

Natural Language & PL's

I. Elements of Language

A. Parts of Speech

Correlation between English parts of speech and words in programming languages [F&G Ch.3]

1. Nouns: Identifiers

a. Natural Language: person, place, or thing

b. PL's: variables, constants, functions, types

c. Issues:

(1). First-class objects

(2). Naming Objects: LISP names can exist w/out being bound, Pascal names can be bound simultaneously to different objects in different scopes, C names can be bound through a pointer to an object that doesn't exist any more

2. Pronouns: Pointers. Must be bound to an object before becoming meaningful.

a. Natural Lang: refers to a noun

b. PL's: pointer. Used to label dynamically created objects, can have dangling pointer

3. Adjectives: Data Types

a. Natural Lang.: describe the size, shape and characteristics of objects

b. PL's: data types give size, structure, & encoding. These characteristics may be inherited (OOP)

4. Verbs: action words

a. Natural Lang.: actions or states of being (e.g. It runs, He wept)

b. PL's: action words like RETURN, BREAK, STOP, GOTO, :=.

(1). Procedure & Function calls, and arithmetic operators are like action verbs.

(2). Relational Operators (e.g. <=) are like states of being

(3). Different syntactic forms for verbs: Pascal vs. LISP [F&G p. 52]

(4). Domain of verbs indicates where it can appropriately be used. Similarly for domain of function. [F&G p. 53]

5. Propositions & Conjunctions

a. Natural Lang: Used to denote time, position, conditionals, and the relationship of phrases

b. PL's: While, IF, CASE

B. Metalanguage used to describe language

Can use English to describe English

1. Words: Lexical Tokens. Lexer used to get lexemes according to some set of rules and delimiters [F&G p. 55]

2. Sentences: Statements

a. Originally fixed-format (card input, 80 cols.)

b. Later became free-form, w/statement separators (e.g. ";")

3. Paragraphs: Scopes.

a. Some English words (e.g. pronouns) are understood to apply to the entire paragraph.

b. PL's: scope can be indicated in distinct ways [F&G pp. 60-62]

4. Footnotes: Comments

a. Natural Lang: conveys something about the text

b. PL's: provides info. about program that is not part of the prog.