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ARISTOTLE'S LEGACY

Aristotelian Traditional Logic ensure statements are not capricious. What is true, is true, what is false, is false.

A statement cannot be true and false at the same time, or be true now and become false, later:

```
        a is a
        a is not b
        is not a & b
```

Traditional logic, which is also called Syllogistic logic was an innovation in its own time, for it provided the means to preserve the integrity of statements.

The Syllogism relies on four statements to make inference:

```
All S are A.
All S are not A.
Some S are A.
Some S are not A.
```

An innovation that was inspired by the Syllogism was the introduction of propositions, as opposed to statements. Whereas statements were mainly rigid, and could not allow for the possibility of introducing change (such as the kind encountered in scientific experiments), propositional logic was a welcome change that granted more freedom.

Propositional logic, in its original form relied on two main rules and two derivatives:

Modus Ponendo Ponens:

```
        if W implies J, and
        J is true,
        then W is true.
```

Modus Tollendo Tollens:

```
        if W implies J,
        and J is false,
        then W is false.
```

Modus Ponendo Tollens:

```
        if W and J are both false,
        but J is true,
        then W is false.
```

Modus Tollendo Ponens:

```
        if either W or J is true,
        and W is not true,
        then J is true.
```

This is better and more flexible than the four-statement syllogistic inference, but it has its own problems which we will address in the future chapters.

Finally, there is a necessary distinction between philosophical and mathematical induction. In mathematics, the chain of induction holds because math is static; things are what they appear like, and words and symbols mean what they represent. Math is honest and stable. Proof by induction holds because mathematical quantities do not obey game-theoretic variability.

By contrast, philosophical induction leads to the white swan problem. If all the swans we have seen so far have been white, it does not guarantee that there are no black swans.