Predicate Logic

The first of these, predicate logic, involves using standard forms of logical symbolism which have been familiar to philosophers and mathematicians for many decades. Most simple sentences, for example, ``Peter is generous'' or ``Jane gives a painting to Sam,'' can be represented in terms of logical **formulae** in which a **predicate** is applied to one or more **arguments** :

*PREDICATE ARGUMENTS*

*generous (peter)*

*gives (jane, painting, sam)*

Consider the following sentence: ``Every respectable villager worships a deity.'' A moment's reflection will reveal that this is ambiguous. Is it saying that there is one single deity to which each respectable villager offers worship? Or does each worshipper have his or her own deity, to which a fellow respectable villager may or may not be also praying? With predicate logic it is easy to reveal the nature of the ambiguity, by a device known as **quantification**. Quantification allows one to talk in a general way about all things of a certain class or about some particular but unspecified thing of a certain class.

We can, for instance, express the proposition ``All of Jane's friends are generous'' in terms of the following formula:

*For any X: IF friend(X,jane) THEN generous(X)*

while the sentence ``Jane has at least one friend who is generous'' can be expressed as follows:

*For some X: friend(X,jane) AND generous(X)*

The expressions `For any X' and `For some X' are known as **quantifiers**. We can now use quantification to exhibit the ambiguity of the sentence about the respectable villagers. The first reading of it can be represented as

*For some X: for any Y: deity(X)   
AND IF (villager(Y) AND respectable(Y)) THEN   
worships(Y,X)*

while the second can be represented as

*For any Y: (IF villager(Y) AND respectable(Y) THEN   
For some X: deity(X) AND worships(Y,X))*

It is thus possible to show in a clear way that the original sentence can express (at least) two quite distinct propositions. It is possible to infer from the first, but not from the second, that if Margaret and Neil are two respectable villagers, then they both worship the same entity. (In the interests of ecumenical peace, however, it is sometimes better to refrain from letting such ambiguities come out into the open!)