

主编

G. Fant

H. Fujisaki

J. Shen (沈家煊)

现代语音学前沿文集

*Frontiers
in
Phonetics
and
Speech
Science*



创于1897

商务印书馆

The Commercial Press

主编
G. Fant
H. Fujisaki
J. Shen(沈家焯)

现代语音学前沿文集

*Frontiers
in
Phonetics*

商务印书馆

2009年·北京

图书在版编目(CIP)数据

现代语音学前沿文集/G. Fant, H. Fujisaki, J. Shen(沈家焯)主编. —北京:商务印书馆, 2009

ISBN 978 - 7 - 100 - 06769 - 0

I. 现… II. G… III. 语音学—国际学术会议—文集
IV. H01 - 53

中国版本图书馆 CIP 数据核字(2009)第 172018 号

所有权利保留。

未经许可,不得以任何方式使用。

现代语音学前沿文集

G. Fant, H. Fujisaki, J. Shen(沈家焯) 主编

商务印书馆出版

(北京王府井大街36号 邮政编码 100710)

商务印书馆发行

北京瑞古冠中印刷厂印刷

ISBN 978 - 7 - 100 - 06769 - 0

2009年12月第1版

开本 787 × 1092 1/16

2009年12月北京第1次印刷

印张 27 1/4 插页 40

定价: 90.00 元

贺吴宗济先生百岁华诞

Festschrift for Professor Wu Zongji's 100th Birthday

现代语音学前沿文集

Frontiers in Phonetics and Speech Science

Edited by

GUNNAR FANT

*Department of Speech Communication and Music Acoustics
Royal Institute of Technology
Stockholm, Sweden*

HIROYA FUJISAKI

*University of Tokyo
Tokyo, Japan*

JIAXUAN SHEN

*Institute of Linguistics, Chinese Academy of Social Sciences
Beijing, China*

List of Contributors and their Affiliations

蔡莲红	清华大学计算机系
陈玉东	中国科学院心理所, 中国传媒大学
崔丹丹	清华大学计算机系
黄华新	浙江大学语言与认知研究中心, 浙江大学人文学院
孔江平	北京大学中文系
林茂灿	中国社会科学院语言研究所
路继伦	天津师范大学外国语学院
吕士楠	中国科学院声学研究所, 北京捷通华声语音技术公司
麦耘	中国社会科学院语言研究所
孟凡博	清华大学计算机系
缪冠琼	北京捷通华声语音技术公司
冉启斌	南开大学汉语言文化学院
石锋	南开大学汉语言文化学院
王韞佳	北京大学中文系
吴洁敏	浙江大学外语学院, 浙江大学语言与认知研究中心
吴宗济	中国社会科学院语言研究所
熊文婷	清华大学计算机系
闫润强	摩托罗拉上海实验室
张家绿	中国科学院声学研究所
祖漪清	摩托罗拉上海实验室

ABRAMSON Arthur S., Haskins Laboratories and The University of Connecticut, USA

AURAN Cyril, UFR Angellier, Université Charles de Gaulle -Lille 3, France

BOMBIEN Lasse, Institute of Phonetics and Speech Processing, Munich University, Germany

BOUZON Caroline, Laboratoire Parole et Langage, Université de Provence, France

CAO Jianfen, Institute of Linguistics, Chinese Academy of Social Sciences, China

CAO Wen, Center for Studies of Chinese as a Second Language, Beijing Language and Culture University, China

CHITORAN Ioana, Department of French and Italian, Dartmouth College, USA

DANG Jianwu, School of Information Science, Japan Advanced Institute of Science and Technology, Japan

EDMONDSON Jerold A., Department of Linguistics, University of Texas at Arlington, USA

ESLING John H., Department of Linguistics, University of Victoria, Canada

FANT Gunnar, Department of Speech, Music and Hearing, Royal Institute of Technology, Sweden

FUJISAKI Hiroya, Professor Emeritus, University of Tokyo, Japan
GOLDSTEIN Louis, Haskins Laboratories and University of Southern California, USA
GREENBERG Yoko, Language and Speech Research Laboratory, Waseda University, Japan
NAM Hosung, Haskins Laboratories, USA
HIRST Daniel, Laboratoire Parole et Langage, Université de Provence, France
HIROSE Keikichi, Department of Information and Communication Engineering, University of Tokyo, Japan
HOOLE Philip, Institute of Phonetics and Speech Processing, Munich University, Germany
KATO Hiroaki, ATR Human Information Processing Research Laboratories, National Institute of Information and Communications Technology, Japan
KOHLE Klaus J., Institute of Phonetics and Digital Speech Processing, University of Kiel, Germany
KRUCKENBERG Anita, Department of Speech, Music and Hearing, Royal Institute of Technology, Sweden
KÜHNERT Barbara, Institut du Monde Anglophone, Université Sorbonne Nouvelle Paris III, and Institut du Monde Anglophone, CNRS, France
LEE Chin-Hui, School of Electrical and Computer Engineering, Georgia Institute of Technology, USA
LEHISTE Ilse, Professor Emeritus, The Ohio State University, USA
LI Aijun, Institute of Linguistics, Chinese Academy of Social Sciences, China
LI Ke, Language and Speech Research Laboratory, Waseda University, Japan
LU Xugang, ATR Spoken Language Communication Research Labs, National Institute of Information and Communications Technology, Japan
LUANGTHONGKUM Theraphan, Department of Linguistics, Chulalongkorn University, Thailand
MENG Helen, Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong, Hong Kong SAR, China
MINEMATSU Nobuaki, Department of Information and Communication Engineering, University of Tokyo, Japan
MIXDORFF Hansjörg, Department of Computer Science and Media, Berlin University of Applied Sciences, Germany
MOOSHAMMER Christine, Haskins Laboratories, USA
NAM Hosung, Haskins Laboratories, USA
OHALA John J., Department of Linguistics, University of California, Berkeley, USA
POLLS Louis C. W., Institute of Phonetic Sciences, University of Amsterdam, The Netherlands
SAGISAKA Yoshinori, Language and Speech Research Laboratory, Waseda University, Japan
SALTZMAN Elliot, Haskins Laboratories and Boston University, USA
SU Zhao-yu, Institute of Linguistics, Academia Sinica, Taiwan of China

SUN Qinghua, Department of Information and Communication Engineering, University of Tokyo, Japan

TSENG Chiu-yu, Institute of Linguistics, Academia Sinica, Taiwan of China

TSUZAKI Minoru, ATR Spoken Language Communication Research Labs, National Institute of Information and Communications Technology, Japan

XU Yi, Department of Speech, Hearing and Phonetic Sciences, University College London, UK

ZHANG Jinsong, College of Information Sciences, Beijing Language and Culture University, China

ZHU Mingzhao, Language and Speech Research Laboratory, Waseda University, Japan

序 言

这次由我们所主办的语音学研讨会，中外学者会聚一堂，切磋学理，交流心得成果，同时也庆贺吴宗济先生百岁华诞。

2004年，吴宗济先生在95岁高龄的时候曾经豪迈地说：你们就把我当成59岁好了，有什么困难任务，你们尽管压过来。又过去了五年，吴先生百岁，豪迈之情不减，我们惊喜地看到他不但完成了社科院的老年基金项目“汉语普通话韵律研究”，而且还主持编辑出版了《赵元任语言学文集》中英文版，现在又参加了《罗常培语音学文集》的编辑工作。

我1979年到语言研究所当研究生，除了国际音标的训练，实验语音学的启蒙知识就是看吴先生写的《实验语音学知识讲话》，后来我做汉语口误的研究，细读吴先生的文章《试论普通话语音的“区别特征”及其相互关系》，深深为吴先生将中国传统音韵学和现代语音学理论结合起来的能力所折服。再后来我自己的学生也去吴先生那儿请教语音学和音韵学，获益匪浅，对吴先生也是十二分佩服。

一个真正的语言学家首先要有听音辨调的能力，吴先生回忆自己大学毕业到史语所应当助理，李方桂先生在钢琴上弹了几组四部和弦，考生中唯有吴先生能用五线谱把乐调谱出来交卷。回想我在语言所工作的时候参加一次出国进修选拔的考试，一道题是把录音中的一段曲调记录下来，我只能胡乱用五线谱画了个调形，跟吴先生比起来真是十分的惭愧。吴先生的过人之处是不仅“耳聪”而且“手巧”，他对实验仪器的摆弄能力也是他取得杰出成就的原因。吴先生给自己的书斋取名“补听缺斋”，给自选文集取名《补听集》，手、耳、脑并用，自然就“武艺高强”。

吴先生不仅武艺高强，还境界高远。他用王国维谈到的创业或治学必经的三个境界回顾自己的历程。要用实验方法来分析发音方法和特点，补听缺，探究语音演变规律，发现自身的差距要迎头赶上，出外取经，这是第一个境界“独上高楼，望尽天涯路”。要用机器合成或识别语言，要它“听懂”自然话语而不错、“说出”如口语般流利自然，就需要文、理双方的结合，这种结合谈何容易，孜孜不倦，锲而不舍，这个阶段辛苦而漫长，是第二个境界“衣带渐宽终不悔，为伊消得人憔悴”。把治学做人联系起来，眼光要大，认真务实，学无止境，有海纳百川、博取众长的胸襟和气魄，对人类语言的奥秘有更深的领悟。这第三个境界就是“众里寻他千百度。蓦然回首，那人却在灯火阑珊处”了。

吴先生退休20多年来，退而不休，与一些大学合作，完成了“汉语语调合成”的科研课题，并应用这项的理论研究成果，开发出汉语文一语转换系统的产品，获得了相当好的经济效益，得到国家的优等奖励。他还为所内所外培养了许多语音研究的后继人才和研究骨干。他对汉语语音学如何面向信息时代的未来进行了思考和探讨，提出我的研究方向要随形势的需要而有所调整。另外，他还就汉语声调与音乐乐律的关系，以及汉语语音的科学分类等问题，回顾了从隋唐以来的许多阐述，指出了古代文献中关于汉语声调的叙述、用乐律描写调值及其变化规则等方法，至今仍有参考价值。最近他又想到汉字草书笔法与汉语语调规则的相似性，拿历史上狂草名家的运笔和连写的轨迹和普通话的连读变调和语调规则加以对照，发现书法的

“连绵”、“映带”、“错综”和语音的“协同变调”或“停延轻重”在服从语法、表达情感上有相通的规则可寻。他认为对中国传统的知识善于领会并加以援用，也许能运用东方的思维方式为未来语音学的研究开辟新的途径。

这次研讨会和论文集的编辑得到吴先生日本的好友和同道藤崎博也教授的鼎力支持，我们深表感谢。现在会议的论文集即将出版，我就写上面这些话算作序言。

沈家煊

中国社会科学院语言研究所所长

Foreword

Dear Professor Wu Zongji,

On the remarkable occasion commemorating your centennial birthday, it is our great honor and pleasure to address you on behalf of all the contributors to this volume.

Born as a son in a notable family, you graduated from the renowned Tsinghua University 75 years ago, with your unique training both in Science and Humanities. Since then, you have consistently been pursuing an academic career, developed an efficient laboratory for speech research within the Chinese Academy of Social Sciences with highly qualified students and associates, whose works along with your own are well known internationally. Since 1979, you have also been serving the international community as member of the Permanent Council for the Organization of International Congresses on Phonetic Sciences, where some of us had the pleasure of working with you more closely. Our admiration and friendship continues even today.

Although the main part of the contributions to this volume are based on the papers presented at the International Forum held in conjunction with the Phonetic Congress of China in Beijing, April 2008, we are very pleased to include some from your friends and admirers, both old and young, in the field of speech communication, who could not be at the meeting. Along with all these valuable contributions which are in the printed volume, we are happy to present you a DVD of photographs and other records that are worthy of commemorating the extraordinary fruitful life of a century of our great and admired friend, teacher, and father, who, to our great pleasure, continues to live an active scientific life.

Dear Professor Wu, you are the hope and pride of all those who had the pleasure of being under your scholarly influence. We wish you many more years of unprecedented, fruitful and happy life!

Gunnar Fant and Hiroya Fujisaki

Biography



Wu Zongji, alias Zhichuan, descendant of a family from Wuxing, Zhejiang Province.

1. Brief life history

1909-04-04: Born in Ji'ning, Shandong Province. In his childhood he studied at Nanyang High School in Shanghai and then Dacheng High School (old system) in Peking. After graduation, he was admitted to the Preparatory Course of Nankai University in Tianjin.

1928: Admitted into Tsinghua University, and studied first at Dept. of Civil Engineering, and later at Dept. of Chemistry, and finally at Dept. of Chinese Literature. Obtained the B.S. of Literature degree in 1934.

1934-1935: Worked at the Publication Office of Tsinghua University, and was in charge of editing, publishing and exchanging of "Journal of Tsinghua University", "Tsinghua Science Reports", and various literature and history books and other publications.

1935-1940: Admitted into the Institute of History and Languages, Chinese Central Academy of Sciences, as Assistant, first at Nanjing, and then moved with the Institute to Kunming in 1937.

1949-1950: Special reporter of Dagong Newspaper in Shanghai.

1950-1951: Chief Editor in Chinese Film and Record Corporation.

1955-1956: Head of Section of Research and Investigation on Scientific Instruments, Chinese Export Corporation, Shanghai.

1956: Joined the Institute of Linguistics, Chinese Academy of Sciences, first as Assistant Researcher, and then as Researcher up to present.

2. Working experience at the Institute of Linguistics

(1) **1956-1957:** Served as a teacher of phonetics for the Research Class of Mandarin Speech in cooperation with the Ministry of Education and the Institute of Linguistics.

(2) **1957-1958:** Sent to Czechoslovakia, German Democratic Republic, Sweden, and Denmark, to investigate and study experimental phonetics.

(3) **1978:** Became Director of the Speech Laboratory, Institute of Linguistics, Chinese Academy of Social Sciences (formerly the Institute of Linguistics, Chinese Academy of Sciences).

(4) **1978:** Became Professor and Supervisor of M.S. students in the Graduate School of CASS.

(5) **1978-1980:** Member of the Scientific Committee, Institute of Linguistics, CASS.

(6) **1979:** Researcher, Institute of Linguistics, CASS.

(7) **1979-1980:** Adjunct Professor at the Dept. of Chinese Literature of Peking University. Opened the course of Experimental Phonetics.

(8) **1979:** Elected as Member of the Permanent Council for the Organization of International Congresses of Phonetic Sciences.

(9) **1979:** Invited to be Member of the Scientific Committee of the Institute of Acoustics, Chinese Academy of Sciences, and also joined the editorial committee of the Chinese Journal of Acoustics.

(10) **1981:** Became Member of the Scientific Committee of the Chinese Society of Linguistics, and also served as the chief editor of the 5th and the 6th volumes of "Chinese Journal of Linguistics".

(11) **1981:** Elected as Vice Chairman of the Committee of Language and Music Acoustical Society, National Acoustical Society.

(12) **1986:** Retired, and then rehired during 1986-1995.

(13) **1988:** Invited to be Visiting Scholar at the Ohio State University.

(14) **1995:** Invited to be Advisor of the Language Society of Beijing.

(15) **1996:** Participated in the NNSF project "Research on Mandarin Intonation Synthesis" conducted by the University of Science and Technology of China.

3. Main Academic Career at the Institute of Linguistics

The academic career of Prof. Wu Zongji on speech can be divided into four stages as follows:

During the first stage, he mainly worked on the introduction and application of experimental phonetics and the analysis of Mandarin vowels, consonants and tones. During this stage, his main publications include “Figures of the Monosyllables of Mandarin”, “Introduction to Experimental Phonetics”, “Introduction to Modern Mandarin Phonetics” and dozens of other papers. In particular, from 1982 onward, he focused his work on the analysis of Mandarin tones and on the study of the variations of Mandarin tones in utterances. He published a series of papers on the rules of tone sandhi in bi-syllable, tri-syllable, quadro-syllable, and quinta-syllable sequences and their phonetic, syntactic and phonological origins.

During the second stage, he mainly worked on intonational variations. He found that the tone patterns of short words such as bi-syllabic and tri-syllabic words basically remain invariant, while phrasal intonation is mainly up-and-down variations of the baseline. Based on this, he proposed a new method for intonation analysis, namely, applying ‘change key’ (musical term, the so-called ‘key shifting’) processing without changing the tone patterns. At the same time, he changed the commonly accepted linear frequency scale into musical tone scale, thereby normalizing the data and simplifying the calculation simultaneously. This theory and method opened up a powerful way to solve various problems in the study of Mandarin intonation. The main theory can be found in his papers published during 1993-1996.

During the third stage, he mainly worked on the applied research, especially on the application of his co-articulation theory and intonation theory to speech synthesis. He designed a complete set of phonetic symbols (both segmental and prosodic) for the purpose of speech synthesis, providing conditions for improving the naturalness of synthetic speech. The main contents are found in his papers during 1996-2000.

In the fourth stage of his academic activity which started from around 2000 and is being continued up to today, on the one hand he has been summarizing his research works both in modern phonetics and traditional Chinese phonology and integrating them into speech technology, but on the other hand he has started exploring a new topic of interest in the cognitive aspects of human communication that are common to speech and handwriting. As the only one actor and witness of the progress of Modern Phonetics in China over the last 100 years, he still contributes to this field with a remarkable insight and novel ideas. The corresponding publications are partially found in *Linguistic Essays by Wu Zongji*, which was published in 2004.

Photo Album



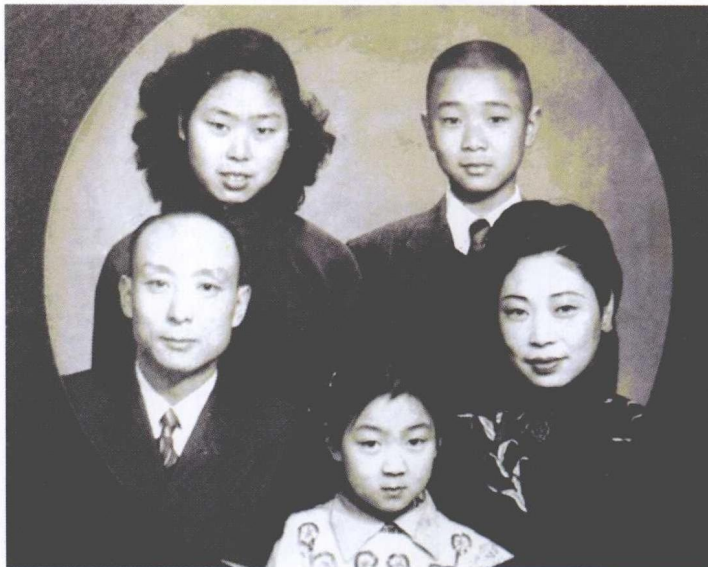
1928, **Z. Wu** with his wife, father-in-law and mother-in-law.
From right to left: **Z. Wu**, his father-in-law G. Mei (ex-president of the High Court of Shandong Province in the early period of ROC), mother-in-law, and wife J. Mei.



1934, **Z. Wu** studying at Tsinghua University.



1934, **Z. Wu** graduated from Tsinghua University.



1952, Family photo taken in Shanghai.

First row (from left to right): **Z. Wu**, second daughter Caizhu, wife J. Mei.
Second row (from left to right): first daughter Qiangzhu and son Youzhi.



July 31, 1938, **Z. Wu** in Kunming, with Prof. Chao and three other assistants.
From left to right: **Z. Wu**, Y. Chao, T. Dong, S. Ding and S. Yang.



1957, Visiting Prof. B. Hála at the Department of Phonetics of Brno University, Brno, Czechoslovakia.
From right to left: **Z. Wu**, an assistant, and B. Hála.



1957, **Z. Wu** on a bridge over Vltava river, Czechoslovakia.