JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Institutsskolloquium Psychologisches Institut

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„Cognitive Constraints and Language Processing: Information-Theoretic Approach“

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Abstract:

“Cognitive Constraints and Language Processing: Information-Theoretic Approach”

In number of experiments with lexical decision it was demonstrated that the cognitive system is extremely sensitive to the amount of uncertainty (i.e. the amount of information) carried by inflected forms of open class words (nouns, adjectives, verbs). The language of interest is Serbian which is, like most Slavic languages, highly inflected language in which the grammatical status of an open class word is marked by an inflectional suffix attached to the base morpheme.

In the regression analyses where the amount of information carried by inflected forms was contrasted with their processing latencies it was demonstrated that almost all processing variability is accounted for by the amount information. Of special interest is the slope of linear function which *indicates processing speed per bit of information* for a given experiment. It was observed that processing speed per bit of information varies from experiment to experiment. The parameter that correlates with processing speed per bit is *cross entropy* which can be taken as an index of experiment’s complexity, and by the same token as an index of processing load. Processing load increase (i.e. cross entropy value) is paralleled by nonlinear increase of processing speed per bit of information, thus compensating for the load increase. At certain value of cross entropy (about 6 bits) increase in complexity could not be additionally compensated by processing speed increase. Likewise, low entropy values (about 0.5 bits) slow down processing speed, up to the point where the cognitive system becomes inefficient.

The range of cross entropy variation (0.5-6 bits) could be taken as an index of boundary conditions which constrain morphological structuring. The observed range is not language specific. It could be thought of as being an ontic property of the cognitive system which guides emergence and logic of cognitive structures.