Logic - Lecture 10

Singular Sentences

We are now going to start studying predicate logic or quantifier logic. Instead of operating with entire sentences... simple or compound... we are going to consider the inner workings of sentences. There will be a subject and a predicate, something that is asserted about the subject.

In this lecture, subjects are going to be things with names, like George Washington, France, or that bottle of Cuban rum.

Later we will expand our perspective and consider categorical sentences where subjects can be entire classes, traditionally called categories. "All horses are vertebrates" or "Some bankers are dishonest" make assertions about categories of objects.

Some definitions:

1. A name is an expression that refers to a particular individual person or thing.
2. A singular sentence is a sentence containing a name.
3. An individual constant is a lower case letter used to abbreviate a name.

4 An <u>individual variable</u> is a lower case letter (x, y, z usually) that serves as a placeholder for a name.

5 A <u>propositional function</u> is a singular sentence with some or all of its names replaced by individual variables.

6 A <u>predicate letter</u> is a capital letter that abbreviates some property that an individual constant or individual variable is supposed to possess.

Some examples illustrating how this works:

Given the singular sentences below we encode them as follows:

1) Tolstoy was Russian Rt
2) War and Peace is a novel Nw
3) The moon is cratered Cm
4) Angela is happy Ha
5) Bob is happy Hb

The property exhibited by the named object is capitalized and the object follows in lower case. The corresponding propositional functions are:

1) Rx
2) Ny
3) Cz
4) Hw
5) Hw

Note that 4) and 5) yield the same function ... "w is happy".

So far our singular sentences have been simple. We can easily compound them.

Let P = "went to the party"
B = "saw Betty"
M = "saw Marge"

Then "x went to the party but did not see either Betty or Marge" is coded as $Px \cdot (\neg Bx) \cdot (\neg Mx)$.

With obvious notation, "If z lives in a glass house, then z should not throw stones" is $Gz \supset \neg Tz$, and so forth.