

IN THE NAME OF ALLAH

## Human Languages, Computer Languages: Similarities & Differences

There are about 140 human languages and 15 full-fledged computer languages currently in use ; ( although more than 2500 computer languages have already been listed by computer programmers.)

Just like half of the world's spoken tongues, most of these computer languages are either endangered or extinct; when modern source codes dominate computer systems, hundreds of older languages are running out of life: reasons that a language endures are many; among them one can mention:

- 1-appealing to a wide audience
- 2-delivering new functionality
- 3-having a powerful user base or bucker...

So we can consider principles like:

- 4-Clearness & being well defined
- 5-Completeness & universality
- 6-Its fluency in use of time and space
- 7-Being readable & writable for human users
- 8-Simplicity (being based on a few elements)
- 9-Regularity & extensibility

Some common features for the endurance of a language, either of human or of computer, and that is definitely the survival of the fittest.

Computer languages evolve, and are related to one another in rather complex ways. Almost every computer language can be regarded as an improved version of something else. Sometimes it is hard to know where to draw a line and say: "This is a separate language."- (in this case human languages are more distinct).

In computer language, dialects have also major differences and are certainly considered by their users to be distinct languages; variants are intended to be the same, but have certain features which make them incompatible, being often the result of commercial products offered by different vendors; versions arise as a computer language matures. A series of revisions will be issued, causing small changes in the language.

Another important point in computer language is that, unlike human languages, the language's name is not always an accurate guide to its identity: sometimes a language undergoes significant evolution without any official change in name; sometimes just the name

changes & in many cases the same name is used for several distinct languages.

However, it should be regarded that human languages are also open-ended, infinite & creative.

The grammars used by computers for parsing are not the same as the grammars linguists construct for human languages, which are models of linguistic performance.

In human languages, a grammar consists of a finite collection of grammatical categories (noun, verb, noun phrase, verb phrase), individual words (elements of alphabet), rules for describing the order in which these elements of the grammatical categories must appear.

But in a context-free grammar (that of all computer languages), categories are called variables, the words, terminals, the grammar rules, production, and the most general grammatical categories called start symbol.

So we can see connections between human & computer languages with respect to both structure (syntax) & meaning (semantics); human languages always seem to have fairly definite rules for what is grammatically correct; but in any given language there are always many exceptions that are convincingly universal across more than just languages with clear historical connections; still all the computer languages that are in widespread use are, as mentioned above, based quite explicitly on context-free grammar that is much less complex than human language grammar with many variances & exceptions.

Because human language is natural, it is apparently as old as human itself; the first real human language was developed in Nazi Germany ca. 1945; computer languages are, like human language, according to different aspects, of utility, etc., divided as formal & informal or classic & modern:

For example, FORTRAN, the first classic computer language, is used only for computation.

The mother tongue of computers is neither digits nor letters. In a computer language every thing is translated (compiled) into the binary number system; so the mother tongue of computers is digits one & zero.

Human languages typically have 50,000 common words while computer languages usually have a few hundreds at most.

Computers are multilingual: they are fluent in all computer languages; however, when it comes to language acquisition, no computer can match the ability of even a four year-old child; children do not learn a language by imitating and storing of sentences but by constructing a mental grammar. Generally when humans speak, they do not "generate" a sentence by starting with a symbol 'S' and

applying rules consecutively until the final output is a string of phonetic symbols, which then must be translated into neuromuscular commands to the articulators to produce speech, rather we use grammatical knowledge together with other cognitive structures and capabilities to produce utterances.

In expressing general human issues, different human languages tend to be largely equivalent. Computer languages are also mostly equivalent in their handling of general programming issues; natural languages are not suitable for programming languages because humans themselves do not use natural languages when they construct precise formulation of concepts & principles of particular knowledge domains; instead humans use a mix of natural languages, formalized symbolic notation of mathematics & logics & diagrams. The most successful of these symbolic notations contain a few basic simple rules to produce objects of generalizations & analogies. Successful computer languages do the same by catering the natural problem-solving approaches used by humans.

Computer languages are usually simple to learn due to the small number of types in the language; usually an hour or so is enough time to learn a new computer language for someone who has already programmed.

Human languages, unlike computer languages are difficult to process due to impreciseness, ambiguity, redundancy, context-dependency, etc. However, these properties are in fact essential to human communication.

In this article it was mostly tried to avoid any deepening into either sides of the subject; rather the main concern was a comparative study of human languages & computer languages in order to help human users of computers understand both human languages & computer languages better.

It must be noted that in this article fields like machine translation, talking computers, or grammar- checking soft wares are not included; moreover in the case of human languages matters like psychological factors and cognitive aspects are, for the sake of clarity, excluded: Here, a computer language means a system for programming and a human language a system for communication.

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May, 2004

Appendix:

1-Key Terms

2-References

“Definitions for some key terms”

- Computation: the application of a sequence of operations to a value to yield another value
- Program: a specification of a computation
- Syntax: the structure or form of a program
- Semantics: the relationship between the program & the model of computation
- Pragmatics: the degree of the success of a language in its faithfulness to the underlying model of computation and its utility from human programmers

#### REFERENCES:

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