

Information about Putonghua (Mandarin) speech

1. A comparison between Putonghua (Mandarin) and English phonology

Aspect	Language	Number	Details	Source
Consonants	Putonghua (Mandarin)	22 consonants	/p, p ^h , t, t ^h , k, k ^h , m, n, ŋ, f, s, ʃ, x, ʅ, l, ɕ, ts, ts ^h , tʂ, tʂ ^h , tɕ, tɕ ^h /	Zhu Hua (2007)
	English	24 consonants	/p, b, t, d, k, g, m, n, ŋ, θ, ð, f, v, s, z, ʃ, ʒ, h, tʃ, dʒ, j, w, ɹ, l/	Smit (2004)
Consonant clusters	Putonghua (Mandarin)	None		Zhu Hua (2007)
	English	23 consonant clusters	Many 2 and 3 element consonant clusters in initial position including /pl, bl, kl, gl, fl, sl, pɹ, bɹ, tɹ, dɹ, kɹ, gɹ, θɹ, fɹ, ʃɹ, pj, tj, fʃ, mj, nj, sm, sn, sp, st, sk, spl, spɹ, stɹ, skw/ and many 2 to 4 element consonant clusters in final position	Smit (2004)
Vowels and diphthongs	Putonghua (Mandarin)	9 vowels + 9 diphthongs + 4 triphthongs	Vowels: /i, y, u, ɤ, o, a, ə, ɛ, ɔ/ Diphthongs: /ae, ei, ao, ou, ia, ie, ua, uo, ye/ Triphthongs: /iao, iou, uae, uei/	Zhu Hua (2007)
	English (US-General American)	14 vowels + 3 diphthongs	Vowels: /i, ɪ, e, ɛ, æ, ə, ɜ, ʊ, o, ʌ, ɔ, ɑ/ Diphthongs: /aɪ, aʊ, ɔɪ/ (Smit also lists 5 'r'-colored diphthongs)	Smit (2007)
	English (Canadian)	14 vowels + 3 diphthongs	Vowels: /i, ɪ, e, ɛ, æ, ə, ɜ, ʊ, ʊ, o, ʌ, ɔ, ɑ/ Diphthongs: /aɪ, ʌʊ, ɔɪ/	Bernhardt, & Deby (2007)
	English (UK-Received Pronunciation)	12 vowels + 8 diphthongs	Vowels: /i, ɪ, e, æ, a, ə, ɜ, u, ʊ, ʌ, ɔ, ɒ/ Diphthongs: /aɪ, aʊ, ɔɪ, eɪ, oʊ, ɪə, eə, ʊə/	Howard (2007)
	English (Australian)	12 vowels + 8 diphthongs	Vowels: /i:, ɪ, e, æ, ɛ:, ɐ, ɔ:, ʊ, ʊ:, ɜ:, ə/ OR /i, ɪ, e, æ, a, ʌ, ɒ, ɔ, ʊ, u, ɜ, ə/ ⁱⁱ Diphthongs: /æɪ, ae, əɐ, æɔ, ɔɪ, ɪə, eɪ, ʊə/ ⁱ OR /eɪ, aɪ, oʊ, aʊ, ɔɪ, ɪə, eə, ʊə/ ⁱⁱ	ⁱ Harrington, Cox, & Evans, (1997) ⁱⁱ Mitchell (1946)
	English (New Zealand)	12 vowels + 8 diphthongs	Vowels: /i, ɪ, e, æ, ə, ɜ, u, ʊ, ʌ, ɔ, ɒ, ɑ/ ⁱ OR /i, ɪ, e, æ, a, ə, ɜ, ʊ, ʌ, ɔ, ɒ/ ⁱⁱ Diphthongs: /aɪ, aʊ, ɔɪ, eɪ, oʊ, ɪə, eə, ʊə/ ⁱ OR /aɪ, aʊ, ɔɪ, eɪ, oʊ, ɪə, eə, ʊə/ ⁱⁱ	ⁱ Bauer & Warren (2004) ⁱⁱ MacLagan (2009)
Tones	Putonghua (Mandarin)	4 tones	High level, rising, falling-rising, high falling	Zhu Hua (2007)
	English	0 tones	-	

Syllable shape	Putonghua (Mandarin)	$C_{(0-1)}VC_{(0-1)}$		Zhu Hua (2007)
	English	$C_{(0-3)}VC_{(0-4)}$	The smallest syllable is V and the largest is CCCVCCCC strengths.	Smit (2004) McLeod (2007)
Stress-timed or syllable-timed?	Putonghua (Mandarin)	Syllable-timed	Weak stress is an essential prosodic feature.	Zhu Hua (2007)
	English	Stress-timed	Syllables can be strong or weak. Stress also is used for emphasis.	
Varieties	Putonghua (Mandarin)	Putonghua, Mandarin	Putonghua is spoken in mainland China (and taught in schools). Subvariety of <i>Beifang</i> . Mandarin (Guoyu) is spoken in Taiwan.	
	English	Many dialects	Many dialects including General American English, Received Pronunciation (England), Scottish English, Irish English, Australian English, New Zealand English, South African English etc.	
Writing system	Putonghua (Mandarin)	Chinese (simplified)	Logographic characters.	
	English	Roman script	Roman script loosely related to phonetic realizations of the consonants and vowels.	

References

Putonghua (Mandarin) studies

Zhu Hua (2007). Putonghua (Modern Standard Chinese) speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 516-527). Clifton Park, NY: Thomson Delmar Learning.

English studies

Bauer, L., & Warren, P. (2004). New Zealand English: Phonology. In E. Schneider, K. Burridge, B. Kortmann, R. Mesthrie & C. Upton (Eds.). *A handbook of varieties of English: Vol. 1. Phonology* (pp. 580-602). Berlin, Germany: Mouton de Gruyter.

Bernhardt, B. M. H., & Deby, J. (2007). Canadian English speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 177-187). Clifton Park, NY: Thomson Delmar Learning.

Harrington, J., Cox, F., & Evans, Z. (1997). An acoustic phonetic study of broad, general, and cultivated Australian English vowels. *Australian Journal of Linguistics*, 17, 155-184.

Howard, S. (2007). English speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 188-203). Clifton Park, NY: Thomson Delmar Learning.

MacLagan, M. (2009). Reflecting connections with the local language: New Zealand English. *International Journal of Speech-Language Pathology*, 11(2), 113-121.

McLeod, S. (2007). Australian English speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 241-256). Clifton Park, NY: Thomson Delmar Learning.

Mitchell, A. G. (1946). *The pronunciation of English in Australia*. Sydney, Australia: Angus & Robertson.

Smit, A. B. (2004). *Articulation and phonology: Resource guide for school-age children and adults*. Clifton Park, NY: Thomson Delmar Learning.

Smit, A. B. (2007). General American English speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 128-147). Clifton Park, NY: Thomson Delmar Learning.

2. Putonghua (Mandarin) speech assessments

For a list of speech assessments in Putonghua (Mandarin) see: www.csu.edu.au/research/multilingual-speech/speech-assessments

Intelligibility in Context Scale: Chinese (Simplified) www.csu.edu.au/research/multilingual-speech/ics

3. Monolingual speech acquisition (summaries and studies written in English)

Summaries of Putonghua (Mandarin) speech acquisition

Zhu Hua (2006). The normal and disordered phonology of Putonghua (Modern Standard Chinese)-speaking children. In Zhu Hua & B. Dodd (Eds.), *Phonological development and disorders in children: A multilingual perspective* (pp. 81-108). Cleavdon, UK: Multilingual Matters.

Zhu Hua (2007). Putonghua (Modern Standard Chinese) speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 516-527). Clifton Park, NY: Thomson Delmar Learning.

Studies of Putonghua (Mandarin) speech acquisition

Zhu Hua & Dodd, B. (2000). Development and change in the phonology of Putonghua-speaking children with speech difficulties. *Clinical Linguistics and Phonetics*, 14, 351-368.

Zhu Hua & Dodd, B. (2000). Putonghua (modern standard Chinese)-speaking children with speech disorder. *Clinical Linguistics and Phonetics*, 14, 165-191.

Zhu Hua & Dodd, B. (2000). The phonological acquisition of Putonghua (modern standard Chinese). *Childhood Language*, 27, 3-42.

Wong, P. (2012). Monosyllabic Mandarin tone productions by three-year-olds growing up in Taiwan and the U.S.: Inter-judge reliability and perceptual results. *Journal of Speech, Language, and Hearing Research*, doi: 10.1044/1092-4388(2012/11-0273)

4. Multilingual speech acquisition (summaries and studies written in English)

General summaries

Goldstein, B. A., & McLeod, S. (2012). Typical and atypical multilingual speech acquisition. In S. McLeod & B. A. Goldstein (Eds.), *Multilingual aspects of speech sound disorders in children* (pp. 84-100). Bristol, UK: Multilingual Matters.

Grech, H., & McLeod, S. (2012). Multilingual speech and language development and disorders. In D. Battle (Ed.), *Communication disorders in multicultural and international populations* (4th ed., pp. 120-147). St Louis, MO: Elsevier.

Zhu Hua & Dodd, B. (Eds.). (2006). *Phonological development and disorders in children: A multilingual perspective*. Cleavdon, UK: Multilingual Matters.

Yavaş, M. (2007). Multilingual speech acquisition. In S. McLeod (Ed.), *The international guide to speech acquisition* (pp. 96-100). Clifton Park, NY: Thomson Delmar Learning.

Summaries of multilingual Putonghua (Mandarin) speech acquisition

So, L. K. H., & Leung, C. S. S. (2006). Phonological development of Cantonese–Putonghua bilingual children. In Z. Hua & B. Dodd (Eds.), *Phonological development and disorders in children: A multilingual perspective* (pp. 413-430). Cleavdon, UK: Multilingual Matters.

Studies of multilingual Putonghua (Mandarin) speech acquisition

Languages	Country	Study	Age of children	Total number of children (no. of multilingual children)**	Typically/atypically developing children	Speech /language	Production/perception
Cantonese-Putonghua	Hong Kong and Shenzhen, China	Law, N. C. W., & So, L. K. H. (2006). The relationship of phonological development and language dominance in bilingual Cantonese-Putonghua children. <i>International Journal of Bilingualism</i> , 10(4), 405-427.	2;6 – 4;11	100 (100)	typical	speech	production
Mandarin-English	Taiwan	Lin, L.-C., & Johnson, C. J. (2010). Phonological patterns in Mandarin-English bilingual children. <i>Clinical Linguistics and Phonetics</i> , 24(4-5), 369-386.	bilingual mean = 5;0; monolingual mean = 5;3	48 (25)	typical	speech	production
Spanish-Mandarin-Taiwanese	Not specified (most likely Paraguay and Taiwan)	Yang, H.-Y., & Hua, Z. (2010). The phonological development of a trilingual child: Facts and factors. <i>International Journal of Bilingualism</i> , 14, 105-126.	1;3 – 2;0	1 (1)	typical	speech	production

Note. * Studies of typically and atypically developing multilingual children published in English were included; however, studies that only included monolingual children were excluded.

**The total number of children may have included both multilingual and monolingual children, so the number in brackets provides the total number of multilingual children.