

**International Workshop on Parsing Technologies**

28-31 August 1989

Carnegie Mellon University

*Holiday Inn - Oakland, CMU, Hidden Valley - Somerset*  
*Pittsburgh, Pennsylvania - USA*

## Preface

WELCOME to the International Workshop on Parsing Technologies.

The interest and the progress being made in the field of parsing is exciting. The technical program has been assembled to include all aspects of this technology. We hope it will stimulate further discussion, research and development in the field.

We hope the emphasis of this workshop will center around the exchange of ideas rather than the presentation of results. In this workshop, presenters should be prepared to discuss problems and techniques - with a particular emphasis on work-in-progress and unresolved difficulties.

The program committee has selected a variety of areas for discussion, hoping that you will choose the set of presentations that best match your interests and specialties. The variety should encourage discussion and exchange that should benefit all. We hope to encourage participation, discussion and even argument.

The workshop program and organization have been created through the efforts of a large number of people who have given generously of their time and talent.

I would like to thank each of the committee members: Bob Berwick, Harry Bunt, Jaime Carbonell, Eva Hajicova, Aravind Joshi, Ron Kaplan, Bob Kasper, Martin Kay, Match Marcus, Makoto Nagao and Yorick Wilks.

In addition, I would like to acknowledge contributions and extend my gratitude to the local arrangement people. Especially Joan Maddamma, the workshop secretary, who did most of the administrative work for this volume and the workshop.

Masaru Tomita  
Workshop Chairman  
Carnegie Mellon University

UNIVERSITY LIBRARIES  
CARNEGIE MELLON UNIVERSITY  
PITTSBURGH, PA 15213-0390

## Workshop Committee

### Workshop Chairman:

*Masaru Tomita, Carnegie Mellon University*

### Program Committee:

*Robert Berwick, Massachusetts Institute of Technology*

*Harry Bunt, Tilburg University*

*Jaime Carbonell, Carnegie Mellon University*

*Eva Hajicova, Charles University*

*Aravind Joshi, University of Pennsylvania*

*Ronald Kaplan, Xerox PARC*

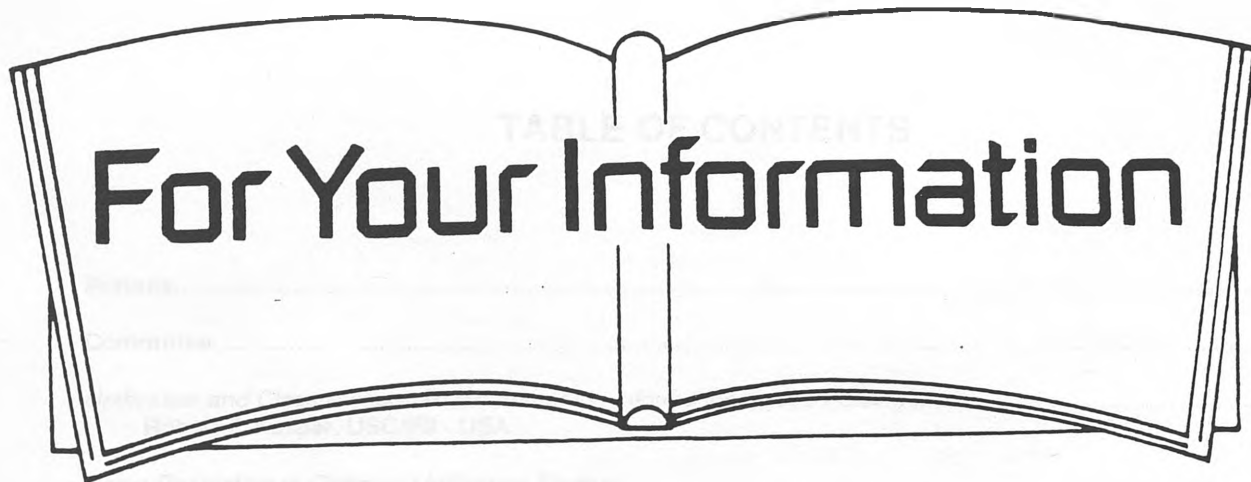
*Robert Kasper, University of Southern California*

*Martin Kay, Xerox PARC*

*Mitch Marcus, University of Pennsylvania*

*Makoto Nagao, Kyoto University*

*Yorick Wilks, New Mexico State University*



# For Your Information

*For additional copies of this book, write:*

*Carnegie Mellon University  
Attn: Joan Maddamma  
School of Computer Science  
Pittsburgh, PA 15213-3890 USA*

*PRICE: \$50.00 within USA - \$55.00 for overseas mail*

# TABLE OF CONTENTS

Preface.....	ii
Committee.....	iii
<i>Unification and Classification: An Experiment in Information-Based Parsing</i> .....	1
Robert T. Kasper, USC/ISI - USA.	
<i>Using Restriction to Optimize Unification Parsing</i> .....	8
Dale Gerdemann, University of Illinois - USA.	
<i>An Overview of Disjunctive Constraint Satisfaction</i> .....	18
John T. Maxwell III* and Ronald M. Kaplan, Xerox PARC - USA.	
<i>A Uniform Formal Framework for Parsing</i> .....	28
Bernard Lang, INRIA - FRANCE.	
<i>Head-Driven Bidirectional Parsing: A Tabular Method</i> .....	43
Giorgio Satta* and Oliviero Stock University of Padova - ITALY.	
<i>Head-Driven Parsing</i> .....	52
Martin Kay, Xerox PARC - USA.	
<i>Parsing with Principles: Predicting a Phrasal Node Before Its Head Appears</i> .....	63
Edward Gibson, Laboratory for Computational Linguistics, CMU - USA.	
<i>The Computational Implementation of Principle-Based Parsers</i> .....	75
Sandiway Fong* and Robert Berwick, MIT, AI Laboratory - USA.	
<i>Probabilistic Parsing Method for Sentence Disambiguation</i> .....	85
T. Fujisaki*, F. Jelinek, J. Cocke, E. Black, IBM-T. J. Watson Center-USA, T. Nishino, Tokyo Science University - JAPAN.	
<i>A Sequential Truncation Parsing Algorithm Based on the Score Function</i> .....	95
Keh-Yih Su*, National Tsing Hua Univ., Jong-Nae Wang and Mei-Hui Su BTC R&D Ctr., Jing-Shin Chang, National Chiao Tung University - CHINA.	
<i>Probabilistic LR Parsing for Speech Recognition</i> .....	105
J. H. Wright* and E. N. Wrigley, University of Bristol, UNITED KINGDOM.	
<i>Parsing Speech for Structure and Prominence</i> .....	115
Dieter Huber, University of Gothenburg - SWEDEN.	
<i>Parsing Continuous Speech by HMM-LR Method</i> .....	126
Kenji Kita*, Takeshi Kawabata, Hiroaki Saito, ATR Interpreting Telephony Research Laboratories - JAPAN.	
<i>Parsing Japanese Spoken Sentences Based on HPSG</i> .....	132
Kiyoshi Kogure, ATR Interpreting Telephony Research Laboratories - JAPAN.	
<i>Probabilistic Methods in Dependency Grammar Parsing</i> .....	142
Job M. van Zuijlen, BSO/Research, THE NETHERLANDS.	
<i>Predictive Normal Forms for Composition in Categorical Grammars</i> .....	152
Kent Wittenburg* and Robert Wall, MCC - USA.	

<i>Parsing Spoken Language Using Combinatory Grammars</i> .....	162
Mark Steedman, University of Pennsylvania - USA.	
<i>Recognition of Combinatory Categorical Grammars and Linear Indexed Grammars</i> .....	172
K. Vijay-Shanker, University of Delaware and David J. Weir*, Northwestern University - USA.	
<i>Handling of Ill-Designed Grammars in Tomita's Parsing Algorithm</i> .....	182
Rohman Nozohoor-Farshi, University of Windsor - CANADA.	
<i>Analysis of Tomita's Algorithm for General Context-Free Parsing</i> .....	193
James R. Kipps, The RAND Corporation - USA.	
<i>The Computational Complexity of Tomita's Algorithm</i> .....	203
Mark Johnson, Brown University - USA.	
<i>Probabilistic Parsing for Spoken Language Applications</i> .....	209
Stephanie Seneff, MIT - USA.	
<i>Connectionist Models of Language</i> .....	219
James L. McClelland, Carnegie Mellon University - USA.	
<i>A Connectionist Parser Aimed at Spoken Language</i> .....	221
Ajay Jain* and Alex Waibel, Carnegie Mellon University - USA.	
<i>Massively Parallel Parsing in <math>\Phi</math>DmDialog: Integrated Architecture for Parsing Speech Inputs</i> .....	230
Hiroaki Kitano*, Teruko Mitamura and Masaru Tomita, CMT/CMU - USA.	
<i>Parallel Parsing Strategies in NLP</i> .....	240
Anton Nijholt, Twente University of Technology - THE NETHERLANDS.	
<i>Complexity and Decidability in Left-Associative Grammar</i> .....	254
Roland Hausser, Computational Linguistics Lab - CMU - USA.	
<i>The Selection of a Parsing Strategy for an On-Line Machine Translation System in a Sublanguage Domain. A New Practical Comparison</i> .....	264
Patrick Shann, University of Geneva and University of Zurich-SWITZERLAND.	
<i>Finite State Machines from Feature Grammars</i> .....	277
Alan W. Black, University of Edinburgh - UNITED KINGDOM.	
<i>An Effective Enumeration Algorithm of Parses for Ambiguous CFL</i> .....	286
Tadashi Seko, Nariyoshi Yamai*, Nara National College of Technology - JAPAN, Noboru Kubo and Toru Kawata, SHARP Corporation - JAPAN.	
<i>A Morphological Parser for Linguistic Exploration</i> .....	297
David Weber, Summer Institute of Linguistics - CMU - USA.	
<i>The Parallel Expert Parser: A Meaning-Oriented, Lexically- Guided, Parallel-Interactive Model of Natural Language Understanding</i> .....	309
Geert Adriaens, Siemens NLP Research - BELGIUM.	
<i>Chart Parsing for Loosely Coupled Parallel Systems</i> .....	320
Henry S. Thompson, University of Edinburgh-UNITED KINGDOM.	
<i>Parallel LR Parsing Based on Logic Programming</i> .....	329
Hozumi Tanaka* and Hiroaki Numazaki, Tokyo Institute of Technology-JAPAN.	
<i>The Relevance of Lexicalization to Parsing</i> .....	339
Yves Schabes* and Aravind K. Joshi, University of Pennsylvania - USA.	

<i>A Framework for the Development of Natural Language Grammars</i> .....	350
Massimo Marino, University of Pisa - ITALY	
<i>An Efficient Method for Parsing Erroneous Input</i> .....	361
Stuart Malone* and Sue Felshin, MIT - USA.	
<i>Analysis Techniques for Korean Sentences Based on Lexical Functional Grammar</i> .....	369
Deok Ho Yoon* and Yung Taek Kim, Seoul National University - KOREA.	
<i>Learning Cooccurrences by Using a Parser</i> .....	379
Kazunori Matsumoto*, Hiroshi Sakaki, Shingo Kuroiwa, KDD Kamifukuoka R&D Labs - JAPAN.	
<i>Parsing, Word Associations and Typical Predicate-Argument Relations</i> .....	389
Kenneth Church*, William Gale, Patrick Hanks, and Donald Hindle, AT&T Bell Labs - USA.	
<i>An Efficient, Primarily Bottom-Up Parser for Unification Grammars</i> .....	399
Neil K. Simpkins* and Peter J. Hancox, Aston University - UNITED KINGDOM.	
<i>PREMO: Parsing by Conspicuous Lexical Consumption</i> .....	401
Brian M. Slator and Yorick Wilks*, New Mexico State University - USA.	
<i>Parsing Algorithms 2-Dimensional Language</i> .....	414
Masaru Tomita, CMT/CMU - USA.	
<i>A Broad-Coverage Natural Language Analysis System</i> .....	425
Karen Jensen, IBM - USA.	
<i>Pseudo Parsing Swift-Answer Algorithm</i> .....	442
S. Pal Asija, Shelton, Connecticut - USA.	
<i>A Dependency-Based Parser for Topic and Focus</i> .....	448
Eva Hajicova, Charles University - CZECHOSLOVAKIA.	
<i>Parsing Generalized Phrase Structure Grammar with Dynamic Expansion</i> .....	458
Navin Budhiraja, Subrata Mitra*, Harish Karnick, Rajeev Sangal, Indian Institute of Technology Kanpur - INDIA.	