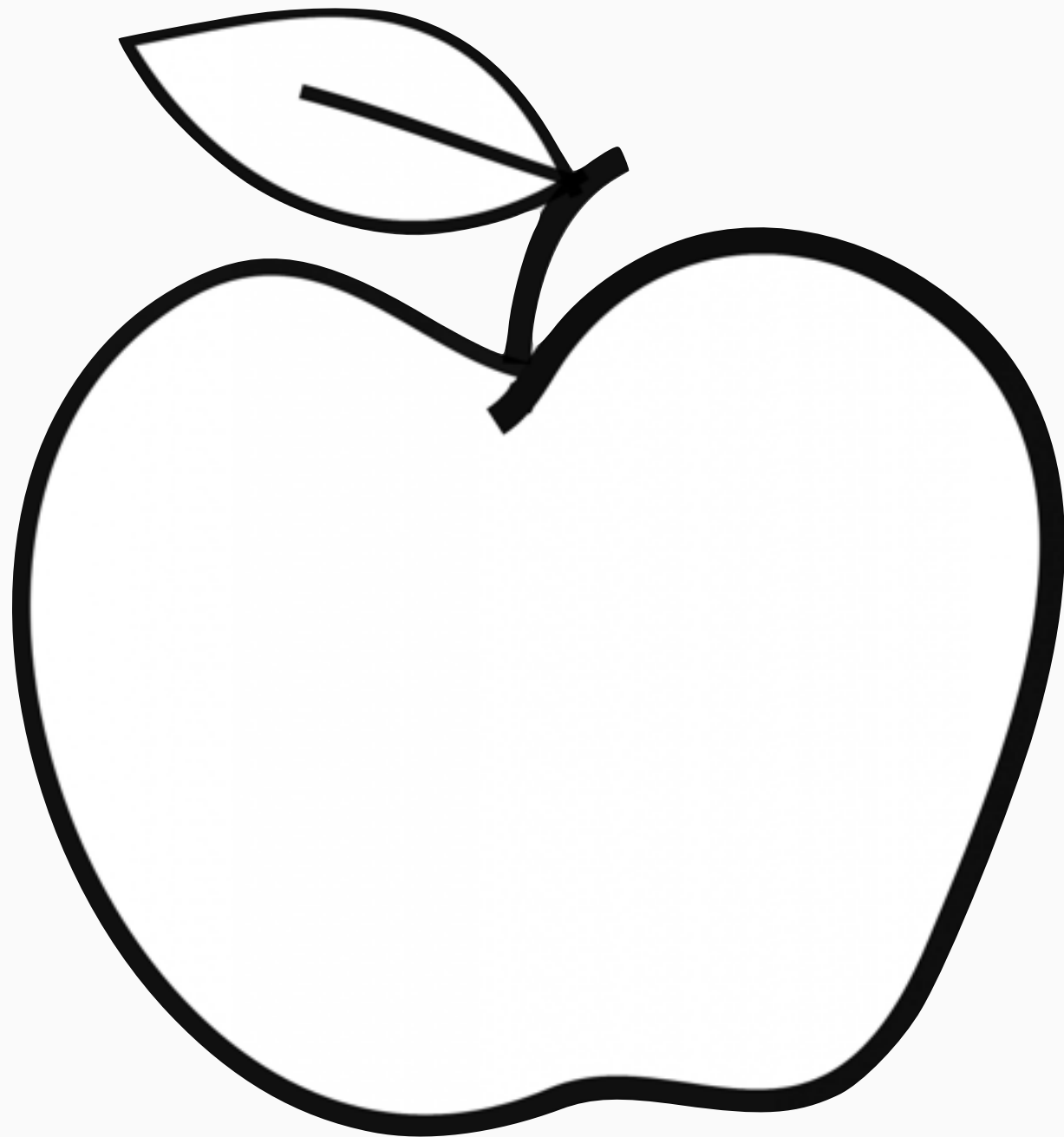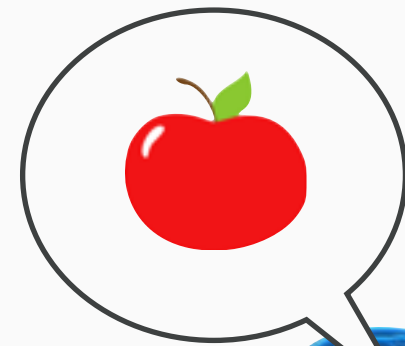# Programs: An Extension of the Will
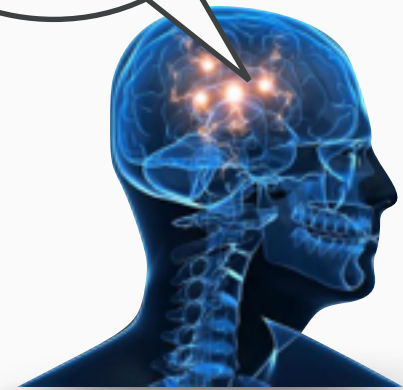
Programs: An Extension of the Will

Idea!

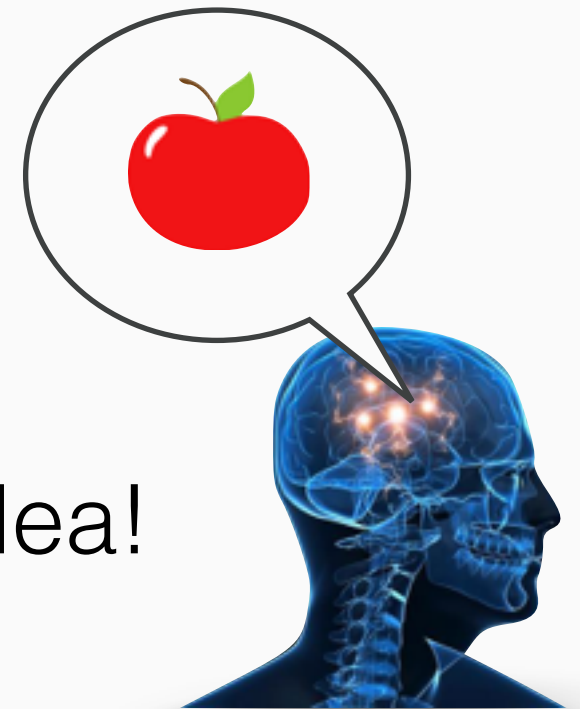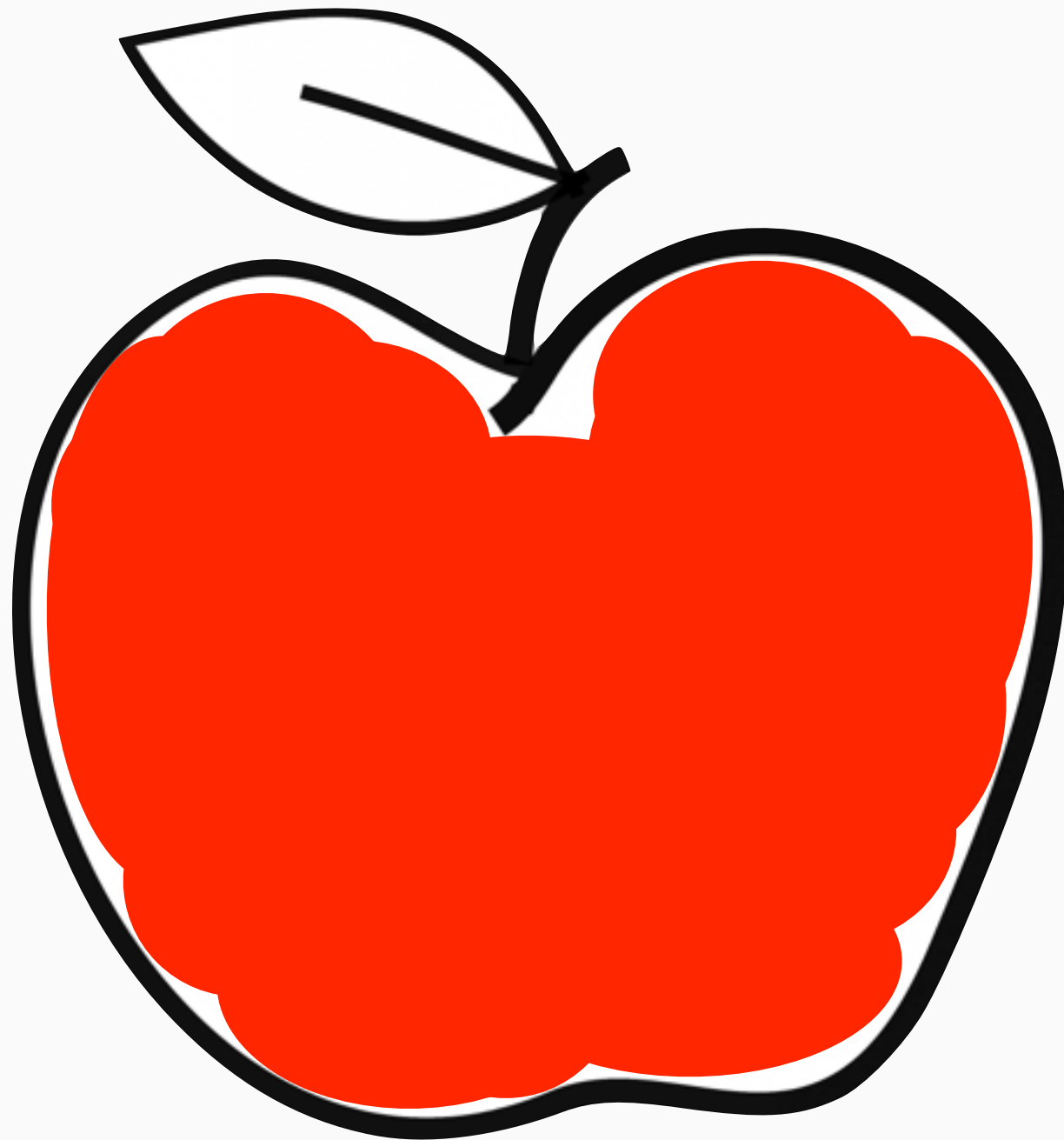# Programs: An Extension of the Will

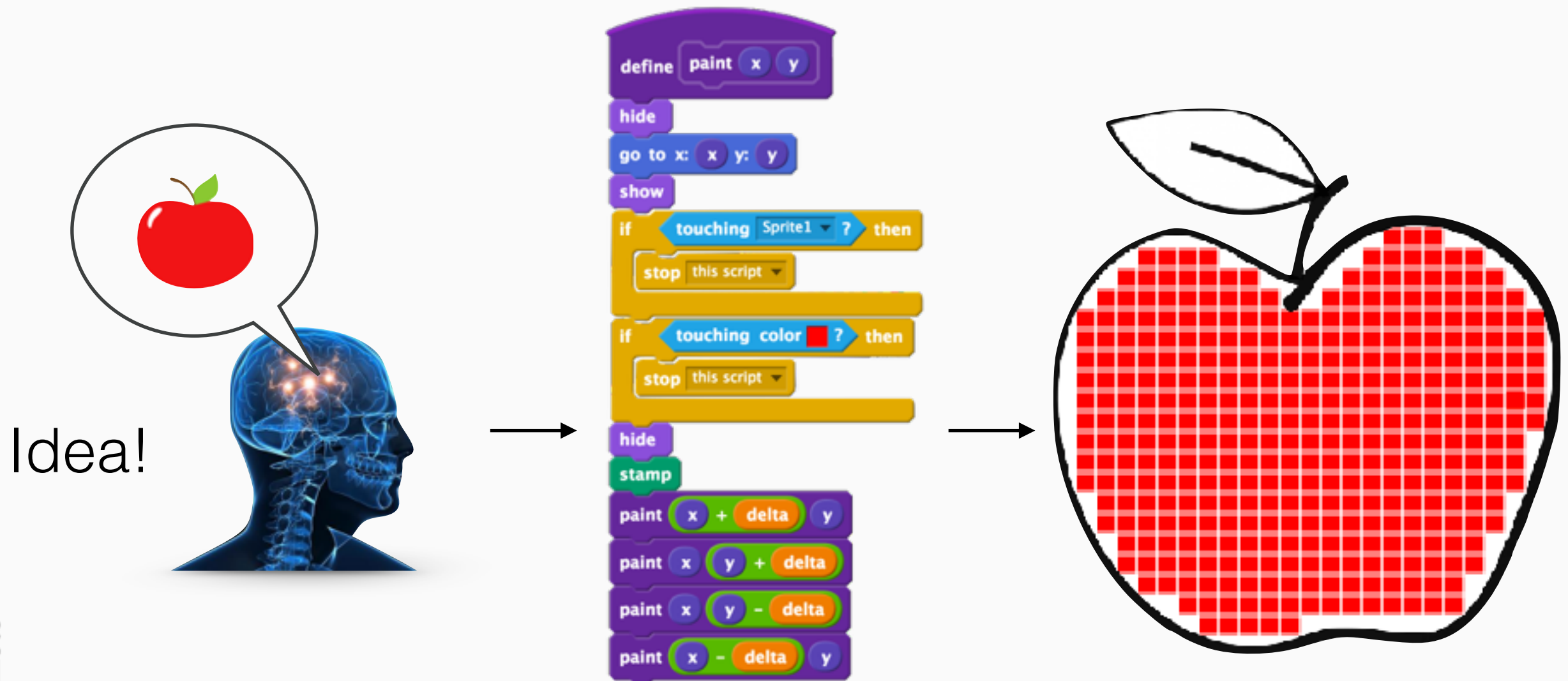Idea!

Action!

Programs: An Extension of the Will

Idea!

Action!

Programs: An Extension of the Will

With programs, I can delegate my idea to the computer

Idea!

Programming

‣ Lots of languages!

‣ Each language provides a different way to write commands to the computer.

‣ They all do basically the same thing…

Programming

‣ Lots of languages!

‣ Each language provides a different way to write commands to the computer.

‣ They all do basically the same thing…

‣ Allow us to access the wonderful world of computation!

Things that can be computed, period.

Things a regular computer can compute before the sun goes supernova

Dominos!
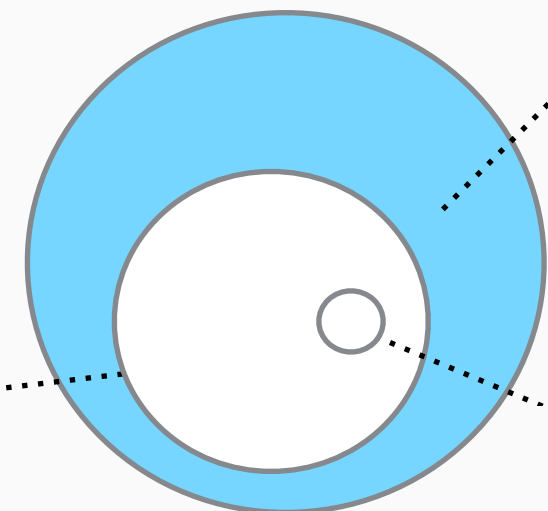
This Class: Scratch

‣ Developed by the "Lifelong Kindergarten" group at MIT

‣ Sort of like LEGO! Clip together blocks.

‣ Edit/run in your browser:

scratch.mit.edu

This Class: and Python!

‣ End of term extra-credit project.

‣ Several optional workshops to learn python

‣ Python: a rich language that looks an awful lot like english!

```
>>> print "Hello CS8!"
Hello CS8!
```

This Class: and Python!

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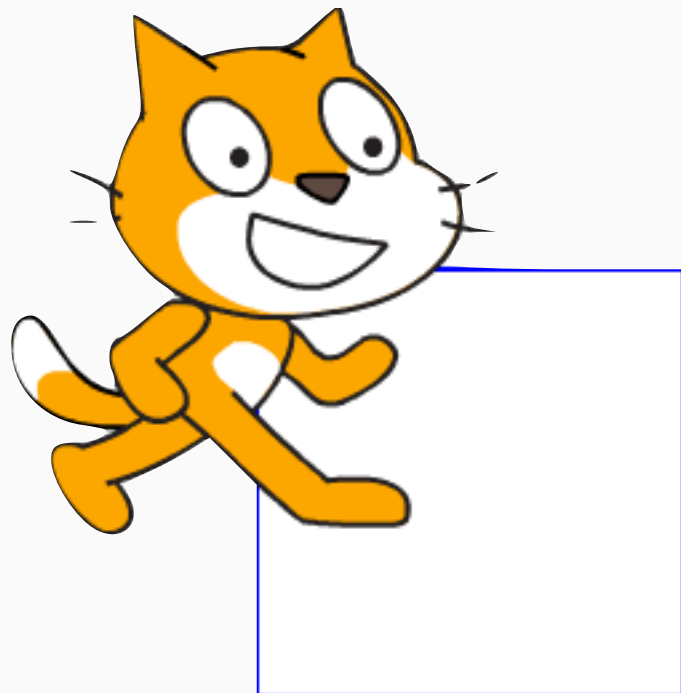‣ Python: a rich language that looks an awful lot like english!
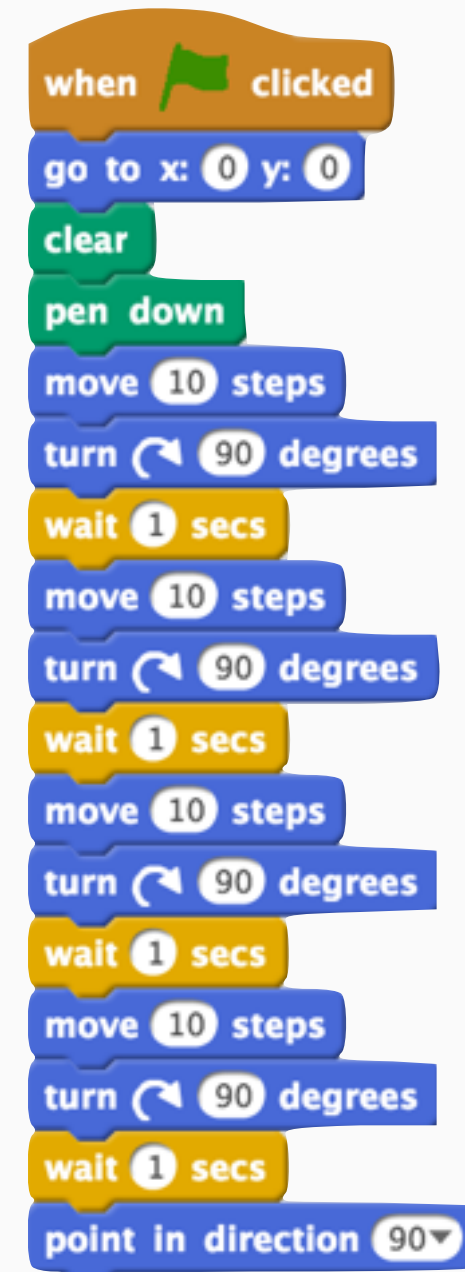
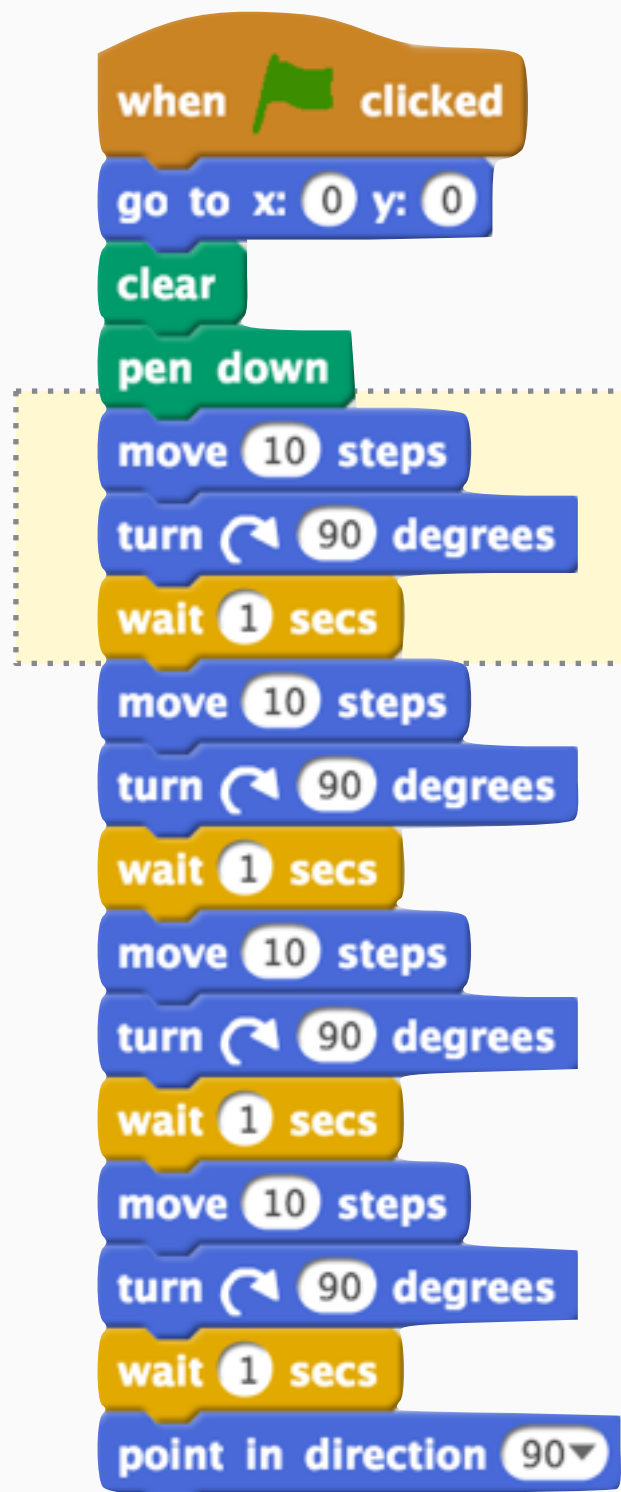‣ (also it's my favorite)

Mostly: Scratch!
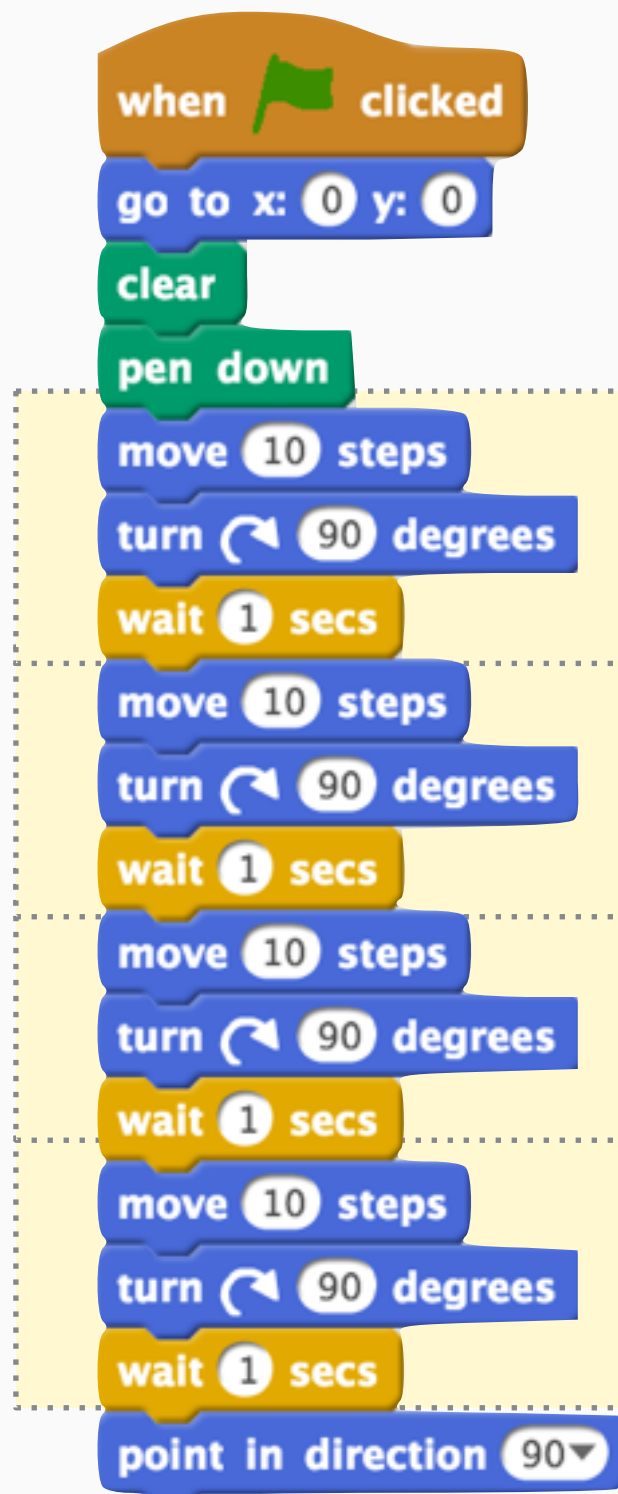
Let's take a look!

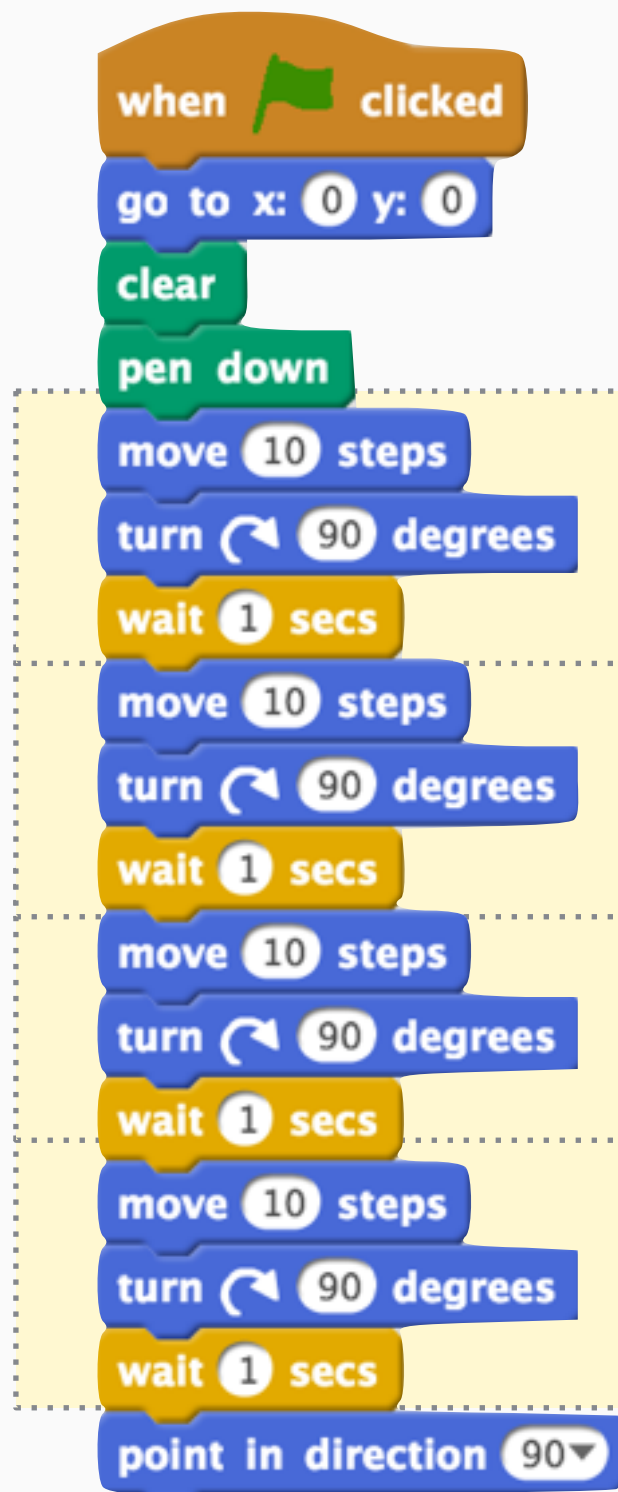# Demo 1: A Square

Let's take a look!

Demo 2: Loops

Repeats!

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Repeats!

Demo 2: Loops

Idea: tell the computer to repeat!

← Repeats!

Let's take a look!

Demo 3: Logic

or   and

not

Anything with this shape:

evaluates to **True** or **False**

Demo 3: Logic

or

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Let's take a look!

Anything with this shape:
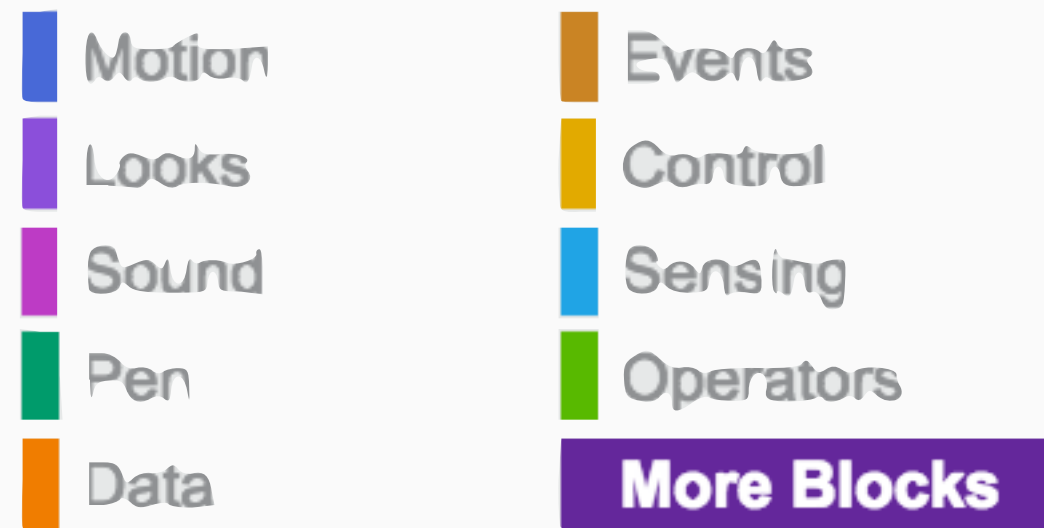
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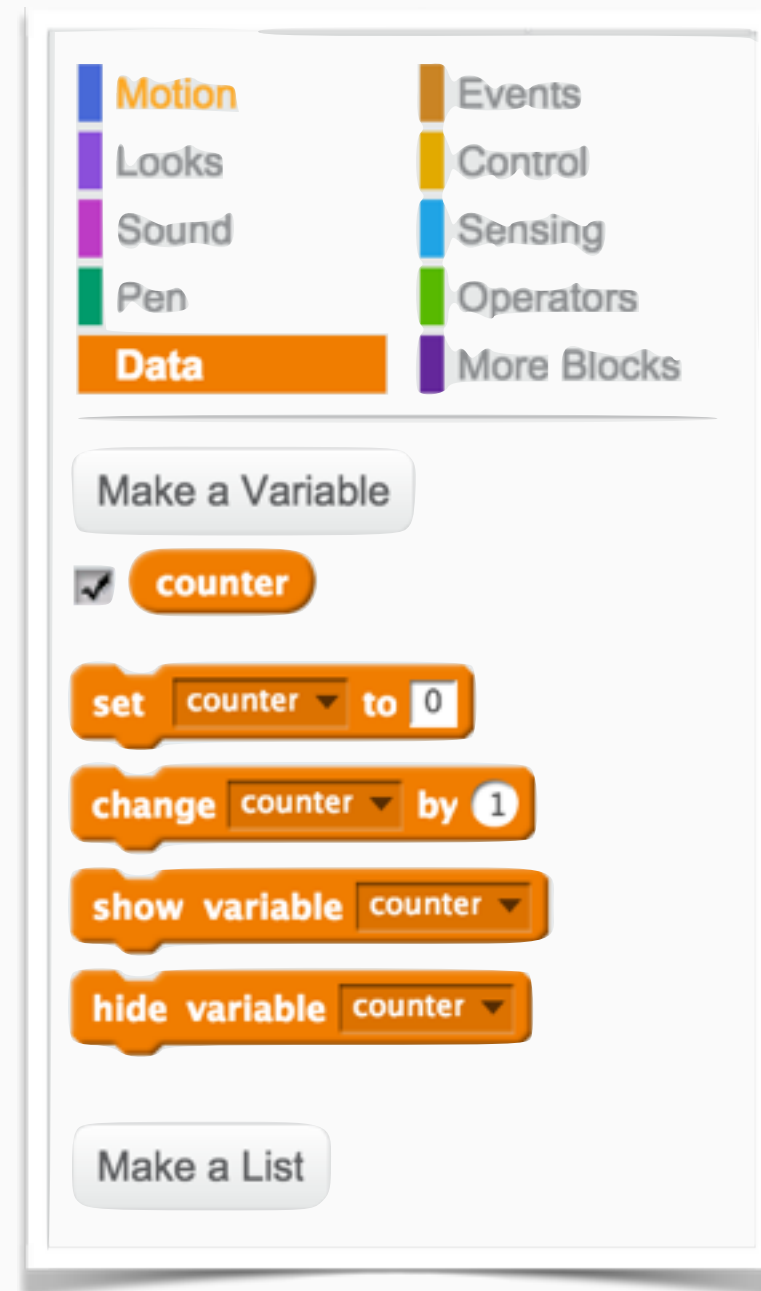# Demo 4: Making Blocks

Let's take a look!

Demo 5: Variables

Let's take a look!

Demo 6: Conditions and Loops

Let's take a look!

Demo 7: Coin Flipping!

And more… Let's take a look!

Things You'll Do in Scratch

‣ **Machine Learning:** Writer a classifier, similar to how your email determines what is "Spam" and what is "Ham"!

‣ **Programming:** A simple game

‣ **Vision + NLP:** Model Roald Dahl's style of writing!

‣ **Recursion:** Draw recursive pictures

‣ And more…

Block Types