



Universiteit
Leiden
The Netherlands

Versatility of phonemic pitch in affective iconicity and perceptual reorganisation

Zheng, T.

Citation

Zheng, T. (2025, November 19). *Versatility of phonemic pitch in affective iconicity and perceptual reorganisation*. LOT dissertation series. LOT, Amsterdam. Retrieved from <https://hdl.handle.net/1887/4283265>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/4283265>

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

Versatility of phonemic pitch

In affective iconicity and perceptual reorganisation

Published by

LOT

phone: +31 20 525 2461

Binnengasthuisstraat 9

1012 ZA Amsterdam

e-mail: lot@uva.nl

The Netherlands

<http://www.lotschool.nl>

Cover illustration: Concept by Tingting Zheng, painting by M.Y. Priscilla Lam, and editing by M.Y. Priscilla Lam and Tingting Zheng.

ISBN: 978-94-6093-487-2

DOI: <https://dx.medra.org/10.48273/LOTo702>

NUR: 616

Copyright © 2025: Tingting Zheng. All rights reserved.

Versatility of phonemic pitch
In affective iconicity and perceptual reorganisation

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr.ir. H. Bijl,
volgens besluit van het college voor promoties
te verdedigen op woensdag 19 november 2025
klokke 10.00 uur
door

Tingting Zheng
geboren te Shanxi, China
in 1992

Promotores: Prof. dr. Claartje Levelt

Prof. dr. Yiya Chen

Promotiecommissie: Dr. Victoria Nyst

Prof. dr. Nancy Kula

Prof. dr. Asli Özyürek

(Max Planck Institute for Psycholinguistics)

Dr. Caicai Zhang

(The Hong Kong Polytechnic University)

To my family
Aan mijn familie
致我挚爱的家人

Two roads diverged in a wood, and I,
I took the one less travelled by,
And that has made all the difference.
— Robert Frost, *“The Road Not Taken”* (1915)

Table of contents

Acknowledgements	I
Chapter 1 General introduction	1
1.1 Iconicity	4
1.2 Iconicity of pitch	7
1.2.1 Affective iconicity of pitch	9
1.2.2 Linguistic pitch is predominant over phonemes in affective iconicity.....	12
1.2.3 Adaptive significance of linguistic pitch in affective iconicity	15
1.3 Methodological approaches and stimuli used in affective iconicity research	17
1.4 Interim summary on affective iconicity.....	18
1.5 Perceptual reorganisation	23
1.6 Perceptual reorganisation of pitch.....	25
1.7 Summary of the contents of this dissertation.....	29
Chapter 2 Affective iconicity of tonemes in bisyllabic units in Standard Chinese	31
2.1 Introduction	33
2.1.1 Ethical approval	39
2.2 Study 1. Corpus analysis of Chinese bisyllabic words	40
2.2.1 Method	40
2.2.2 Data analysis	41
2.2.3 Results	42
2.2.4 Discussion	44
2.3 Study 2. Online assessment of Chinese bisyllabic words	46
2.3.1 Method	47
2.3.2 Data analysis	50
2.3.3 Results	52

2.3.4 Discussion	54
2.4 Study 3. Two-alternative forced-choice task using Chinese bisyllabic nonce words.....	56
2.4.1 Method	57
2.4.2 Data analysis	62
2.4.3 Results	64
2.4.4 Discussion	65
2.5 General discussion.....	66

Chapter 3 Affective iconicity of tonemes and phonemes in monosyllabic units in Standard Chinese 73

3.1 Introduction	76
3.2 Method	80
3.2.1 Sample size estimation.....	80
3.2.2 Participants	80
3.2.3 Stimuli	81
3.2.4 Procedure	84
3.3 Data analysis.....	86
3.4 Results.....	87
3.4.1 V dataset	88
3.4.2 CVL dataset	92
3.5 Discussion	98

Chapter 4 Adaptive significance of tonemes for affective iconicity in Standard Chinese..... 105

4.1 Introduction	108
4.2 Method	114
4.2.1 Corpus datasets	114
4.3 Data analysis.....	115
4.4 Results.....	116
4.4.1 V-shaped relationship between arousal and valence	116

4.4.2 Effects of individual lexical tone on arousal and valence ratings	118
4.5 Discussion	123

Chapter 5 Development of hemispheric lateralisation of lexical pitch processing: A cross-linguistic study in Dutch and Japanese infants 129

5.1 Introduction	132
5.1.1 Ethical approval	140
5.2 Experiment 1. Habituation of lexical pitch in Dutch infants ...	140
5.2.1 Method	142
5.2.2 Data analysis	144
5.2.3 Results	146
5.2.4 Discussion	150
5.3 Experiment 2. Hemispheric lateralisation of lexical pitch in Dutch infants (NIRS study)	152
5.3.1 Method	152
5.3.2 Data analysis	161
5.3.3 Results	165
5.3.4 Discussion	167
5.4 Experiment 3. Hemispheric lateralisation of lexical pitch in Japanese infants (NIRS study)	168
5.4.1 Method	169
5.4.2 Data analysis	171
5.4.3 Results	174
5.4.4 Discussion	176
5.5 General discussion	178

Chapter 6 General discussion 185

6.1 Research questions and findings	186
6.2 Contributions, limitations, and future directions	190

6.2.1 Phonemic pitch in affective iconicity	190
6.2.2 Phonemic pitch in perceptual reorganisation	196
6.3 Conclusion	201
References	203
Appendices	251
Appendix A. Affective iconicity in Standard Chinese: Related studies overview and supplementary results	251
Appendix B. Pseudowords formulation and their wordlikeness ratings in Dutch and Japanese	267
Phonemes	267
Words composition	267
Words recording.....	268
Words manipulation	268
Ratings on the pseudowords	270
Appendix C. Outcomes from all fNIRS data preprocessing pipelines in Experiments 2 and 3 of Chapter 5	272
English summary	275
Samenvatting in het Nederlands	279
中文摘要	283
Curriculum Vitae	285

Acknowledgements

The completion of this dissertation has been a journey full of twists and turns, made possible by the incredible people who walked alongside me.

First and foremost, my deepest gratitude goes to my doctoral promoters, Prof. dr. Claartje Levelt and Prof. dr. Yiya Chen. Your patience, encouragement, and unwavering belief in me have not only shaped my academic growth but also taught me resilience, for which I am eternally grateful. Heartfelt thanks to my master supervisor, Prof. dr. Xuhai Chen, for your early guidance and support, which laid the groundwork for everything that followed.

Being part of such a vibrant and supportive group, including Min Liu, Menghui Shi, Qing Yang, Xinyi Wen, Hana Nurul Hasanah, Matthew Sung, Yiran Ding, Xin Li, Priscilla Lam, Charlie Xu, Katrina Li, Qi Zhang, and Yingyang Wang, was a privilege. To my PhD fellows, Zhen Li, Ami Okabe, Andrew Wigman, Cesko Voeten, Rasmus Puggaard-Rode, Sarah von Grebmer zu Wolfsthurn, Zhuoyi Luo, Zhaole Yang, Ruixue Wu, Jin Wang, Natasja Delbar, Bente De Graeve and many others, thank you for making this journey less lonely and far more fun. Special thanks to Dan Yuan for your research insights and support, and to Min, Han Hu, and Menghui for helping me settle into life in Leiden. I owe so much to my dear friends and colleagues, Qing, Hang, and Jiang. Thank you for being my steady ground and safe space, for seeing me, caring for me, and standing by me through it all.

A huge thank you to those who helped me navigate the technical challenges of this research. Jos Pacilly, for your patience with my Praat scripts; Anne van der Kant, for guiding me through the NIRx system; Szilvia Biro, for your timely fNIRS advice; Guilia Vigna, Heleen de Lange, Ngaira Salomons, Saskia Galindo Jong, and Andreas P. Wölflle,

II

for assisting with experiments; and Isabella Fritz, for generously sharing your fNIRS study materials. To Andreea Geambaşu, for guiding me through the Methods course teaching.

My gratitude also extends to my Japanese colleagues: Prof. dr. Reiko Mazuka, for your invaluable mentorship and hospitality; Naoto Yamane, for training me on HITACHI fNIRS; and Rachel Ka-Ying Tsui and Akiko Okuno, for your support and lovely companionship. Many thanks to other significant lab members for making my time in Japan special because of your kindness and support.

To my officemate, Dr. Evelyn Bosma, thank you for the shared silences and chit-chats. Camilla, you've made life more beautiful in countless ways. Patty, Niels, and Maxi, your kindness, warmth, and boundless joy made Leiden truly feel like home.

My deepest thanks to all the babies, families, and adult participants in my study; your contributions made this research possible. Special appreciation to my colleagues Jurgen Lingen and Jesse Wichers Schreur, who participated with their little ones, and to Aliza Glasbergen-Plas and Ami Okabe, for lending me your voices. To Natasja Delbar, for reviewing and proofreading my Samenvatting.

To the reviewers of my doctoral work, thank you for your time, insights, and for challenging me to think deeper. This dissertation was funded by the China Scholarship Council, with additional support from the Leiden University Centre for Linguistics and the NWO-VICI project "Melody in Speech."

Last but not least, to my family, especially my parents and brother, your unconditional love and support have been my foundation. This dissertation is as much yours as it is mine. Deep appreciation to my friends Min Xu, Xi Liu, and Mengge Tan for always being there for me, and to Shallway, for walking beside me and lighting up the grey.