PROPOSITIONAL LOGIC

A capital letter represents a simple declarative assertion, such as "Socrates is bald."

But the "internal structure" of this assertion is ignored.

PREDICATE LOGIC

We now recognize that assertions (such as the one above) have a subject-predicate structure, which we will capture in the following way:

> We will use capital letters to stand for (*grammatical predicates* or) "*General Terms*" (i.e., properties and relations) and lower case letters to stand for (*grammatical subjects* or) "*Individual Terms*" (i.e., nouns, names, pronouns, and other referring expressions).

So, "Socrates is bald" will be translated:

> Bs

which we might read, "Baldness is true of Socrates" (i.e., "B is true of s.") or, "Socrates has the property of being bald," (i.e., "s has property B.")

QUANTIFED LOGIC

Constants and Variables

We will use lower case letters towards the beginning of the alphabet to stand for names (proper nouns), nouns, and other expressions that refer to a specific entity. These lower case letters are called "*constants*," because their referents are "fixed" or "constant."

But we will reserve lower case letters towards the end of the alphabet (typically "x," "y," and "z") to stand for pronouns (such as "this," "that," or, more typically, "it"). These lower case letters are called "*variables*" because their referents "vary" or are determined by the broader "context."

So, for example, "Bx" would be read "it has property B."

Quantifiers

Note, however, that "it has property B" isn't really a complete statement. Better yet, we are unable to analyze it's truth value without some information about the "context." We need to know something of the "range" of possible referents that might be referred to by "it." For this purpose, we will introduce two quantifiers;

--the "existential quantifier," represented with a backwards "E," i.e., "∃." This can be read as "some" or "at least one." So

"(∃x)Bx" says that "There is something (at least one thing)—call it x—such that x has property B," or, "Something is B," or "There is a B."

The quantifier symbol, ∃, and the variable, in this case "x," go inside parentheses. If what follows this is a simple formula (i.e., contains no truth functional connectives other than "~"), the entire group of symbols, in this case "(∃x)Bx," is a wff, and does not have parentheses around it. If what follows the quantifier is a complex formula (such as "Bx • Fx"), then we must put parentheses around that formula. So

(∃x)Bx

and

(∃x)(Bx • Fx)

are both wffs.

--the "universal quantifier. In many texts, the universal quantifier is represented with an upside down "A," thus, "∀." But in our text, it will be represented by simply putting a variable within parentheses. So,

"(x)Bx" says that, "For all x, x is B," or "Take anything you like, call it x, x is B," or "Everything has property B." Just like for the existential quantifier, if what follows this is a simple formula (i.e., contains no truth functional connectives other than "~"), the entire group of symbols, in this case "(x)Bx," is a wff, and does not have parentheses around it. If what follows the quantifier is a complex formula (such as "Bx ⊃ Fx"), then we must put parentheses around that formula. So

(x)Bx

and

(x)(Bx ⊃ Fx)

are both wffs.