mar is not only of interest to all but should also serve as a model for similar research programs not only into attribute-value structures but alternative grammatical frameworks as well.

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New Directions in Machine Translation (Proceedings of the Conference, Budapest, August 1988)

Dan Maxwell, Klaus Schubert, and Toon Witkam (editors)
(BSO Research, Utrecht)

Dordrecht: Foris Publications, 1988, 259 pp.
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Machine Translation (MT) research is thriving, and papers on this and related topics nowadays often account for many of the papers read at meetings on computational linguistics. The book reviewed here consists of 16 papers on MT (plus an additional short paper that summarizes some of the results of the conference) presented at a gathering held in Budapest in August 1988. The theme of the conference, as stated by one of the editors, was to "attempt to highlight some new approaches and viewpoints against the background of an up-to-date worldwide overview". The 16 papers are the following:

W. J. Hutchins, 'Recent Developments in Machine Translation'

I. Vámos, 'Language and the Computer Society'

I. Oubine and B. Tikhomirov, 'The State of the Art in Machine Translation in the USSR'

D. Zhen Dong, 'MT Research in China'

C. Boitet, 'Pros and Cons of the Pivot and Transfer Approaches in Multilingual Machine Translation'

M. Kosaka, V. Teller, and R. Grishman, 'A Sublanguage Approach to Japanese–English Machine Translation'

I. Guzmán de Rojas, 'ATAMARI: Interlingual MT Using the Aymara Language'

K. Schubert, 'The Architecture of DLT—Interlingual or Double Direct?'

C. Hauenschild, 'Discourse Structure—Some Implications for Machine Translation'

J. Tsujii, 'What is a Cross-Linguistically Valid Interpretation of Discourse?'

C. Galinski, 'Advanced Terminology Banks Supporting Knowledge-Based MT'

W. Blanke, 'Terminologia Esperanto-Centro—Efforts for Terminological Standardization in the Planned Language'

D. Weidmann, 'Universal Applicability of Dependency Grammar'

B. Sigurd, 'Translating to and from Swedish by SWETRA—a Multilingual Translation System'

G. Prószéky, 'Hungarian—A Special Challenge to Machine Translation?'

C. Piron, 'Learning from Translation Mistakes'

Against the background of the conference title, "New Directions in Machine Translation" (which gives the book its title), of the 16 papers, 4 seem to be irrelevant to the topic (Vámos, Piron, Weidmann, Blanke); of the 12 papers left, 3 report the state of various systems (Zhen Dong, Oubine, Hutchins). That leaves only 9 papers original enough to be directly relevant to the conference topic (Boitet, Kosaka, Guzmán de Rojas, Schubert, Hauenschild, Tsujii, Galinski, Sigurd, Prószéky).

The 16 papers discuss the following topics; note that most of them discuss more than one topic, but they all put emphasis on one central topic:

(i) Language and the computer society (Vámos)

(ii) State-of-the-art reports (Oubine, Zhen Dong, Guzmán de Rojas, Sigurd, Hutchins)

(iii) The transfer/interlingua debate (Boitet, Guzmán de Rojas, Schubert, Kosaka, Tsujii, Hauenschild)

(iv) Terminology data banks (Blanke, Galinski)

(v) Linguistic designs/grammars (Guzmán de Rojas, Prószéky, Sigurd, Weidmann, Kosaka)

(vi) MT and discourse (Kosaka, Hauenschild, Tsujii)

(vii) MT history (Hutchins)

(viii) Translation problems (Piron)

The isolated papers of Vámos in (i) and Piron in (viii) above discuss the computer and translation from both ends of the MT dimension. Vámos, a computer scien-

tist, discusses how human activity is affected by the computer revolution and the role of language in this revolution. Indeed, anybody who works around a computer, no matter where he or she stands with respect to the computer, has to realize ultimately that natural language is the link between humanity and the machine. Vámos's contribution turns out to be interesting, for he does not blindly praise the power of computers to help human communication. His paper is about the social and political responsibility of a society wherein computers are everyday tools. Piron's paper, on the other hand, considers the specifics that make translation so hard even for human translators. In the face of all the problems, which make translators themselves prone to mistakes, Piron—who acknowledges having no knowledge of data processing and computers in general—reiterates the doubts shared by most human translators as to whether MT is feasible. How do MT developers answer when facing Piron's typical attitude: "In order to translate properly, you have to feel when and how to switch from one atmosphere to another" (p. 236). If feeling is a sine qua non condition for good translation, then translation by machine must be ruled out, for a computer does not feel. How can knowledge-based MT developers hope to achieve anything of substantial quality when a human translator admits not to know why he does what he does: "But how do I know I know? I don't know" (p. 236)? Many of Piron's objections (partly based on his unfamiliarity with how MT systems function) do have answers; I hope Mr. Piron was provided with some during the conference. Vámos and Piron's papers serve as useful reminders of the relationships of MT to society and translation at large.

The state of the art reports in (ii) above briefly describe various operational and research MT systems developed in the USSR, China, Sweden, and Bolivia. The first two have the properties of system reports; i.e., they describe in general terms the language-pairs worked on, the higher programming languages, the hardware, the grammars, and the MT approaches used. Because of the descriptions being so general, it is difficult at times to really understand what they mean; however, this problem is inherent to systems reports. While the other two papers in (ii) succinctly present general information, they also discuss in some depth the linguistic design or grammar of the respective systems described (see (v) above). Even though dependency grammar, or some modified version, is predominantly represented, other MT system projects are integrating other types of linguistic models, novel to the field: a mathematical model (Guzmán de Rojas), the Harris operator–argument framework (Kosaka) and Generalized Phrase Structure Grammar (Sigurd). Some papers in (v) are more linguistic in nature. For instance, Prószéky's paper on Hungarian shows why certain linguistic properties make Hungarian more suitable to be handled through an interlingua approach (more precisely, through the Distributed Language Translation

approach). Weidmann's paper discusses a version of dependency grammar that he claims will construct a possible universal 'blueprint' for every sentence.

The transfer/interlingua debate ((iii) above) opens with an illuminating paper by Boitet who clearly lays out the gains and pitfalls of the two approaches. This discussion is indirectly refined in Tsujii's paper where a three-way definition of interlingua is proposed; one of these definitions will have direct consequences for an approach wherein discourse considerations are immediately taken into account in the processing of the linguistic material. In this debate, Schubert's paper has the merit of reminding MT developers that in practice a system might have properties of both approaches; the DLT system turns out to be "double direct"; i.e., direct and interlingual.

Integrating the discourse dimension into an MT system is discussed at the levels of implementation and of theory (vi). In the SWETRA system (Sigurd's paper), universal functional representations (UFRs) are used as an intermediate (meta)language between languages. The UFRs of successive sentences are stored so that the system can keep track of the referents of a text for appropriate use of pronouns, for example (p. 208). The concern about developing MT systems sensitive to discourse situation (in the broad sense) is at the origin of Kosaka's sublanguage approach to MT. Techniques of text analysis are used to identify information patterns of a domain-specific language to disambiguate input. Most importantly, this approach tends to be intermediate between transfer and interlingua. Finally, Hauenschild discusses the importance of discourse structure for translation in general and MT, seen as a special case. After looking at idiosyncrasies of how a language expresses the thematic structure of a text, she argues in favor of the transfer approach. However, she also shows that invariants in translation should be captured by an interlingual approach. The conclusion turns out to be that a MT system should combine both approaches.

The aim of the conference was to illuminate the question of the new directions MT is taking by bringing together work from different perspectives. An introduction would have added much to the value of the book and its coherence. In view of the many topics and the new directions MT research and development are taking, the book would also have greatly benefitted from an effort on the part of the editors to explain the presence of some isolated papers (Vámos, Piron, etc), to bring together the papers that belong together under some sort of heading with introductory comments, and finally to reorder the papers. For instance, why leave at the end of the volume Sgall's closing remarks (which would be helpful to the reader as an introduction to the volume) where he draws conclusions about the material presented under three categories: (1) binary translation versus the intermediate language, (2) the linguistic method, and (3) human and artificial intelligence.

The strength of the book lies in the quality of the

individual contributions, some of which are very good. The book is a good source of information to get insight into the various avenues MT development and research are taking.

NOTE

1. Because 20% of the participants at the conference knew Esperanto, abstracts in Esperanto appear at the end of each paper. It would have been more beneficial to the reader to also have abstracts in English.

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Meaning and Mind: An Examination of a Gricean Account of Language by Anita Avramides
(University of Oxford)
Cambridge, MA: The MIT Press, 1989, xi+202 pp.
ISBN 0-262-01108-5, $25.00 (hb)

The Society of Text: Hypertext, Hypermedia, and the Social Construction of Information by Edward Barrett (ed.)
(MIT)
Cambridge, MA: The MIT Press, 1989, xix+459 pp. (Information systems series)
ISBN 0-262-02291-5, $37.50 (hb)

Outils logiques pour le traitement du temps: De la linguistique á l'intelligence artificielle (Logical Tools for the Treatment of Time: From Linguistics to Artificial Intelligence) by Hélène Bestougeff and Gérard Ligozat
(Université Paris 7 and CNRS)
Paris: Masson, 1989, 272 pp. (Études et recherches en informatique)
ISBN 2-225-81632-8 (hb)

Deduction Systems in Artificial Intelligence by Karl Hans Bläsius and Hans-Jürgen Bürckert (eds.)
(IBM Stuttgart and Universität Kaiserslautern)
Chichester, England: Ellis Horwood, 1989, 238 pp. (Ellis Horwood series in artificial intelligence)
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London: Longman, 1989, xv+310 pp. (Copublished in the United States with John Wiley & Sons)
ISBN 0-582-02248-7 (Longman) and 0-470-21187-3 (Wiley), $49.95 (hb)

Perspectives in Artificial Intelligence: Volume 1: Expert Systems: Applications and Technical Foundations; Volume 2: Machine Translation, NLP, Databases and Computer-Aided Instruction by John A. Campbell and José Cuena (eds.)
(University College London and Universidad Politécnica de Madrid)
Chichester, England: Ellis Horwood, 1989, 162 pp. (Vol. 1) and 211 pp. (Vol. 2) (Ellis Horwood series in artificial intelligence)
ISBN 0-7458-0659-7 and 0-470-21434-1 (Vol. 1) and 0-7458-0660-0 and 0-470-21435-X (Vol. 2) (hb)

The Predictability of Informal Conversation by Christine Cheepen
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London: Pinter, 1988, 132 pp. (Distributed in the U.S. by Columbia University Press)
ISBN 0-86187-707-1, $39.00 (hb)

Working Models of Human Perception by Ben A.G. Elsendoorn and Herman Bouma (eds.)
(Institute for Perception Research, Eindhoven)
London: Academic Press, 1989, xiii+514 pp.
ISBN 0-12-238050-9, £27.00 (hb)

Blackboard Systems by Robert Engelmore and Tony Morgan (eds.)
(Stanford University and Systems Designers plc)
Wokingham, England: Addison-Wesley, 1988, xviii+602 pp. (The insight series in artificial intelligence)
ISBN 0-201-17431-6 (hb)

*Speech Input and Output Assessment: Multilingual Methods and Standards by A. J. Fourcin, G. Harland, W. Barry, and V. Hazan (eds.)
(University College London)
Chichester, England: Ellis Horwood, 1989, 290 pp. (Ellis Horwood books in information technology) (Distributed by John Wiley & Sons)
ISBN 0-7458-0651-1 and 0-470-21439-2, $67.95 (hb)

*Natural Language Processing in PROLOG: An Introduction to Computational Linguistics by Gerald Gazdar and Chris Mellish
(University of Sussex and University of Edinburgh)
Wokingham, England: Addison-Wesley, 1989, xv+504 pp.
ISBN 0-201-18053-7, £17.95 (hb)

*Natural Language Processing in POP–11: An Introduction to Computational Linguistics by Gerald Gazdar and Chris Mellish
(University of Sussex and University of Edinburgh)
Wokingham, England: Addison-Wesley, 1989, xv+524 pp.
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Introduction to Lisp and Symbol Manipulation by Sharam Hekmatpour
(Open University)
Hemel Hempstead: Prentice-Hall U.K., 1988, xv+301 pp.
ISBN 0-13-486192-2 (sb)

*Artificial Intelligence Techniques in Language Learning by Rex W. Last
(Department of Modern Languages, University of Dundee)
Chichester, England: Ellis Horwood, 1989, 173 pp. (Ellis Horwood series in computers and their applications)