

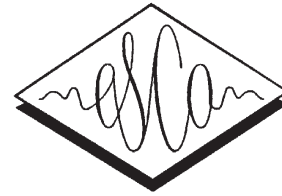
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Multi-Lingual Interoperability in Speech Technology

(l'Interopérabilité multilinguistique dans la technologie de la parole)

Papers and reports presented at the Tutorial and Workshop co-sponsored by the Information Systems Technology Panel (IST) of RTO-NATO and the European Speech Communication Association (ESCA) held in Leusden, The Netherlands on 13-14 September 1999.



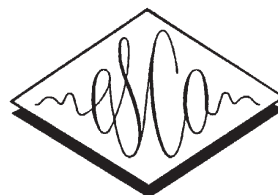
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Multi-Lingual Interoperability in Speech Technology

(RTO MP-28)

Executive Summary

Communications, command and control, intelligence, and training systems are more and more making use of speech technology components: i.e. speech coders, voice controlled C² systems, speaker and language recognition, and automated training suites. Interoperability of these systems is not a simple standardisation problem as the speech of each individual user is an uncontrolled variable such as non-native speakers using, additional to their own language, an official NATO language. For multinational operations, this may cause a reduced performance or even cause malfunction of an action. Standardised assessment methods and specifications for both commercial-off-the-shelf (COTS) and for development of new technology are required.

In the past the former DRG study group on speech technology (Panel-3, RSG.10) studied various effects of military environments in relation to the performance of speech technology focused on specific applications. Examples are the effect of noise on speech recognition, the effect of stress induced by workload, sleep deprivation, or battlefield stress, and presently the effect multi-linguality.

The present study considers interoperability of speech (communication) technology and embraces a wide range of military applications. It was identified that many nations, represented in the Task Group 001 of the IST-panel, have a major interest in command and control (speech recognition and synthesis), electronic war-fare (speaker and language recognition), training (communication operators, air traffic controllers) and understanding and translation systems.

In order to address these subjects a workshop on multilingual interoperability of speech technology was organised under responsibility of the RTO-IST-TG001 task group and the European Speech Communication Association. There were four tutorial papers and fifteen papers on a specific topic. The workshop took place in Leusden, The Netherlands from 13 to 14 September 1999. Over sixty people from twelve countries participated. Four topics were addressed in separate sessions:

- Non-native speech and regional accents
- Cross language speech processing
- Identification of language and speaker
- Human Perception and Assessment.

Each session was concluded with a plenary discussion. In these proceedings the tutorial papers, the topic related papers and a résumé of the discussions are given.

L'Interopérabilité multilinguistique dans la technologie de la parole

(RTO MP-28)

Synthèse

Les organismes C3, le renseignement et les systèmes d'entraînement font de plus en plus appel à des composants issus de la technologie vocale : il s'agit de codeurs vocaux, de systèmes C2 à commande vocale, de systèmes de reconnaissance du locuteur et du langage, ainsi que de programmes automatisés d'entraînement. L'interopérabilité de ces systèmes ne se présente pas comme un simple problème de normalisation, car la voix de chaque utilisateur individuel est une variable non-contrôlée, comme dans le cas d'un locuteur qui s'exprime dans une langue officielle de l'OTAN qui n'est pas la sienne. Dans le cas des opérations internationales, ce problème peut entraîner des performances réduites, voire même l'échec d'une action. Par conséquent, il y a lieu de définir des méthodes et des spécifications d'évaluation normalisées, tant pour les produits du commerce (COTS), que pour le développement de nouvelles technologies.

Dans le passé, le groupe d'étude sur la technologie vocale de l'ancien GRD (Panel-3, RSG.10), a examiné les différents effets des environnements militaires sur les performances de la technologie vocale pour des applications spécifiques. Des exemples de telles applications sont les effets du bruit sur la reconnaissance vocale, l'effet du stress engendré par une surcharge de travail, le manque de sommeil, le stress du champ de bataille, et récemment, l'effet multilingue.

Cette étude examine l'interopérabilité des technologies vocales (communication) et couvre un large éventail d'applications militaires. Il a été constaté que de nombreux pays représentés au Groupe de travail 001 de la commission IST s'intéressent vivement au commandement et contrôle (reconnaissance et synthèse de la parole), à la guerre électronique (reconnaissance du locuteur et du langage), à l'entraînement (opérateurs de communications, contrôleurs de la circulation aérienne) et au système d'analyse et de traduction.

Afin d'examiner ces sujets, un atelier sur l'interopérabilité multilingue de la technologie vocale a été organisé sous l'égide conjointe du groupe RTO-IST-TG001 et de l'Association européenne de la communication vocale. En tout, quatre communications pédagogiques et quinze communications spécialisées ont été présentées. L'atelier a été organisé à Leusden, aux Pays-Bas, les 13 et 14 septembre 1999. Plus de soixante personnes, de douze pays différents y ont participé. Quatre sujets ont été examinés lors de quatre sessions distinctes, à savoir :

- Les locuteurs non-natifs et les accents régionaux

- Le traitement de la parole interlingue

- L'identification du locuteur et du langage

- La perception humaine et l'évaluation

Chaque session a conclu par une discussion plénière. Ce compte rendu de conférence contient les communications et un résumé des discussions.

Contents

	Page
Executive Summary	iii
Synthèse	iv
Foreword	vii
Committee Members	viii

SESSION “NON-NATIVE SPEECH AND ACCENTS” CHAired BY DENIS JOHNSTON, BT, ENGLAND

1. Speech Recognition by Goats, Wolves, Sheep, and... Non-Natives by D.V. Compernelle	1
2. Acoustic-Phonetic Modeling of Non-Native Speech for Language Identification by R. Wanneroy, E. Bilinski, C. Barras, M. Adda-Decker and E. Geoffrois	9
3. How Foreign are “Foreign” Speech Sounds? Implications for Speech Recognition and Speech Synthesis by A. Lindström and R. Eklund	15
4. Clustering of Context Dependent Speech Units for Multilingual Speech Recognition by B. Imperl	21
5. Speech Recognition of Non-Native Speech using Native and Non-Native Acoustic Models by D.A. van Leeuwen and R. Orr	27
6. Report of the Plenary Discussion on “Non-Native Speech and Accents”	33

SESSION “HUMAN PERCEPTION AND ASSESSMENT” CHAired BY EDOUARD GEOFFROIS, DGA, FRANCE

7. An Overview of the Eurescom MIVA Project by D. Johnston	35
8. A Platform for Multilingual Research in Spoken Dialogue Systems by R.A. Cole, B. Serridge, J.-P. Hosom, A. Cronk and E. Kaiser	43
9. Auditory Features Underlying Cross-Language Human Capabilities in Stop Consonant Discrimination by E. Sá Marta and L. Vieira de Sá	49
10. Uses of the Diagnostic Rhyme Test (English Version) for Predicting the Effects of Communicators’ Linguistic Backgrounds on Voice Communications in English: An Exploratory Study by W.D. Voiers	55
11. Speech Intelligibility of Native and Non-Native Speech by S.J. van Wijngaarden	61

12. Report of the Plenary Discussion on “Human Perception and Assessment”	67
--	-----------

SESSION “CROSS LANGUAGE” CHAIRED BY TIM ANDERSON, WPAFB, USA

13. Towards Multilingual Interoperability in Automatic Speech Recognition by M. Adda-Decker	69
14. Multilingual Vocabularies in Automatic Speech Recognition by G. Micca, E. Palme and A. Frasca	77
15. Speech Recognition in Seven Languages by U. Uebler	81
16. A Militarily Operational Automatic Interpreting System by M. Hunt, P. Bamberg, J. Tucker and S. Anderson	87
17. Comparing Three Methods to Create Multilingual Phone Models for Vocabulary Independent Speech Recognition Tasks by J. Köhler	91
18. Language Adaptive LVCSR through Polyphone Decision Tree Specialization by T. Schultz and A. Waibel	97
19. Report of the Plenary Discussion on “Cross Language”	103

**SESSION “IDENTIFICATION” CHAIRED BY LOUIS BOVES,
UNIVERSITY OF NIJMEGEN, THE NETHERLANDS**

20. Automatic Language Identification by M.A. Zissman and K.M. Berkling	105
21. Multilingual Text-Independent Speaker Identification by G. Durou	115
22. Vowel System Modeling: A Complement to Phonetic Modeling in Language Identification by F. Pellegrino, J. Farinas and R. André-Obrecht	119
23. SCoPE, Syllable Core and Periphery Evaluation: Automatic Syllabification and Application to Foreign Accent Identification by K. Berkling, J. Vonwiller and C. Cleirigh	125
24. Report of the Plenary Discussion on “Identification”	131
25. Final Review by L. Boves	133
Appendix – Author Index	A-1

Foreword

Interoperability of systems is of crucial importance. When speech and language come into play, interoperability of systems developed for specific languages becomes an issue. Several different situations must be envisaged. For instance, one might want to use a speech coder optimised for American English in German or French. Or a native speaker of Dutch might want to use a speech recogniser trained for Spanish. These examples show that interoperability is an important issue for many applications of modern speech technology. For this reason a special task group of the NATO Research and Technology Organisation started a project on the development and assessment of multi-lingual applications of speech coding, speech recognition, topic spotting, speaker and language identification, and speech synthesis.

In the past this task group organised a number of workshops in co-operation with ESCA thus initiating an interaction between civil and military applications that to a large extent pose the same requirements. Recent workshops based on this concept were: “Applications of Speech Technology”, Lautrach-Germany 1993, “Speech under Stress”, Lisbon-Portugal 1995, and “Robust Speech Recognition for Unknown Communication Channels” Pont-à-Mousson-France 1997.

The program of the “MIST” workshop covers four themes:

- Non-native speech and regional accents
- Cross language speech processing
- Identification of language and speaker
- Human Perception and Assessment.

Four tutorial lectures introduce the various sessions of the workshop. Additionally, each session concluded with a plenary discussion. A résumé of these discussions are included in these final proceedings.

I would like to thank the NATO-RTO and ESCA for their support in the organisation of the workshop; the tutorial speakers, the discussion leaders and reporters for their time, effort and expertise; the International Scientific Committee for their help in reviewing the proposals and their constructive advice. Finally, I would like to thank my colleagues of the local organising committee who spent a lot of their time supported by their enthusiasm to ensure the very promising programme, for taking care of all of the logistics and for editing these final proceedings.

Herman J.M. Steeneken

Committee Members

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Elisabeth den Os
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Speech	Interoperability												
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