

Linguistic Complexity: Conceptualizations and Results

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Levels of Complexity

General criteria for *complexity* can be ordered in a hierarchy of complexity levels a – e: (a) The number of components: That there are entities that can form a bigger entity or can be described as components of this bigger entity is the minimum requirement for complexity. But it is a matter of terminology if such a 2-step organization – a unit and its elements – already should be considered a minimal hierarchy. (b) The number of components of the components, i.e. the complexity of the components: This criterion refers to a real hierarchy of at least three steps. (c) The number of component types (Changizi 2001): The existence of different types of components makes the entity more complex, irrespective of whether or not it is really hierarchically organized. (d) The number of possible interactions between the components (Simon 1996). (e) The number of rules determining these interactions, i.e. the number of rules necessary for a concise description of these interactions (Gell-Mann 1995).

Complexity in Language

Language can be structured in different ways:

(A) Within language we may discriminate between different subsystems – or rather levels of description? – such as phonology, morphology, syntax, and semantics. This structure is not very distinctive. Semantics, for instance, intrudes on all other subsystems of language.

(B) A rather “technical” hierarchy may differentiate, even if ending at the sentence level, between at least five hierarchical steps: phonemes, syllables, words, clauses, sentences. The elements of the lowest level are the phonemes, and each unit at a higher level n is, in principle, a complex or composition of units of the level $n - 1$ and is in turn an element of units at the level $n + 1$. But a unit on level n can be identical with a unit on level $n - 1$, as is the case in monophonemic syllables, monosyllabic words, monoclausal sentences, and, depending on the definition of *clause*, also in one-word clauses. In any language, the syllable is an easily countable component of bigger entities.

The steps of this “technical” hierarchy can be related to the general criteria illustrated in the first section. And some of them can be assigned (Table 1) to the subsystems listed in A.

Results and Discussion

In the monosyllabic system of 8 Indo-European languages we found significant positive crosslinguistic correlations between the n of monosyllabic words, n of syllable types, and n of phonemes per syllable, and almost significant correlations of all these parameters with the size of the phonemic inventory (Fenk-Oczlon & Fenk, submitted). According to the assignments in Table 1 these correlations point to complexity trade-offs between subsystems (phonology and morphology) rather than within subsystems. But such crosslinguistic correlations do not at all corroborate the idea of an equal overall complexity in natural languages. Further results of the study suggest associations between monosyllabism and high phonological and semantic complexity on the one hand and rigid word order and idiomatic speech on the other.

Table 1: Complexity in the subsystems of language

<i>subsystems</i>	<i>some facets of linguistic complexity</i>
phonology	size of phonemic inventory; syllable complexity; n of syllable types
morphology	complexity in word structure (monosyllabism; n of morphemes per word); n of morphological cases and gender distinctions
syntax	rigid (?) word order; hypotactic constructions
semantics	n of meanings per expression (homonymy, polysemy)

References

- Changizi, M.A. (2001). Universal scaling laws for hierarchical complexity in languages, organisms, behaviors and other combinatorial systems. *Journal of Theoretical Biology*, 211, 277-295.
- Fenk-Oczlon, G., & Fenk, A. (submitted). Complexity trade-offs between subsystems of language. In M. Miestamo, K. Sinnemäki & F. Karlsson (Eds.), *Language complexity: Typology, contact, change*. Amsterdam: John Benjamins.
- Gell-Mann, M. 1995. What is complexity? *Complexity* 1, 16–19.
- Simon, H. A. 1996 (1962). The architecture of complexity: hierarchic systems. In *The sciences of the artificial*. Cambridge, Mass.: MIT Press.