Briefly Noted

Verbmobil: A Translation System for Face-to-Face Dialog

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Verbmobil is a project sponsored by the German government, whose aim is to develop a translation system for face-to-face speech dialogue. This book is the report on a preliminary study of the project conducted by CSLI, Stanford University.

The contents of the book are as follows: Chapter 1 contains introductory material; Chapter 2 and Chapter 3 are devoted to describing the current state-of-the-art of machine translation and speech recognition and speech synthesis technologies, respectively; and Chapter 4 reports a technical recommendation for the Verbmobil project based on the discussions in the preceding chapters.

Chapter 2, which would be the most interesting for readers of *Computational Linguistics*, exhaustively covers various aspects of machine translation. First, the authors argue why machine translation is so difficult. They discuss the indeterminacy of language by referring to a number of examples: situatedness, mismatches between two languages in translation, and ambiguities of various levels. From these considerations, they suggest that good translation is not defined as preserving the meaning but as preserving the *intention* of the original (p. 27), sometimes by adding or deleting information (p. 26). Then, they review current technologies, historical perspectives, and theoretical issues such as syntax and grammar formalism. The most interesting and important discussion in this chapter is the section "Translation Strategy." First, the authors refer to the controversial argument concerning the comparison between the transfer approach and the interlingual approach, but they claim that "the issue of interest is not whether to pursue a transfer or an interlingual approach; the issue is which

levels of analysis are necessary, and how to arrive at a representation suitable for generation of a target text" (p. 82).

From this point, and by considering many examples of translation mismatch that imply the impossibility of *a naive interlingual scheme*, the authors propose a new architecture called "translation by negotiation." In this architecture, some interlingual representation is still supposed, but it does not require that an invariant representation that will be the same for the translation of a source sentence, or text, into any other language can be found at any time. There are three components: an analyzer, a generator, and a negotiator. The analyzer delivers to the negotiator an interlingual representation. The negotiator hands the interlingual representation to the generator. In some (or rare) cases, the generator can find the phrase in the target language that has exactly the same interlingual representation. In other cases, the generator reports to the negotiator error information such as the overspecification or underspecification of the input interlingual representation. Now, it is up to the negotiator to decide whether the error is fatal or not. When it is not so serious, the translation is accepted, but when it is serious, the negotiator has to solve it by some other means, such as referring to the context. In Chapter 2, the authors also discuss other topics: an overview of nonlinguistic translation approaches such as the stochastic approach and the example-based approach, and a comprehensive survey of current machine translation systems. These would also be quite informative to a reader.

Chapter 3 is devoted to introducing speech-recognition technology and speech-synthesis technology, and Chapter 4 contains recommendations for the Verbmobil project. These might be less interesting for a reader of *Computational Linguistics*, so only a brief description is given below.

In Chapter 3, general characteristics of speech are given, and current major speech-recognition technologies (the knowledge-based approach, the stochastic-based [HMM-based] approach, and the connectionism-based approach) are introduced, as well as a traditional template-based approach. These descriptions would be a good introduction for a reader who wants to see a general overview of speech-recognition technologies. As for speech synthesis, most pages are given

to prosody processing and voice conversion.

Most of Chapter 4 consists of technical and planning recommendations for the project. However, the discussion of target domains would be informative to those researchers who are interested in the corpus-based approach.

As the authors pointed out, this book is not a feasibility study, and unfortunately, there is only a little description of those technologies, such as contextual processing or integration of speech and language processing, that are some of the key technologies for speech translation. However, this book is undoubtedly of value not only to students who want to study machine translation or speech recognition, but also to all researchers who are engaged in machine translation or natural language processing.—*Tsuyoshi Morimoto, ATR Interpreting Telecommunications Research Laboratories, Kyoto*

The Encyclopedia of Language and Linguistics

R. E. Asher (editor-in-chief)
(University of Edinburgh)

Oxford: Pergamon Press, 1994, xlviii +
5644 pp. in 10 volumes
Hardbound, ISBN 0-08-035943-4, $2975.00

For several weeks, *The Encyclopedia of Language and Linguistics* has sat heavily in its box on the floor of my office; I couldn't find space for it anywhere else. I wasn't supposed to be reviewing it myself (as I contributed a couple of the articles in it), but I never stopped using it myself long enough to send it out to anyone else. Since it arrived, it has been used as an oracle whenever a linguistic question arose that I couldn't answer from my own knowledge—which is not infrequent, as, like many in computational linguistics, my formal training is heavily computational and only moderately linguistic—and for browsing as a guilt-free diversion from any work that I should have been doing but didn't want to.

Conclusion: Everyone who is a linguist of any flavor at all should have a copy of this encyclopedia.

In its sheer size and comprehensiveness, *The Encyclopedia of Language and Linguistics*— hereafter, *ELL*—completely eclipses its main rival, Oxford University Press's *International*

Encyclopedia of Linguistics (Bright 1992). Table 1 compares the two works on basic objective data. Table 2 demonstrates the breadth of coverage by listing a random sample of articles. (I've listed the first thirty-odd signed articles from Volume 5, where McLuhan, Marx, magic, and marketing all meet. I have not included a number of short, unsigned paragraph-length articles, mostly on the language situation in various places.)

The articles are divided into 33 subject areas, each under a separate editor. There are even quite a number of articles on computational linguistics (edited by C. S. Mellish, University of Edinburgh), but they are less likely to be useful to serious readers of this journal; after all, one uses a work like the *ELL* primarily as a reference upon, or entry point to, the areas of linguistics that are beyond one's regular area of study or expertise.

Of course, in a work as large as this, it is inevitable that there will be a few disappointments and misjudgments. For example, the article on the Summer Institute of Linguistics, which is nearly five encyclopedia pages long, is written in the style of a prospectus ("The Summer Institute of Linguistics began modestly enough in 1934 . . . "), omitting any mention of the controversies over the ethics of the Institute's activities in Latin America.

Unfortunately, given the *ELL*'s price of nearly $3000 a set, most linguists will have to resort to using a copy in their local library (which will have used its entire year's acquisition budget for linguistics books in order to buy it). That's a pity, as much of the value of the work is realized only when it is ready-to-hand.—*Graeme Hirst, University of Toronto*

Reference

Bright, William (editor-in-chief) (1992). *International Encyclopedia of Linguistics.* Oxford University Press.

Dewey's New Logic: A Reply to Russell

Tom Burke
(Center for the Study of Language and Information, Stanford University)

Chicago: The University of Chicago Press, 1994, xii + 288 pp.
Hardbound, ISBN 0-226-08069, $32.00

"This book addresses a number of issues

Table 1
The Encyclopedia of Language and Linguistics compared with *The International Encyclopedia of Linguistics* on objective data.

	Encyclopedia of Lang and Ling	Intl Encyclopedia of Linguistics
Publication date	1994	1992
Number of volumes	10	4
Number of pages	xlviii + 5644	xvi + 1805
Page size	A4 (210 × 297 mm)	$8\frac{1}{2}$ × 11 inches (217 × 280 mm)
Weight	17.9 kg / 39.4 lb	6.2 kg / 13.7 lb
Number of articles	"over 2000"	about 700
Words per page (est.)	1100	750
Size of glossary	"over 3000" entries	about 1400 entries
Size of index (est.)	55,000 lines	31,000 lines
Price (US dollars)	$2975	$425
Price per page	$0.54	$0.23
Price per kiloword*	$0.53	$0.36

*Excluding index, glossary, and front matter.

Table 2
A random sample of articles from *The Encyclopedia of Language and Linguistics*. The slightly strange order of the machine translation articles is as in the encyclopedia.

McDavid, Raven I. (1911–84) ($\frac{3}{4}$ page)
Machine translation in Europe ($8\frac{1}{2}$ pages)
Machine translation: History and general
   principles (10 pages)
Machine translation in North America
   ($5\frac{1}{2}$ pages)
McLuhan, Marshall (1911–80) ($\frac{1}{2}$ page)
Macrostructure ($2\frac{3}{4}$ pages)
Madsen Aarhus, Jacob (1538–86) ($\frac{1}{2}$ page)
Magic [and language] ($1\frac{1}{2}$ pages)
Magyar (2 pages)
Malapropism ($\frac{1}{2}$ page)
Malawi: Language situation (1 page)
Malay (2 pages)
Malayalam ($1\frac{3}{4}$ pages)
Malaysia: Language situation ($1\frac{3}{4}$ pages)
Maldives: Language situation ($\frac{1}{4}$ page)
Mali: Language situation ($\frac{1}{2}$ page)
Malinowski, Bronislaw Kaspar (1884–
   1942) ($\frac{1}{2}$ page)
Malkiel, Yakov (1914–) ($\frac{1}{2}$ page)
Malmberg, Bertil (1913–) ($\frac{3}{4}$ page)
Malta: Language situation ($\frac{1}{4}$ page)

Maltese ($\frac{1}{2}$ page)
Manchu-Tungus languages (2 pages)
Mande languages ($1\frac{3}{4}$ pages)
Manipulation [of others by language]
   (1 page)
Mantra (1 page)
Maps: Dialect and language
   ($14\frac{1}{4}$ pages)
Marathi (1 page)
Markedness ($5\frac{1}{4}$ pages)
Markers and the marked: The language
   of Indian dance (1 page)
Marketing: Semiotics ($3\frac{1}{2}$ pages)
Marr, Nikolai Jakovlevich (1864–1934)
   ($\frac{1}{2}$ page)
Marstrander, Carl J.S. (1883–1965)
   ($\frac{1}{2}$ page)
Martin of Dacia (d. 1304) ($\frac{1}{4}$ page)
Martinet, André (1908–) ($\frac{3}{4}$ page)
Marty, Anton (1847–1914) ($\frac{1}{2}$ page)
Marxist theories of language (3 pages)
Mass expressions (2 pages)

which arose in the debate between John Dewey and Bertrand Russell following the appearance of Dewey's *Logic: The Theory of Inquiry* in 1938. . . . As a rich course of intuitions independent of a Fregean ideology, Dewey's work has the potential to affect future developments in modern logic at a crucial point in its history. Dewey's work belongs at the cutting edge of current research. It is not just a historical oddity. Logic is in fact progressing beyond the narrow limits which Russell was defending, becoming more and more Deweyan in character despite the pervasive ignorance of Dewey's work. In contrast, the view

of logic which Russell helped develop and was defending in his debates with Dewey is now *old*. Dewey's views are very much more timely these days than ever before, whereas Russell's way of thinking about logic is now passé."—*From the preface*

Using Large Corpora

Susan Armstrong (editor)
(Université de Genève)

[Originally published as two special issues of *Computational Linguistics*, 19(1) and 19(2), March and June 1993]
Cambridge, MA: The MIT Press, 1994, viii + 349 pp.
Paperbound, ISBN 0-262-51082-0, $37.50

The contents of the volume are as follows:

"Preface" by Susan Armstrong-Warwick
"Introduction to the Special Issue on Computational Linguistics using Large Corpora" by Kenneth W. Church and Robert L. Mercer
"Generalized Probabilistic LR Parsing of Natural Language (Corpora) with Unification-Based Grammars" by Ted Briscoe and John Carroll
"Accurate Methods for the Statistics of Surprise and Coincidence" by Ted Dunning
"A Program for Aligning Sentences in Bilingual Corpora" by William A. Gale and Kenneth W. Church
"Structural Ambiguity and Lexical Relations" by Donald Hindle and Mats Rooth
"Text-Translation Alignment" by Martin Kay and Martin Röscheisen
"Retrieving Collocations from Text: Xtract" by Frank Smadja
"Using Register-Diversified Corpora for General Language Studies" by Douglas Biber
"From Grammar to Lexicon: Unsupervised Learning of Lexical Syntax" by Michael R. Brent
"The Mathematics of Statistical Machine Translation: Parameter Estimation" by Peter F. Brown, Stephen A. Della Pietra, Vincent J. Della Pietra, and Robert L. Mercer

"Building a Large Annotated Corpus of English: The Penn Treebank" by Mitchell P. Marcus, Beatrice Santorini, and Mary Ann Marcinkiewicz
"Lexical Semantic Techniques for Corpus Analysis" by James Pustejovsky, Sabine Bergler, and Peter Anick
"Coping with Ambiguity and Unknown Words through Probabilistic Models" by Ralph Weischedel, Marie Meteer, Richard Schwartz, Lance Ramshaw, and Jeff Palmucci

Language Computations

Eric Sven Ristad (editor)
(Princeton University)

[DIMACS Workshop on Human Language, 20–22 March 1992]
Providence, RI: American Mathematical Society (DIMACS Series in Discrete Mathematics and Theoretical Computer Science, volume 17), 1994, xiv + 198 pp.
Hardbound, ISBN 0-8218-6608-7, $60.00

The contents of the volume are as follows:

Part I. Phonetics
"C/D Model: A Computational Model of Phonetic Implementation" by Osamu Fujimura
"Relating Phonetic and Phonological Categories" by András Kornai
Part II. Metrical Phonology
"General Properties of Stress and Metrical Structure" by Morris Halle and William Idsardi
"Acquiring Stress Systems" by B. Elan Dresher
"Metrical Consistency" by Luigi Burzio
Part III. Learning Frameworks
"Inductive Reasoning" by Ming Li and Paul Vitányi
"Language Acquisition in the MDL Framework" by Jorma Rissanen and Eric Sven Ristad
Part IV. Morphology
"Parsing Morphology: 'Factoring' Words" by Stephen R. Anderson
"Complexity of Morpheme Acquisition" by Eric Sven Ristad