

---

**ACL-MIT Press Series in Natural-Language Processing**

Aravind Joshi, editor

*Speaking: From Intention to Articulation* (1989)

Willem J. M. Levelt

---

**Speaking**

**Willem J. M. Levelt**

**From Intention to  
Articulation**

**A Bradford Book  
The MIT Press  
Cambridge, Massachusetts  
London, England**

P-2-201/4

400

© 1989 Massachusetts Institute of Technology

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.

This book was set in Times Roman by Asco Trade Typesetting Ltd. in Hong Kong and printed and bound by Halliday Lithograph in the United States of America.

Library of Congress Cataloging-in-Publication Data

Levelt, W. J. M. (Willem J. M.), 1938-

Speaking: from intention to articulation / Willem J. M. Levelt.

p. cm.

"A Bradford book."

Bibliography: p.

Includes index.

ISBN 0-262-12137-9

1. Psycholinguistics. 2. Speech. I. Title.

P37.L44 1989 88-19144

401'.9—dc19

MAX-PLANCK-INSTITUT  
für Psycholinguistik  
Nijmegen

Inv.Nr. 90.655

to nobody Els but you

---

## Contents

Preface xiii

Acknowledgments xv

Author's Notes xvii

---

### Chapter 1

**The Speaker as Information  
Processor** 1

1.1

---

A Case Study 2

1.2

---

A Blueprint for the Speaker 8

1.3

---

Processing Components as Relatively  
Autonomous Specialists 14

1.4

---

Executive Control and  
Automaticity 20

1.5

---

Units of Processing and Incremental  
Production 23

---

Summary 27

---

### Chapter 2

**The Speaker as Interlocutor** 29

2.1

---

Interaction 30

2.2

---

Deixis 44

	2.3	
	Intention	58
	Summary	68
<b>Chapter 3</b>	<b>3.1</b>	
<b>The Structure of Messages</b>	<b>Modes of Knowledge Representation and Preverbal Messages</b>	<b>70</b>
	3.2	
	Semantic Entities and Relations	74
	3.3	
	The Thematic Structure of Messages	90
	3.4	
	Perspective and Information Structure	96
	3.5	
	Mood, Aspect, and Deixis	100
	3.6	
	Language-Specific Requirements	103
	Summary	105
<b>Chapter 4</b>	<b>4.1</b>	
<b>The Generation of Messages</b>	<b>From Intention to Message</b>	<b>107</b>
	4.2	
	Bookkeeping and Some of Its Consequences for Message Construction	110
	4.3	
	Macroplanning 1: Deciding on Information to Be Expressed	123
	4.4	
	Macroplanning 2: Ordering Information for Expression	138

	4.5	
	Microplanning	144
	Summary	157
<b>Chapter 5</b>	5.1	
<b>Surface Structure</b>	Syntactic Aspects	162
	5.2	
	Prosodic Aspects	170
	Summary	179
<b>Chapter 6</b>	6.1	
<b>Lexical Entries and Accessing Lemmas</b>	The Structure and Organization of Entries in the Mental Lexicon	182
	6.2	
	The Structure of Lemmas	188
	6.3	
	Theories of Lemma Access	198
	6.4	
	Failures of Lemma Access	214
	6.5	
	The Time Course of Lexical Access	222
	Summary	232
<b>Chapter 7</b>	7.1	
<b>The Generation of Surface Structure</b>	The Architecture of Grammatical Encoding	236
	7.2	
	Units of Grammatical Encoding	256
	7.3	
	The Encoding of Topic and Other Nuclear Entities	260
	7.4	
	Cohesive Encoding	271

	7.5	
	Feedback in Grammatical Encoding	275
	Summary	282
<b>Chapter 8</b>	8.1	
<b>Phonetic Plans for Words and Connected Speech</b>	Plans for Words	285
	8.2	
	Plans for Connected Speech	301
	Summary	316
<b>Chapter 9</b>	9.1	
<b>Generating Phonetic Plans for Words</b>	The Tip-of-the-Tongue Phenomenon	320
	9.2	
	Frames, Slots, Fillers, and Levels of Processing	321
	9.3	
	Substitutable Sublexical Units	330
	9.4	
	The Slots-and-Fillers Theory and the Causation of Errors	343
	9.5	
	Activation-Spreading Theory	351
	9.6	
	Serial Order in Phonological Encoding	360
	Summary	361
<b>Chapter 10</b>	10.1	
<b>Generating Phonetic Plans for Connected Speech</b>	A Sketch of the Planning Architecture	365
	10.2	
	The Generation of Rhythm	372

	10.3	
	<b>The Generation of Intonation</b>	398
	10.4	
	<b>The Generation of Word Forms in Connected Speech</b>	405
	Summary	410
<b>Chapter 11</b>	11.1	
<b>Articulating</b>	<b>Managing the Articulatory Buffer</b>	414
413	11.2	
	<b>The Vocal Organs and the Origins of Speech Sounds</b>	422
	11.3	
	<b>Motor Control of Speech</b>	435
	Summary	454
<b>Chapter 12</b>	12.1	
<b>Self-Monitoring and Self-Repair</b>	<b>Self-Monitoring</b>	460
458	12.2	
	<b>Interrupting and the Use of Editing Expressions</b>	478
	12.3	
	<b>Making the Repair</b>	484
	Summary	497
<b>Appendix Symbols from the International Phonetic Alphabet, with Examples</b>		500
<b>Bibliography</b>		501
<b>Author Index</b>		539
<b>Subject Index</b>		547

---

## Preface

Talking is one of our dearest occupations. We spend hours a day conversing, telling stories, teaching, quarreling, ... and, of course, speaking to ourselves. Speaking is, moreover, one of our most complex cognitive, linguistic, and motor skills. Articulation flows automatically, at a rate of about fifteen speech sounds per second, while we are attending only to the ideas we want to get across to our interlocutors.

This fascinating human skill has not received the attention it deserves within psycholinguistics. Psycholinguistics is the science of human language production, comprehension, and acquisition, but the main body of research and teaching relates primarily to the latter two topics. Language production is the stepchild of psycholinguistics. Butterworth's (1980c, 1983b) excellent two-volume anthology is the only source on the subject; there is no text and no coherently written handbook.

When the European Science Foundation invited me to lecture on "speaking" at a summer course in psycholinguistics to be held in Brussels in 1985, I gladly accepted and began writing what I thought would be an introductory text. A year and a half would suffice, I thought, in view of the rather limited psycholinguistic literature on the subject.

My main discovery was that the literature on speaking is gigantic. But the majority of it is not to be found in standard psycholinguistic sources. Other disciplines have asked the questions that psycholinguists have ignored. Students of conversational analysis, pragmatics, discourse semantics, artificial intelligence, syntax, phonology, speech communication, and phonetics have contributed myriad theoretical insights and empirical findings. The major problem with this huge literature, however, is that it is compartmentalized—phoneticians ignore phonology, conversational analysts ignore discourse semantics and phonetics, students of AI ignore psycholinguistics, and so on.

The present book gives a bird's-eye view of this highly heterogeneous research field. It is an effort to provide a theoretical integration of hitherto disparate approaches to the speaker in us, but without relaxing the psycholinguist's main objective: to understand the mental information processing that underlies our capacity for speech.

The book's organization is straightforward. After an introductory chapter on the speaker as information processor and a subsequent chapter on the speaker as interlocutor, the text follows the generation of speech step by step. The steps consist of message generation, grammatical encoding, phonological encoding, and articulation. The final chapter deals with the speaker's self-monitoring and self-repair. Each processing step computes its own kind of output or representation, and I always discuss these representations before discussing the issues of processing themselves. Not surprisingly, the representational chapters or sections have a more strongly linguistic flavor than the parts of the book that discuss processing.

My strategy in this book has been to exemplify theoretical issues rather than to formalize them. The text contains few formulas and acronyms, little computer jargon, and few statistics, but many worked-out cases, many examples, and much graphic support. It should be readable not only by psycholinguists and their advanced students, but also by anyone interested in the other disciplines mentioned above.

While plowing through the mound of literature, I decided that neither you nor I should bite off more than we can chew. The book concentrates on the normal spontaneous speech production of adults. It does not cover the neurological basis of speech and language. In particular, it contains nothing on aphasia and other relevant neurological disorders, nor does it discuss reading (although there are occasional references to experimental work in which reading materials have been used). Reading aloud differs from spontaneous speech in many important ways, and results on reading therefore cannot, as a rule, be generalized to conditions of spontaneous speech. Speaking is usually accompanied by gestures, gaze patterns, body movements, and so forth. In spite of its communicative importance, this so-called paralinguistic behavior is not reviewed. The book, finally, does not deal with the history of research in speech and speaking, despite occasional references to Wilhelm Wundt, Karl Bühler, and other pioneers.

What people can do with words is incredible, and its psychology is still largely a mystery. By necessity, this book is incomplete and theoretically wanting, even in the areas on which it focuses. I look forward to the day when it can be replaced by something better.

---

## Acknowledgments

This book emerged in the stimulating circle of the Max-Planck-Institut für Psycholinguistik and Nijmegen University. Numerous colleagues can't give up educating me in matters linguistic and psycholinguistic, and I would be at a loss without them. Also, many distinguished visitors from all over the world have given me help and advice. I am sincerely grateful to all of them.

Some, from within and without this circle, have taken the effort to read drafts of chapters and to formulate comments, either orally or in writing. Before mentioning them, I must say that each of these efforts has deeply touched me. Time and again I experienced it as a great privilege to be taken so seriously and with so much friendship. In alphabetical order, these angels were Manfred Bierwisch, Melissa Bowerman, Herbert Clark, Anne Cutler, Jane Edwards, Lyn Frazier, Merrill Garrett, Gerard Kempen, Wolfgang Klein, Aditi Lahiri, and John Marshall. I would also like to thank Gerard van Galen, who gave me a special tutorial on psychomotor theory.

Though I typed the manuscript myself with two index fingers on a terminal, finishing touches have been made by Uschi de Pagter and Edith Sjoerdsma, especially in completing the bibliography. Our librarian, Karin Kastens, also helped me on countless occasions. Many thanks to all three of them.

The graphic work was done by Wil Maas during three months of ideal cooperation.

Nijmegen, February 29, 1988

---

## Author's Notes

### **On Pronominalization**

I will contribute to the present chaos of person pronominalization in English by adhering to the following conventions: Speakers, whether male, female, or generic, will receive masculine pronominalization. Hearers or addressees will be treated as female. When there are two or more interlocutors (i.e., speakers/hearers), the first one will be male, the second one female, and so on in alternation. General use of these conventions in psycholinguistics will, given the bias for language-comprehension research, make most person reference female.

### **On Transcription**

I will follow the transcription conventions of the International Phonetic Alphabet. The phonetic symbols used are listed in the appendix.