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EM 6 NIGRA: A New Integrated Model of Grammatical Competence and Performance

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NIGRA is projected as the consequent conclusion and keystone of the research program behind its predecessor project NEGRA. The work in NEGRA has now reached the point where several different successful lines of research can finally be merged for feeding into the new models. During the three phases of funding these different strands of research have each created necessary preconditions for the ultimate goal of the project: a cognitively plausible integrated model of grammatical competence and performance.

These preconditions include:

§ a linguistically interpreted corpus as a central basis for empirical research
§ psycholinguistic results on relevant questions in human sentence processing
§ a database of exemplified phenomena in human sentence processing
§ software tools for corpus-based empirical research
§ a range of alternative dependency-based grammar formalisms
§ implemented models of concurrent grammatical processing
§ implemented models of statistical processing
§ hybrid processing models combining symbolic and statistical techniques

Several ingredients of the envisaged improved model have been developed and tested in the course of the current phase of NEGRA. Relevant empirical data missing in the literature were obtained in specially designed experiments. Thus NEGRA has progressed from resource creation, through resource exploitation and the investigation of processing methods to actual theory building.

The main objective of NIGRA is to bring together the collected insights, methods, processing models and representation systems into an integrated model of grammatical competence and performance. Since in the near future no such model will be able to satisfy all desiderata, we will concentrate on demands arising from linguistic phenomena that are hard for any existing processing algorithm but seem effortless for the human processor. Among them are word order freedom, long distance dependencies, extrapositions etc. Thus the underlying research question concerns the essential relation between computational processing models and actual linguistic competence and performance in humans.

NIGRA will extend and improve the implemented processing model based on the ACT-R architecture. We will then evaluate the model against the benchmark of performance phenomena built in earlier phases of the SFB. A grammar model combining insights from dependency and categorial grammar will be designed together with sample grammars for nontrivial language fragments containing the investigated phenomena. To this end several lexicalized grammar models will be exploited that have been investigated and extended in the course of NEGRA. The ontology of the grammar model together with insights of processing will be employed to extend the word order typology of NEGRA into a first attempt to create a computational typology of linguistic phenomena and languages. A central notion is the parametrization of processing models according to computational types of languages. In this research NIGRA will closely collaborate with typologists at ZAS in Berlin.

Other collaborations include Stanford U. (Wasow, Flickinger et al.), U. Michigan (R. Lewis et al.) and — still planned — U. Penn (J. Trueswell). Within the SFB, NIGRA will most closely interact with the projects CHORUS and DIALOG continuing a long-standing fruitful cooperation.
Research staff: 2 BAT II A
Research assistants: 2 SHK 19 hours per week