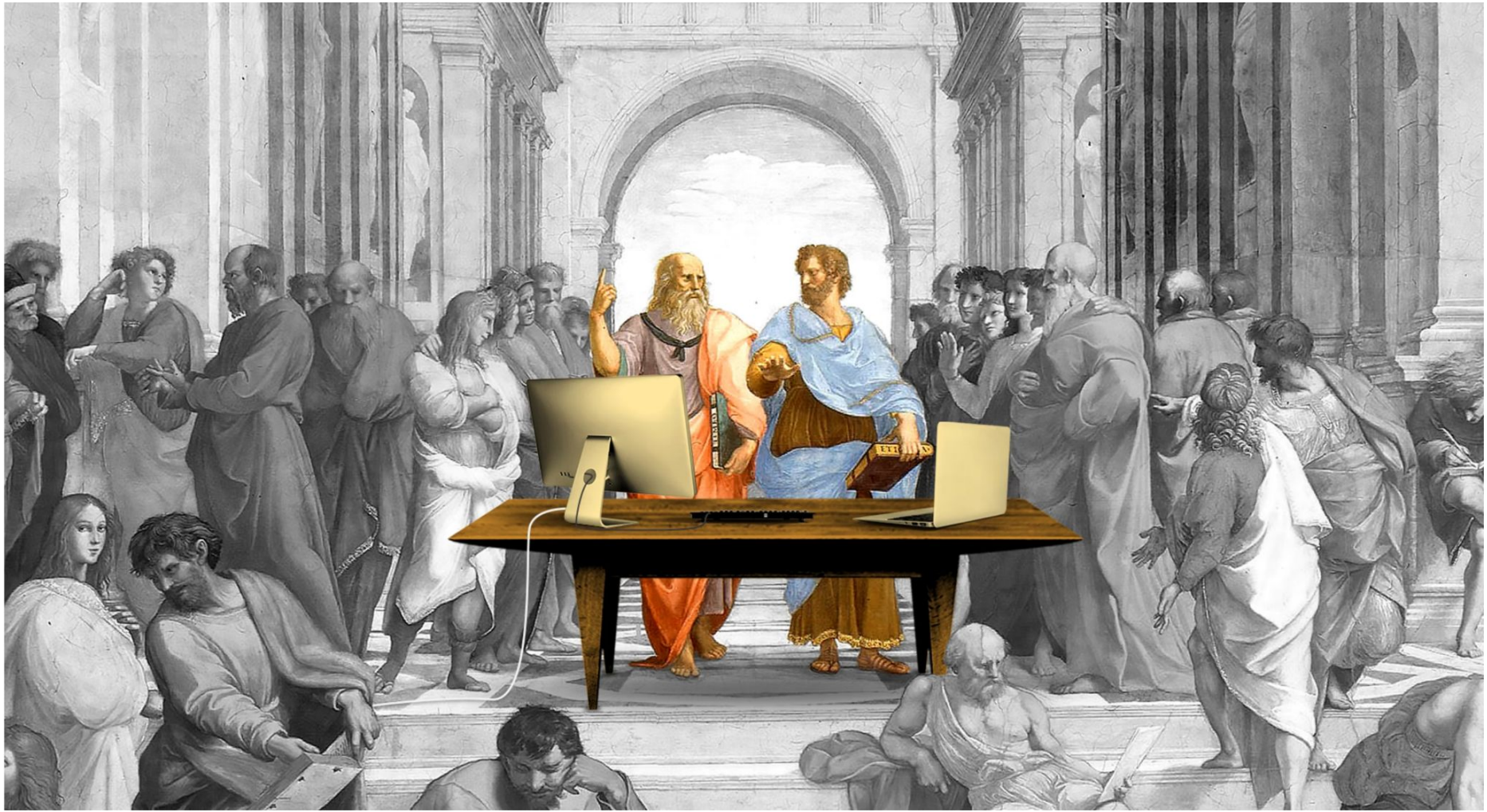
CS 103000
Prof. Madeline Blount

Week 3:
LOGIC && CONDITIONALS
CONTROL FLOW
BRANCHES

Dall-E 2: cats learning C++ in the forest on '90's technology



Atlantic, 2017

Aristotle

Law of Noncontradiction:

- No statement can be both true AND false

Law of Excluded Middle:

- Every statement either true OR false

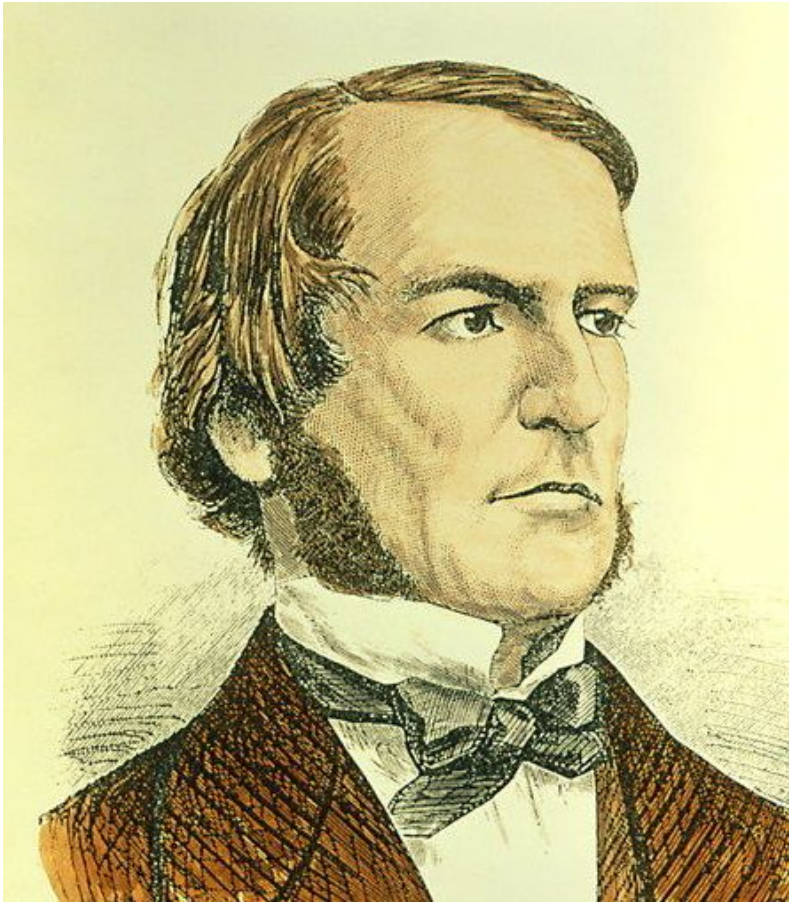
Liar Paradox:

- “This statement is not true.”

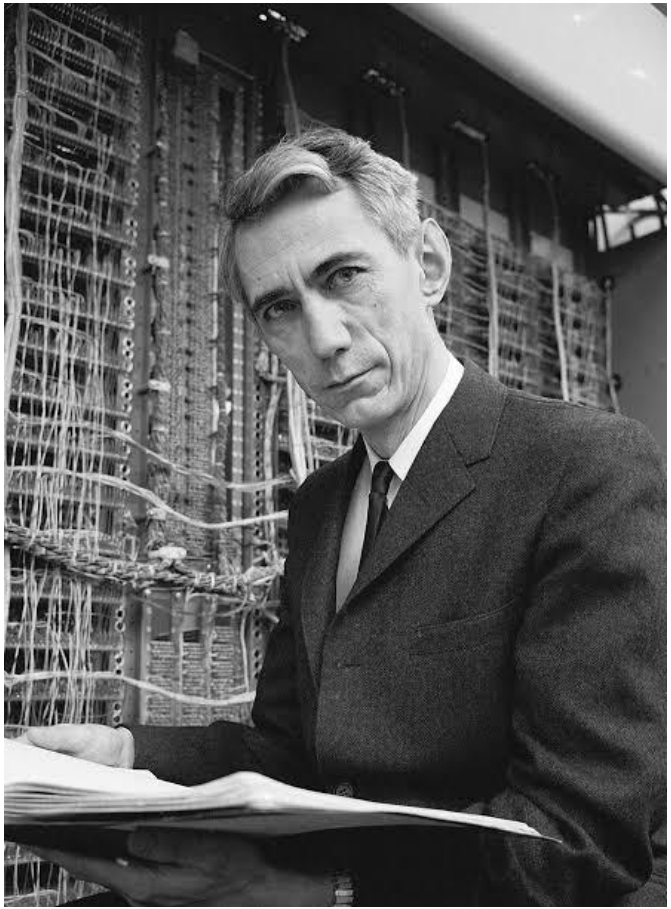
Other ways of knowing:

- Poetic license!
- Religious knowledge!
- Quantum mechanics!

… so, we are only assuming 1 kind of logic



Boole, *Laws of Thought*, 1854



Shannon, 1938

Proposition I.

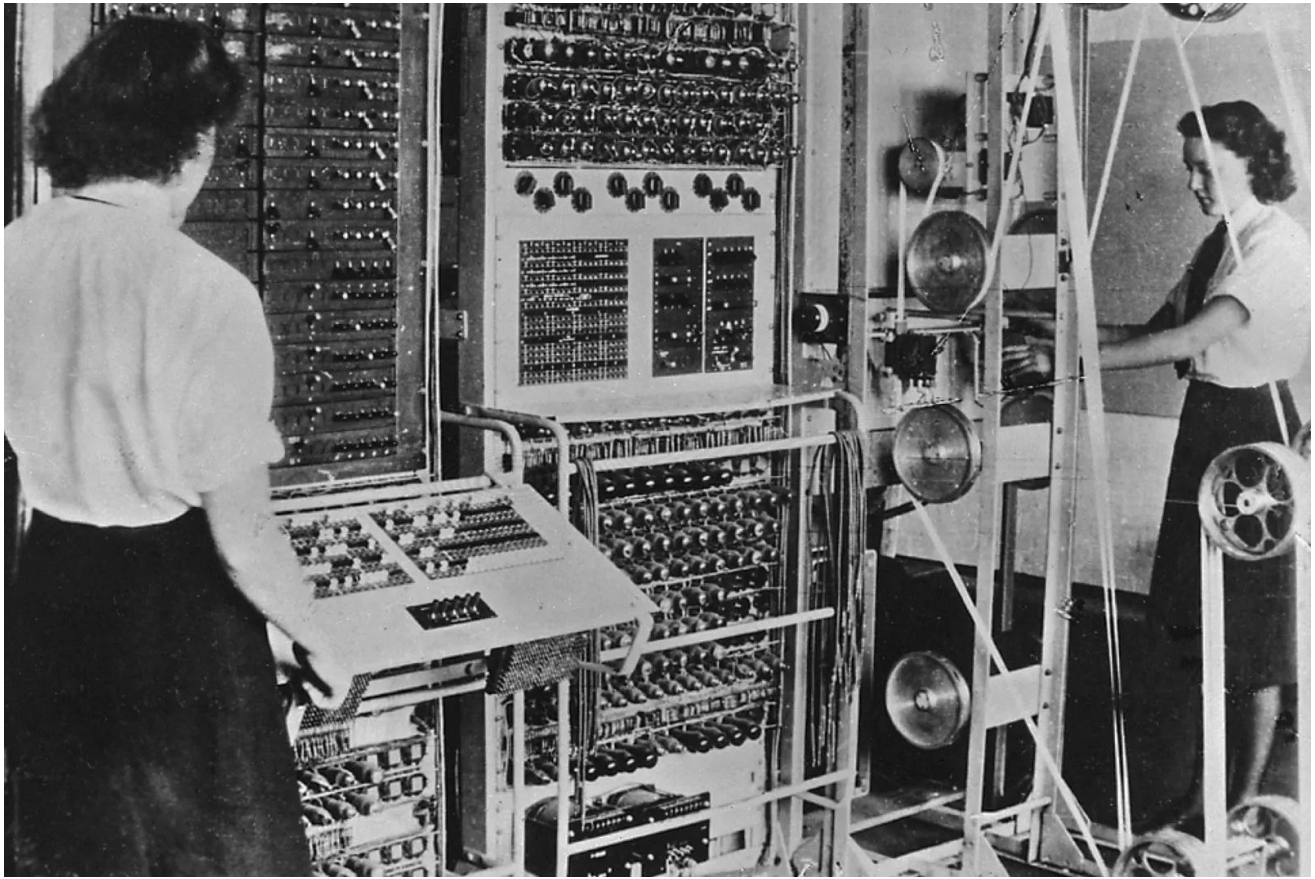
All the operations of Language, as an instrument of reasoning, may be conducted by a system of signs composed of the following elements, viz. :

1st. *Literal symbols, as x, y, &c., representing things as subjects of our conceptions.*

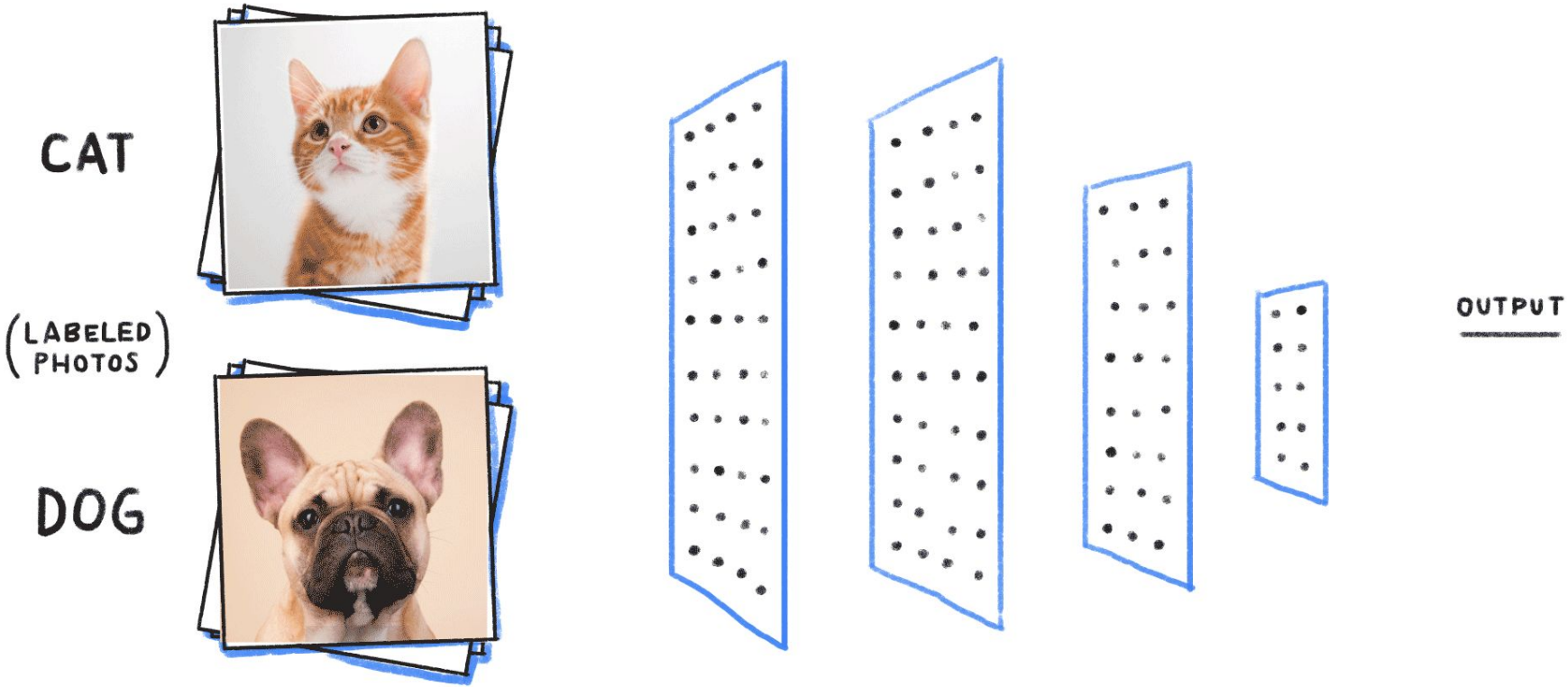
2nd. *Signs of operation, as* $+, -, \times$, *standing for those operations of the mind by which the conceptions of things are combined or resolved so as to form new conceptions involving the same elements.*

3rd. *The sign of identity,* $=$.

And these symbols of Logic are in their use subject to definite laws, partly agreeing with and partly differing from the laws of the corresponding symbols in the science of Algebra.



Code breaking machines, Bletchley park WWII (Turing, working to break German Enigma) - Boolean logic



Even advanced neural networks based on Boolean logic, classification
STATISTICAL INFERENCE, NEW RULES

&& AND (x == y && y == z)

|| OR (x == y || y == z)

! NOT !(x == y) NOT

```
!!(x == y)
```

NOT NOT … TRUE!

BANG BANG!

bool <name>

TRUE or FALSE

1 or 0