RECENT COMPUTER IMPLEMENTATIONS OF PHRASE STRUCTURE GRAMMARS

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Person: John Bear
Address: Linguistics Research Center,
P.O. Box 7247, University Station,
University of Texas,
Austin, TX 78712, USA.
Implementation: All paths, left corner chart parser.
Uses features for agreement and unbounded dependencies.
Relative clauses, questions, existentials.
No semantics.
Language: Interlisp.
Machine (OS): DEC20 (TOPS 20)
References:

Bear, John (1981) Gaps as syntactic features. MA dissertation, University of Texas at Austin. Published by IULC, Bloomington, IN., in 1982.

Bear, John and Lauri Karttunen (1979) PSG: a simple phrase structure parser. Texas Linguistic Forum 15, 1-46.

Person: Roger Evans
Address: Cognitive Studies Programme,
University of Sussex,
Brighton BN1 9QN, UK.
Implementation: Parser (intended for grammar testing).
Incorporates all aspects of the 1982 GPSG framework:
features, metarules, ID/LP, feature instantiation,
coordination, etc. No semantics implemented.
Parses using ID/LP format directly (doesn't create the
induced set of PS rules).
Allows user to 'direct' the parsing if they wish.
Language: Prolog (within the POPLOG environment)
Machines (OS): VAX 11/780 (VMS), VAX 11/750 (UNIX).

Person: Mark Johnson
Address: Department of Linguistics,
University of California at San Diego,
La Jolla, CA 92093, USA.
Implementation: Suite of small programs: sentence generator
employing features, instantiation, ID/LP;
feature package defining unification, increment,
etc.; LR(1) parser.
Language: FranzLisp
Machine (OS): VAX 11/780 (UNIX)

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Computer implementations of phrase structure grammars

Person: Francis Jeffry Pelletier
Address: Department of Philosophy,
University of Alberta,
Edmonton, Canada T6G 2H1,
Implementation: Recursive descent parser.
Incorporates metarules, slash categories.
Provides intensional logic translations.
Doesn't incorporate features or ID/LP.
Language: SNOBOL (SPITBOL dialect)
Machine (OS): Amdahl 470 (MTS)

Persons: Geoffrey K. Pullum, Daniel P. Flickinger,
Carl Pollard, Derek Proudian, Ivan A. Sag,
Thomas Wasow, and formerly also Jean Mark
Gawron and Anne E. Paulson.
Computer Science Laboratory,
Hewlett Packard Company,
1501 Page Mill Road,
Palo Alto, CA 94304, USA.
Implementation: Top-down parser and transducer yielding
first order logic translations.
Includes metarules, features, some feature
instantiation principles, slash categories,
but not ID/LP.
Intended as portable front-end for databases,
and currently hooked up to relational database
in HPRL (a development of FRL).
System currently undergoing thorough revision
and redesign.
Language: LISP (PSL)
Machines (OS): VAX 11/780 (UNIX), HP 9836 (NMODE).
Reference:

Gawron, Jean Mark, Jonathan King, John Lamping, Egon Loebner, Anne Paulson, Geoffrey Pullum, Ivan Sag & Thomas Wasow (1982) The GPSG linguistics system. Proceedings of the 20th Annual Meeting of the Association for Computational Linguistics, 74-81. Also distributed as Hewlett Packard Computer Science Technical Note CSL-82-5.

Person: Stephen 6. Pulman
Address: Linguistics,
School of English and American Studies,
University of East Anglia,
Norwich NR4 7TJ, UK.

Implementation: RTN based parser operating either depth or breadth first. Compiles metarules (not ID/LP) into RTN and then optimises. Slash categories included, but not other featural information. Minimal semantics associated with one test grammar.

Language: P0P11

Machine (OS): VAX 11/780 (VMS)

References:

Pulman, Stephen (1983a) Generalised phrase structure grammar, Earley's algorithm, and the minimisation of recursion. In K. Sparck-Jones 8 Y. Wilks (eds.) Automatic Natural Language Parsing. Chichester: Ellis Norwood, 117-131.

Pulman, Stephen (1983b) Computational linguistics and language teaching. MS, UEA.

Person: Lenhart K. Schubert
Address: Department of Computing Science,
University of Alberta,
Edmonton, Canada T66 2H1,

Implementation: Left corner parser, with pruning of syntactically or semantically unusual alternatives. Incorporates features and morphological analysis, coordination and slash categories. Provides first order logic translations. Intended as a front end for a question-answering system with access to a logic-based semantic net. Doesn't incorporate metarules.

Languages: LISP and PASCAL versions

Machine (OS): Amdahl 470/V8 (MTS)

References:

Schubert, Lenhart (1982) An approach to the syntax and semantics of affixes in 'conventionalized[1] phrase structure grammar. Proceedings £l the 4th Biennial Conference of the Canadian Society for Computational Studies of Intelligence, 189-195.

Schubert, Lenhart, and Jeffry Pelletier (1982) From English to logic: Context-free computation of 'conventional' logical translation. American Journal of Computational Linguistics 8, 27-44.

Persons: Stuart Shieber and Stan Rosenschein (PATR-I).
Address: SRI International,
333 Ravenswood Avenue,
Menlo Park, CA 94025, USA.
Implementation: CKY parser, feature system allows Boolean combinations of feature equalities interpreted on the fly, no metarules, semantics converted to first-order logic and passed to a theorem prover.
Language: INTERLISP
Machine (OS): DEC20 (TOPS 20)
References:

Rosenschein, Stanley, and Stuart M. Shieber (1982) Translating English into logical form. Proceedings of the 20th Annual Meeting of the Association for Computational Linguistics, 1-8.

Person: Stuart Shieber and others (PATR-II).
Address: SRI International,
333 Ravenswood Avenue,
Menlo Park, CA 94025, USA.
Implementation: Parser: CKY (LISP), Earley's algorithm (Prolog);
feature system: directed acyclic graph structures, semantics embedded in feature system;
morphological analysis by method of Kimmo Koskenniemi (LISP, Lauri Karttunen)
Languages: 3 implementations of the PATR-II formalism:
INTERLISP (DEC20), Prolog (DEC20),
ZETALISP (Symbolics 3600).
Machines (OS): DEC20 (TOPS 20), Symbolics 3600.
References:

Koskenniemi, Kimmo (1983) A two level model for morphological analysis. Proceedings of the 8th International Joint Conference on Artificial Intelligence, 683-685.

Shieber, Stuart (1983a) Sentence disambiguation by a shift-reduce parsing technique. Technical Note 281, SRI International. Also in Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics, 113-118. And in Proceedings of the 8th International Joint Conference on Artificial Intelligence, 699-703.

Shieber, Stuart (1983b) Direct parsing of ID/LP grammars. Technical Note 291, SRI International.

Shieber, Stuart, Susan Stucky, Hans Uszkoreit, and Jane Robinson (1983) Formal constraints on metarules. Technical Note 283, SRI International. Also in Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics, 22-27.

Stucky, Susan (1983) Metarules as meta-node-admissibility conditions. Technical Note 304, SRI International.

Person: Hidetoshi Shirai
Address: Department of Mathematical Engineering
and Instrumentation Physics,
Faculty of Engineering,
University of Tokyo,
Hongo 7-1-2, Bunkyo-ku,
Tokyo 113, JAPAN.
Implementation: Deterministic parser based on PARSIFAL.
Incorporates metarules, raising constructions,
and unbounded dependencies.
Montague semantics.
Language: LISP.
Machine (OS): Hitac M200H (VOS 3).
Reference:

Shirai, Hidetoshi (1983) Deterministic parser. In Proceedings of the Workshop on Non-Transformational Grammars. Tokyo: ICOT, 57-61.

Persons: Henry Thompson and John Phillips.
Address: Department of Artificial Intelligence,
University of Edinburgh,
Hope Park Square,
Edinburgh EH8 9NW, UK.
Implementation: Chart parser (intended for grammar testing).
Incorporates all aspects of the 1982 GPSG framework:
features, metarules, feature instantiation,
coordination, etc.
Semantics currently being implemented.
Language: UCI LISP, FranzLisp.
Machines (OS): DEC10 (Tops10), VAX 11/780 (UNIX).
References:

Thompson, Henry (1981) Chart parsing and rule schemata in PSG. Proceedings of the 19th Annual Meeting of the Association for Computational Linguistics, 167-172.

Thompson, Henry (1982) Handling metarules in a parser for GPSG. Edinburgh D.A.I. Research Paper No. 175. Also: In M. Barlow, D. Flickinger & I.A. Sag (eds.) Developments in Generalized Phrase Structure Grammar: Stanford Working Papers in Grammatical Theory, Volume 2. Bloomington: Indiana University Linguistics Club, 26-37.

Thompson, Henry (1983) Crossed serial dependencies: a low-power parseable extension to GPSG. Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics, 16-21.

Other relevant references:

Crain, Stephen, and Janet Fodor (1982) How can grammars help parsers? To appear in D. Dowty, L. Karttunen and A. Zwicky (eds.) Natural language processing: psycholinguistic, computational, and theoretical perspectives. New York: Cambridge University Press.

Ejerhed, Eva (1980) A context-free phrase-structure parser for English auxiliaries. Paper presented to the Fourth Groningen Round Table Conference on Auxiliaries, Groningen, Holland, July 1980.

Ejerhed, Eva and Kenneth Church (1982) Recursion-free context-free grammar. Paper presented at the Workshop on Scandinavian Syntax and Theory of Grammar, University of Trondheim, June 3-5, 1982.

Fodor, Janet (1980) Parsing, constraints and the freedom of expression. Mimeo, University of Connecticut, Storrs, Connecticut.

Fodor, Janet (1982) Constraints on gaps: parsing versus expressive power. Paper presented at the Workshop on the Explanation of Linguistic Universals, Cascais, Portugal, 3-10 January, 1982.

Fodor, Janet (1983) Phrase structure parsing and the island constraints. Linguistics and Philosophy 6, 163-223.

Hirakawa, Hideki (1983) Chart parsing in concurrent Prolog. Technical Report of ICOT Research Center, TR-008, May 1983.

Joshi, Aravind, and Leon Levy (1982) Phrase structure trees bear more fruit than you would have thought. American Journal of Computational Linguistics 8, 1-11.

Joshi, Aravind (1983) Factoring recursion and dependencies: an aspect of tree-adjoining grammars (TAG) and a comparison of some formal properties of TAGs, GPSGs, PLGs, and LFGs. Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics, 7-15.

Karttunen, Lauri (1981) Unbounded dependencies: slash categories vs. dotted lines. In J. Groenendijk, T. Janssen, and M. Stokhof (eds.) Formal Methods in the Study of Language. Mathematical Centre Tracts, Amsterdam, 323-342.

Kay, Martin (1983) When meta-rules are not meta-rules. In K. Sparck-Jones & Y. Wilks (eds.) Automatic Natural Language Parsing. Chichester: Ellis Horwood, 94-116. Also: In M. Barlow, D. Flickinger & I.A. Sag (eds.) Developments in Generalized Phrase Structure Grammar: Stanford Working Papers in Grammatical Theory, Volume 2. Bloomington: Indiana University Linguistics Club, 69-91.

Konolige, Kurt (1980) Capturing linguistic generalizations with metarules in an annotated phrase-structure grammar. In Proceedings of the 18th Annual Meeting of the Association for Computational Linguistics, 43-48.

Matsumoto, Yuji, et al. (1983) BUP: a bottom-up parser embedded in Prolog. To appear in New Generation Computing 2.

Milne, Rob (1981) The implications of the word HAVE. Presented at the meeting of the Association for Computational Linguistics, New York, December 28, 1981.

Pullum, Geoffrey (1983) Context-freeness and the computer processing of human languages. Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics, 1-6.

Pulman, Stephen (1983) Trace theory, parsing and constraints. In Margaret King (ed.) Parsing natural language. London: Academic Press, 171-196.

Robinson, Jane (1980) Computational aspects of the use of metarules in formal grammars. Research Proposal No. ECU 80-126, S.R.I. International.

Ross, Kenneth (1981) Parsing English phrase structure. PhD dissertation. University of Massachusetts at Amherst.

Sampson, Geoffrey (1983) Context-free parsing and the adequacy of context-free grammars. In Margaret King (ed.) Parsing natural language. London: Academic Press, 151-170.

Uszkoreit, Hans (1983) A framework for processing partially free word order. Proceedings of the 21st AnnuaI Meeting of the Association for Computational Linguistics, 106-112.