

Supplemental Material S1. Word lists of six themes for picture naming test.

(a) Theme I: Vegetables

Set 1:		First Syllable			Second Syllable		
Trained Words	Initial	Final	Tone	Initial	Final	Tone	
土豆 (potato)	<i>t</i> [t ^h]	<i>u</i> [u]	T3 [21]	<i>d</i> [t]	<i>ou</i> [ou]	T4 [51]	
茄子 (eggplant)	<i>q</i> [tɕ ^h]	<i>ie</i> [iɛ]	T2 [35]	<i>z</i> [ts]	<i>-i</i> [ɿ]	[neutral tone]	
白菜 (cabbage)	<i>b</i> [p]	<i>ai</i> [ai]	T2 [35]	<i>c</i> [ts ^h]	<i>ai</i> [ai]	T4 [51]	
萝卜 (radish)	<i>l</i> [l]	<i>uo</i> [uo]	T2 [35]	<i>b</i> [p]	<i>o</i> [o]	[neutral tone]	
辣椒 (chili)	<i>l</i> [l]	<i>a</i> [A]	T4 [51]	<i>j</i> [tɕ]	<i>iao</i> [iau]	T1 [55]	
玉米 (corn)	<i>Ø</i>	<i>ü</i> [y]	T4 [51]	<i>m</i> [m]	<i>i</i> [i]	T3 [214]	
大蒜 (garlic)	<i>d</i> [t]	<i>a</i> [A]	T4 [51]	<i>s</i> [s]	<i>uan</i> [uan]	T4 [51]	
黄瓜 (cucumber)	<i>h</i> [x]	<i>uang</i> [uaŋ]	T2 [35]	<i>g</i> [k]	<i>ua</i> [uA]	T1 [55]	
木耳 (agaric)	<i>m</i> [m]	<i>u</i> [u]	T4 [51]	<i>Ø</i>	<i>er</i> [ɤ]	T3 [214]	
芹菜 (celery)	<i>q</i> [tɕ ^h]	<i>in</i> [in]	T2 [35]	<i>c</i> [ts ^h]	<i>ai</i> [ai]	T4 [51]	
Set 2:		First Syllable			Second Syllable		
Untrained Words	Initial	Final	Tone	Initial	Final	Tone	
南瓜 (pumpkin)	<i>n</i> [n]	<i>an</i> [an]	T2 [35]	<i>g</i> [k]	<i>ua</i> [uA]	T1 [55]	
洋葱 (onion)	<i>Ø</i>	<i>iang</i> [iaŋ]	T2 [35]	<i>c</i> [ts ^h]	<i>ong</i> [oŋ]	T1 [55]	

(b) Theme II: Fruits

Set 1:		First Syllable			Second Syllable		
Trained Words	Initial	Final	Tone	Initial	Final	Tone	
苹果 (apple)	<i>p</i> [p ^h]	<i>ing</i> [iŋ]	T2 [35]	<i>g</i> [k]	<i>uo</i> [uo]	T3 [214]	
香蕉 (banana)	<i>x</i> [ɕ]	<i>iang</i> [iaŋ]	T1 [55]	<i>j</i> [tɕ]	<i>iao</i> [iau]	T1 [55]	
葡萄 (grape)	<i>p</i> [p ^h]	<i>u</i> [u]	T2 [35]	<i>t</i> [t ^h]	<i>ao</i> [au]	[neutral tone]	
橙子 (orange)	<i>ch</i> [tɕ ^h]	<i>eng</i> [ɛŋ]	T2 [35]	<i>z</i> [ts]	<i>-i</i> [ɿ]	[neutral tone]	
西瓜 (watermelon)	<i>x</i> [ɕ]	<i>i</i> [i]	T1 [55]	<i>g</i> [k]	<i>ua</i> [uA]	T1 [55]	

草莓 (strawberry)	<i>c</i> [tʰ]	<i>ao</i> [ɑu]	T3 [21]	<i>m</i> [m]	<i>ei</i> [ei]	T2 [35]
芒果 (mango)	<i>m</i> [m]	<i>ang</i> [aŋ]	T2 [35]	<i>g</i> [k]	<i>uo</i> [uo]	T3 [214]
菠萝 (pineapple)	<i>b</i> [p]	<i>o</i> [o]	T1 [55]	<i>l</i> [l]	<i>uo</i> [uo]	T2 [35]
石榴 (pomegranate)	<i>sh</i> [ʃ]	<i>-i</i> [ɿ]	T2 [35]	<i>l</i> [l]	<i>iu</i> [iou]	[neutral tone]
桂圆 (longan)	<i>g</i> [k]	<i>ui</i> [uei]	T4 [51]	<i>Ø</i>	<i>üan</i> [yæn]	T2 [35]
Set 2:	First Syllable			Second Syllable		
Untrained Words	Initial	Final	Tone	Initial	Final	Tone
柠檬 (lemon)	<i>n</i> [n]	<i>ing</i> [iŋ]	T2 [35]	<i>m</i> [m]	<i>eng</i> [əŋ]	T2 [35]
樱桃 (cherry)	<i>Ø</i>	<i>ing</i> [iŋ]	T1 [55]	<i>t</i> [tʰ]	<i>ao</i> [ɑu]	T2 [35]

(c) Theme III: Animals

Set 1:	First Syllable			Second Syllable		
Trained Words	Initial	Final	Tone	Initial	Final	Tone
老虎 (tiger)	<i>l</i> [l]	<i>ao</i> [ɑu]	T3 [35]	<i>h</i> [x]	<i>u</i> [u]	T3 [214]
大象 (elephant)	<i>d</i> [t]	<i>a</i> [A]	T4 [51]	<i>x</i> [ɛ]	<i>iang</i> [iaŋ]	T4 [51]
熊猫 (panda)	<i>x</i> [ɛ]	<i>iong</i> [jɔŋ]	T2 [35]	<i>m</i> [m]	<i>ao</i> [ɑu]	T1 [55]
斑马 (zebra)	<i>b</i> [p]	<i>an</i> [an]	T1 [55]	<i>m</i> [m]	<i>a</i> [A]	T3 [214]
蝴蝶 (butterfly)	<i>h</i> [x]	<i>u</i> [u]	T2 [35]	<i>d</i> [t]	<i>ie</i> [iɛ]	T2 [35]
乌龟 (tortoise)	<i>Ø</i>	<i>u</i> [u]	T1 [55]	<i>g</i> [k]	<i>ui</i> [uei]	T1 [55]
嗡嗡 (buzz)	<i>Ø</i>	<i>ueng</i> [uəŋ]	T1 [55]	<i>Ø</i>	<i>ueng</i> [uəŋ]	T1 [55]
孔雀 (peacock)	<i>k</i> [kʰ]	<i>ong</i> [ɔŋ]	T3 [21]	<i>q</i> [tɕʰ]	<i>üe</i> [yɛ]	T4 [51]
蚊子 (mosquito)	<i>Ø</i>	<i>uen</i> [uən]	T2 [35]	<i>z</i> [ts]	<i>-i</i> [ɿ]	[neutral tone]
企鹅 (penguin)	<i>q</i> [tɕʰ]	<i>i</i> [i]	T3 [21]	<i>Ø</i>	<i>e</i> [ɤ]	T2 [35]
Set 2:	First Syllable			Second Syllable		
Untrained Words	Initial	Final	Tone	Initial	Final	Tone
兔子 (rabbit)	<i>t</i> [tʰ]	<i>u</i> [u]	T4 [51]	<i>z</i> [ts]	<i>-i</i> [ɿ]	[neutral tone]
小狗 (puppy)	<i>x</i> [ɛ]	<i>iao</i> [iau]	T3 [35]	<i>g</i> [k]	<i>ou</i> [ou]	T3 [214]

(d) Theme IV: Daily Necessities

Set 1:	First Syllable			Second Syllable		
Trained Words	Initial	Final	Tone	Initial	Final	Tone
牙刷 (toothbrush)	<i>Ø</i>	<i>ia</i> [iA]	T2 [35]	<i>sh</i> [ʃ]	<i>ua</i> [uA]	T1 [55]
毛巾 (towel)	<i>m</i> [m]	<i>ao</i> [au]	T2 [35]	<i>j</i> [tɕ]	<i>in</i> [in]	T1 [55]
筷子 (chopsticks)	<i>k</i> [k ^h]	<i>uai</i> [uai]	T4 [51]	<i>z</i> [ts]	<i>-i</i> [ɿ]	[neutral tone]
水杯 (glass)	<i>sh</i> [ʃ]	<i>ui</i> [uei]	T3 [21]	<i>b</i> [p]	<i>ei</i> [ei]	T1 [55]
拖把 (mop)	<i>t</i> [t ^h]	<i>uo</i> [uo]	T1 [55]	<i>b</i> [p]	<i>a</i> [A]	T3 [214]
马桶 (toilet)	<i>m</i> [m]	<i>a</i> [A]	T3 [35]	<i>t</i> [t ^h]	<i>ong</i> [oŋ]	T3 [214]
枕头 (pillow)	<i>zh</i> [tʃ]	<i>en</i> [ən]	T3 [21]	<i>t</i> [t ^h]	<i>ou</i> [ou]	[neutral tone]
手套 (gloves)	<i>sh</i> [ʃ]	<i>ou</i> [ou]	T3 [21]	<i>t</i> [t ^h]	<i>ao</i> [au]	T4 [51]
衣架 (hanger)	<i>Ø</i>	<i>i</i> [i]	T1 [55]	<i>j</i> [tɕ]	<i>ia</i> [iA]	T4 [51]
台灯 (lamp)	<i>t</i> [t ^h]	<i>ai</i> [ai]	T2 [35]	<i>d</i> [t]	<i>eng</i> [əŋ]	T1 [55]
Set 2:	First Syllable			Second Syllable		
Untrained Words	Initial	Final	Tone	Initial	Final	Tone
雨伞 (umbrella)	<i>Ø</i>	<i>ü</i> [y]	T3 [35]	<i>s</i> [s]	<i>an</i> [an]	T3 [214]
闹钟(alarm clock)	<i>n</i> [n]	<i>ao</i> [au]	T4 [51]	<i>zh</i> [tʃ]	<i>ong</i> [oŋ]	T1 [55]

(e) Theme V: Snacks

Set 1:	First Syllable			Second Syllable		
Trained Words	Initial	Final	Tone	Initial	Final	Tone
饼干 (cookies)	<i>b</i> [p]	<i>ing</i> [iŋ]	T3 [21]	<i>g</i> [k]	<i>an</i> [an]	T1 [55]
软糖 (fudge)	<i>r</i> [ʒ]	<i>uan</i> [uan]	T3 [21]	<i>t</i> [t ^h]	<i>ang</i> [aŋ]	T2 [35]
面包 (bread)	<i>m</i> [m]	<i>ian</i> [ian]	T4 [51]	<i>b</i> [p]	<i>ao</i> [au]	T1 [55]
牛奶 (milk)	<i>n</i> [n]	<i>iu</i> [iou]	T2 [35]	<i>n</i> [n]	<i>ai</i> [ai]	T3 [214]
海苔 (seaweed)	<i>h</i> [x]	<i>ai</i> [ai]	T3 [21]	<i>t</i> [t ^h]	<i>ai</i> [ai]	T2 [35]
橙汁 (orange juice)	<i>ch</i> [tʃ ^h]	<i>eng</i> [əŋ]	T2 [35]	<i>zh</i> [tʃ]	<i>-i</i> [ɿ]	T1 [55]
瓜子(melon seeds)	<i>g</i> [k]	<i>ua</i> [uA]	T1 [55]	<i>z</i> [ts]	<i>-i</i> [ɿ]	T3 [214]

薯片 (potato chips)	<i>sh</i> [ʃ]	<i>u</i> [u]	T3 [21]	<i>p</i> [p ^h]	<i>ian</i> [ian]	T4 [51]
麻花 (bread twist)	<i>m</i> [m]	<i>a</i> [a]	T2 [35]	<i>h</i> [x]	<i>ua</i> [ua]	T1 [55]
核桃 (walnut)	<i>h</i> [x]	<i>e</i> [ɤ]	T2 [35]	<i>t</i> [t ^h]	<i>ao</i> [au]	[neutral tone]
Set 2:	First Syllable			Second Syllable		
Untrained Words	Initial	Final	Tone	Initial	Final	Tone
蛋糕 (cake)	<i>d</i> [t]	<i>an</i> [an]	T4 [51]	<i>g</i> [k]	<i>ao</i> [au]	T1 [55]
香肠 (sausage)	<i>x</i> [ɐ]	<i>iang</i> [ian]	T1 [55]	<i>ch</i> [tɕ ^h]	<i>ang</i> [aŋ]	T2 [35]

(f) Theme VI: Toys

Set 1:	First Syllable			Second Syllable		
Trained Words	Initial	Final	Tone	Initial	Final	Tone
积木 (toy blocks)	<i>j</i> [tɕ]	<i>i</i> [i]	T1 [55]	<i>m</i> [m]	<i>u</i> [u]	T4 [51]
气球 (balloon)	<i>q</i> [tɕ ^h]	<i>i</i> [i]	T4 [51]	<i>q</i> [tɕ ^h]	<i>iu</i> [iou]	T2 [35]
拼图 (puzzle)	<i>p</i> [p ^h]	<i>in</i> [in]	T1 [55]	<i>t</i> [t ^h]	<i>u</i> [u]	T2 [35]
彩泥 (color-mud)	<i>c</i> [ts ^h]	<i>ai</i> [ai]	T3 [21]	<i>n</i> [n]	<i>i</i> [i]	T2 [35]
滑梯 (slide)	<i>h</i> [x]	<i>ua</i> [ua]	T2 [35]	<i>t</i> [t ^h]	<i>i</i> [i]	T1 [55]
秋千 (swing)	<i>q</i> [tɕ ^h]	<i>iu</i> [iou]	T1 [55]	<i>q</i> [tɕ ^h]	<i>ian</i> [ian]	T1 [55]
魔方 (magic cube)	<i>m</i> [m]	<i>o</i> [o]	T2 [35]	<i>f</i> [f]	<i>ang</i> [aŋ]	T1 [55]
风车 (windmill)	<i>f</i> [f]	<i>eng</i> [əŋ]	T1 [55]	<i>ch</i> [tɕ ^h]	<i>e</i> [ɤ]	T1 [55]
铃铛 (bell)	<i>l</i> [l]	<i>ing</i> [iŋ]	T2 [35]	<i>d</i> [t]	<i>ang</i> [aŋ]	[neutral tone]
水枪 (water gun)	<i>sh</i> [ʃ]	<i>ui</i> [uei]	T3 [21]	<i>q</i> [tɕ ^h]	<i>iang</i> [ian]	T1 [55]
Set 2:	First Syllable			Second Syllable		
Untrained Words	Initial	Final	Tone	Initial	Final	Tone
足球 (football)	<i>z</i> [ts]	<i>u</i> [u]	T2 [35]	<i>q</i> [tɕ ^h]	<i>iu</i> [iou]	T2 [35]
口哨 (whistle)	<i>k</i> [k ^h]	<i>ou</i> [ou]	T3 [21]	<i>sh</i> [ʃ]	<i>ao</i> [au]	T4 [51]

Note. *Italics* represent *Pinyin*, an alphabetic phonological coding system widely used in mainland China, and the corresponding transcriptions of the International Phonetic Alphabet (IPA) in square brackets. The symbol ‘Ø’ means zero onset in Mandarin initials. There are four Mandarin citation tones, traditionally characterized as Tone 1 (T1), Tone 2 (T2), Tone 3 (T3), and Tone 4 (T4). T1 [55] is a high-level tone, T2 [35] is a mid-rising tone, T3 [214] is a dipping (i.e., falling-

rising) tone, and T4 [51] is a high-falling tone, with digits in square brackets referring to tone transcriptions in Chao’s tone letters (Chao, 1930). The bold tone numbers indicate the surface tone realizations of T3 after the process of tone sandhi.