Universiteit
Leiden
The Netherlands

Tone and intonation processing: from ambiguous acoustic signal to linguistic representation

Liu, M.

Citation
Liu, M. (2018, November 1). *Tone and intonation processing: from ambiguous acoustic signal to linguistic representation*. *LOT dissertation series*. LOT, Utrecht. Retrieved from https://hdl.handle.net/1887/66615

Version:	Not Applicable (or Unknown)
License:	Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden
Downloaded from:	https://hdl.handle.net/1887/66615

Note: To cite this publication please use the final published version (if applicable).

Cover Page

Universiteit Leiden

The handle http://hdl.handle.net/1887/66615 holds various files of this Leiden University dissertation.

Author: Liu, M.
Title: Tone and intonation processing: from ambiguous acoustic signal to linguistic representation
Issue Date: 2018-11-01

Tone and intonation processing:

From ambiguous acoustic signal to linguistic representation

Published by
LOT
Trans 10
3512 JK Utrecht
The Netherlands

phone: +31 30 253 6111

e-mail: lot@uu.nl
http://www.lotschool.nl

Cover illustration: Surface signals and beyond, by Feifei Wang.

ISBN: 978-94-6093-299-1
NUR 616

Copyright © 2018: Min Liu. All rights reserved.

Tone and intonation processing: From ambiguous acoustic signal to linguistic representation

Proefschrift

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof.mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 1 november 2018
klokke 11.15 uur

door

MIN LIU

geboren te Shaanxi, China
in 1988

Promotor:	Prof.dr. Niels O. Schiller
Co-promotor:	Dr. Yiya Chen
Promotiecommissie:	Prof.dr. Rint Sybesma (secretaris) Prof.dr. Carlos Gussenhoven (Radboud University) Prof.dr. Claartje Levelt Prof.dr. Herbert Schriefers (Radboud University)

Table of Contents

Acknowledgements IX

Chapter 1 General introduction 1
1.1 Neural correlates of tone and intonation processing in Standard Chinese 5
1.2 Context effects on tone and intonation processing in Standard Chinese 8
1.3 Tonal mapping between Standard Chinese and Xi'an Mandarin 10
1.4 Cross-dialect phonological similarity in segment and tone on bi-dialectal spoken word recognition 12

Chapter 2 Online processing of tone and intonation in Standard Chinese: Evidence from ERPs 15
2.1 Introduction 17
2.2 Method 23
2.2.1 Participants 23
2.2.2 Materials 23
2.2.3 Recording and stimuli preparation 25
2.2.4 Task 28
2.2.5 Procedure 29
2.2.6 EEG data recording 29
2.2.7 Behavioral data analysis 30
2.2.8 EEG data analysis 30
2.3 Results 32
2.3.1 Behavioral results 32
2.3.2 ERP results 34
2.4 General discussion 37
2.5 Conclusion 42

Chapter 3 Context matters for tone and intonation processing in Standard Chinese 43

3.1 Introduction....45
3.2 Experiment 1....49
3.2.1 Method....49
3.2.2 Results....53
3.3 Experiment 2....56
3.3.1 Method....56
3.3.2 Results....58
3.4 Experiment 1 vs. Experiment 2....61
3.4.1 Response accuracy....61
3.4.2 Reaction time....62
3.5 General discussion....63
3.6 Conclusion....67

Chapter 4 Tonal mapping of Xi'an Mandarin and Standard Chinese....69
4.1 Introduction....71
4.2 Experiment 1....76
4.2.1 Method....76
4.2.2 Results....79
4.3 Experiment 2....82
4.3.1 Method....83
4.3.2 Results....88
4.4 General discussion....91
4.5 Conclusion....96

Chapter 5 Effects of cross-dialect phonological similarity in segment and tone on bi-dialectal auditory word recognition: Evidence from Xi'an Mandarin and Standard Chinese....97
5.1 Introduction....99
5.2 The present study....102
5.3 Method....105
5.3.1 Participants....105
5.3.2 Stimuli....107
5.3.3 Stimuli recording....110
5.3.4 Procedure....111

5.3.5 Data analysis 112
5.4 Results 113
5.4.1 Response accuracy 113
5.4.2 Reaction time 114
5.5 General discussion 119
5.6 Conclusion 125

Chapter 6 General discussion 127

Appendix A 137

Appendix B 139

Appendix C 141

Appendix D 143

References 163

Summary 183

Samenvatting 189

摘 要 195

Curriculum vitae 201

Acknowledgements

I could not have finished my PhD dissertation without the help and guidance of many people. My deepest gratitude goes to my supervisors Yiya Chen and Niels Schiller. I thank Yiya for shaping the mindset of me as an entry-level researcher, for sharing her expertise in research and wisdom in life with me, and for giving constructive comments and suggestions on my work and career. I am grateful to Niels for his continuous encouragement over the years. I thank him for giving me the freedom to pursue my research interests and for providing prompt feedback at the last stage of my dissertation revisions. I have learnt a lot from both my supervisors. It has been a great privilege working with them.

I owe special thanks to Prof. Qingfang Zhang and Dr. Xuhai Chen. I appreciate that they gave me access to lab facilities when I conducted experiments in China. Qun Yang, Tingting Zheng, thank you for offering technical support and helping me recruit participants for the experiments. To all my participants in Leiden and in China, thank you for expressing interest in my experiments and showing up at the lab on time. You made my life much easier.

As I look back over all these years at LUCL, my heart is filled with such gratitude for the many amazing friends and colleagues I have met here. Yifei, thank you for sticking with me through thick and thin along the journey. I cherish the time we spent together attending conferences, traveling, and sharing happiness and sorrows. Qian, thank you for enlightening me on the issue of statistics and cheering me up when I was down. Man, thank you for sharing your knowledge of psycholinguistics with me, and I really enjoyed the lovely dinners you hosted. Ting, it was so much fun discussing research with you and wandering around cities. Han, you inspired me to relish and experience life. Thank you. Bobby, I owe you special thanks for helping me set up my experiments. I am extremely grateful that you helped me overcome frustration when things did not work out. Arum, Nazar, Nurenzia, Amanda, my dear office mates, I feel incredibly lucky to work side by side with you. Your loving and caring nature has made my days much more productive. I am indebted to

Cesko, my paranymph. Thank you for translating my Nederlandse samenvatting and helping me out with the final preparations. I would also like to thank Kate Bellamy and Eric Shek for proofreading the dissertation. Thanks also go to the anonymous reviewers of my submitted papers, and to the doctoral committee of this dissertation: Prof. Rint Sybesma, Prof. Carlos Gussenhoven, Prof. Herbert Schriefers and Prof. Claartje Levelt. Some of the other colleagues inside and outside LUCL I would like to thank are Aliza Glabergen-Plas, Bastien Boutonnet, Bei Peng, Eleanor Dutton, Elisabeth Mauder, Hanna Fricke, Hang Cheng, Lei Huang, Kalinka Timmer, Lesya Ganushchak, Leticia Pablos, Libo Geng, Lisette Jager, Jiang Wu, Jos Pacilly, Junru Wu, Menghui Shi, Mengru Han, Qi Wang, Qing Yang, Olga Kepinska, Saskia Lensink, Stella Gryllia, Xin Li, Yang Yang and Yunus Sulistyono.

It has been a really challenging but deeply rewarding five years. One person that made all this happen in the first place is my MA supervisor, Prof. Jinsong Zhang. For that, I owe him special thanks. I thank him for arousing my interest in research several years ago and I thank him, in particular, for encouraging me to pursue my PhD abroad.

I have enjoyed my life in Leiden greatly. I am especially thankful to two individuals who made significant contributions to it, James and Cynthia. Thank you for helping me settle in when I first came, and thank you for treating me like family all the time.

A huge thanks to my wonderful friends: Feifei, Shuju, Yanhua, Shanshan, Xiaolong, Cuicui, Fanhong, Xiaorong and Xiaotang. I feel so blessed to have you always there for me. Thank you.

Last but not least, no words can describe how thankful I am to my family: my mum and dad, my elder sister and my younger brother. Thank you for your unconditional love and endless belief in me. You have given me the strength to keep going.

This dissertation was funded by a PhD scholarship from the Chinese Scholarship Council. I would also like to acknowledge the partial financial support from the Leiden University Centre for Linguistics and the Leids Universiteits Fonds.