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, ʂ, x, ɹ, l, ɕ, ʦ, $ʦ^h$, ʦʂ, $ʦʂ^h$, ʨ, $ʨ^h$/	Zhu Hua (2007)
	English	24 consonants	/p, b, t, d, k, g, m, n, ŋ, θ, ð, f, v, s, z, ʃ, ʒ, h, ʧ, ʤ, 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, fj, 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, ɑ, ə, ɛ, ɚ/ Diphthongs: /ae, ei, ɑo, ou, ia, iɛ, uɑ, uo, yɛ/ Triphthongs: /iɑo, iou, uae, uei/	Zhu Hua (2007)
	English (US-General American)	14 vowels + 3 diphthongs	Vowels: /i, ɪ, e, ɛ, æ, ə, ɚ, ɝ, u, 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, ɚ, ɝ, ʉ, ʊ, o, ʌ, ɔ, ɑ/ Diphthongs: /ʌɪ, ʌʊ, ɔɪ/	Bernhardt, & Deby (2007)
	English (UK-Received Pronunciation)	12 vowels + 8 diphthongs	Vowels: /i, ɪ, ɛ, æ, a, ə, ɜ, u, ʊ, ʌ, ɔ, ɒ/ Diphthongs: /aɪ, aʊ, ɔɪ, eɪ, oʊ, ɪə, ɛə, ʊə/	Howard (2007)
	English (Australian)	12 vowels + 8 diphthongs	Vowels: /iː, ɪ, e, æ, ɐː, ɐ, ɔ, oː, ʊ, ʉː, ɜː, ə/[i] OR /i, ɪ, ɛ, æ, a, ʌ, ɒ, ɔ, ʊ, u, ɜ, ə/[ii] Diphthongs: /æɪ, ɑe, əʉ, æɔ, ɔɪ, ɪə, eː, ʊə/[i] OR /eɪ, aɪ, oʊ, aʊ, ɔɪ, ɪə, ɛə, ʊə/[ii]	[i] Harrington, Cox, & Evans, (1997) [ii] Mitchell (1946)
	English (New Zealand)	12 vowels + 8 diphthongs	Vowels: /i, ɪ, ɛ, 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, ɔi, eɪ, oʊ, iə, eə, ʊə/[i] OR / ai, aʊ, ɔi, ei, oʊ, iə, 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 *Beifang*. 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.	

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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)

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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. *International Journal of Bilingualism, 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. *Clinical Linguistics and Phonetics, 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. *International Journal of Bilingualism, 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.