RECURSIVE FUNCTIONS FOR COMPUTATION OF NATURAL SECRET LANGUAGES

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The paper describes a system called RENTTU, a collection of functions for computation of transformations from natural languages into several types of natural secret languages such as Pig Latin etc. By a natural secret language, sometimes called cant in English or children's play language we mean a natural language transformation, which preserves important morpho- and phonological qualities of the underlying source language. Such languages seem to make up a rich culture, which is a mixture of lore, linguistics, cryptology, and - if you wish - of computing.

Today the phenomenon lies probably nearest to folklore and children's culture, but in earlier times they have, and perhaps still do constitute important skills of the lower and underground world. In the Middle Ages they were widely used among beggars, tramps, pedlars, vagabonds, thieves etc. To Europe they seem to have come through the Bysantium from the East, where they still today continue to live an active life.

As a linguistic phenomenon they seem to be universal and appear in some form and extent practically in all languages and cultures. Yet it seems that they have attracted little attention from the part of linguistics or cryptology. Most of the treatments seem to fall within sociolinguistics or folklore. As cryptological methods the natural secret language

transformations are fairly simple and their value barely extends beyond the children's playground. Though interestingly enough they seem to well meet five out of the six so called Kerckhoff's criteria often used to assess usability of cryptographic methods and systems.

Anyhow, they work well and fulfill their purpose in situations for which they are aimed for: exchange of oral messages in real time in a situation, where the unintended are present. Since the message does not leave permanent trace, it is not possible to examine it afterwards.

For linguistic research they can be valuable in that they exhibit some phenomena and processes on the morpho- and phonological levels that can serve as a framework for extralinguistic experimentation.

From computing and programming point of view the subject is of definite interest, since it involves nontrivial morpho- and phonological recognition, context conditions and transformations, which offer an instructive excercise in linguistic programming.

Several types of families of secret languages, or rather classes of language transformations, are identified. The typology can be categorized as follows:

1. Syllabic transformations, which may involve deletions, replications, insertions or substitutions of syllables or phonemic elements under certain contextual conditions.
2. Transformations that involve syllable permutations, possibly intermixed with transformations of the above type.
3. Types of transformations, which involve nonsyllabic splitting of words into segments that are interchanged with segments of a given key word or with those of the next word.

Finally some hybrid types occur, which combine features of various types in one language.

As an example a detailed analysis is given of the Kontti language, which is widely known in Finland and belongs to the third category. In Kontti the split point is determined by a number of rules, which are conditioned by some metric and prosodic features together with the vowel consonant structure of the two words. The transformations involve both durational and harmonic accommodations to preserve the metric qualities and to meet the vowel harmony laws in Finnish.

Most delicate rules and conditions are found in splitting criteria concerning various kinds of diphtong, vowel pair and long vowel combinations, in which the Finnish language is fairly rich. Some cases take real ear for the language to be correctly resolved, but all rules and conditions can, as soon as they have become clearly established, be programmed. Thus a full competence of the Konnti language can be implemented on the computer.

From the linguistic point of view the transformations are interesting in the sense that they fully preserve the phono- and morphological well-formedness of the underlying language, i.e. the resulting words and word forms could well be real substance of the source language.

Another notable feature is that the reverse transformation based on the same set and order of rules restores the original words and word forms except for certain degenerate cases, which involve neutral vowels that are incapable of receiving information about harmonic quality when it is changed.

Presently the RENTTU system accounts for some 20 languages known in Finland including some based on Swedish. It consists of a collection of some 50 neat LISP functions written in a purely functional style. The functional style of programming is not only well suited or applicable to the problem, but also clearly reflects the nature of both the

linguistic and the computational aspects of the processes involved. It also results in elegant and concise function definitions. The author would be grateful of any material or observations concerning such languages in other countries. The system has been implemented in INTERLISP on the TeKoLa DECSystem-20 and is available as a listing from the author on request.

References:

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