

Phonotactics and Lexical Effect in Evaluating Perceptual Distinctiveness

Pauline Liu and Mingxing Li (*Hong Kong Baptist University*)

paulinelbolin@gmail.com; mingxingli@hkbu.edu.hk

Objectives: This study examines the potential influence of two factors when evaluating the perceptual distinctiveness of sound pairs: (a) L1 phonotactics, i.e., the rule of segment-tone combination, and (b) lexical status, i.e., if a segment-tone combination corresponds to a lexical item, e.g., a monosyllabic morpheme in Mandarin. The research question is: Do L1 phonotactics and lexical status influence the relative perceptual distinctiveness of sound pairs?

Methodology: A perceptual experiment recruited 31 native Mandarin listeners. The audio stimuli involved 12 monosyllabic segment-tone combinations, forming six sound pairs in three tonal contexts: [na^{HH}-la^{HH}] [na^{LH}-la^{LH}] [na^{HL}-la^{HL}] and [ni^{HH}-li^{HH}] [ni^{LH}-li^{LH}] [ni^{HL}-li^{HL}]. For Mandarin phonotactics, [na^{HH}] is illegal¹ while the other 11 are legal. For lexical status, 10 legal syllables correspond to a Mandarin monosyllabic morpheme (‘a lexical syllable’) while [li^{HH}] does not². The segments were controlled to match their mean durations and intensities in natural speech; the F0 and intensities of the tones matched their intrinsic relative values.

A listener heard a sequence of two pairs differing by tone, as in **Table 1**, and judged which pair is more distinct. Within a pair, the ISI was 50 ms and, between two pairs, the interval was 150 ms.

Table 1. Sequences of sound pairs

Tones	[na-la]	[ni-li]
HH vs. LH	Sequence 1: [na ^{HH} -la ^{HH}] vs. [na ^{LH} -la ^{LH}]	Sequence 4: [ni ^{HH} -li ^{HH}] vs. [ni ^{LH} -li ^{LH}]
HH vs. HL	Sequence 2: [na ^{HH} -la ^{HH}] vs. [na ^{HL} -la ^{HL}]	Sequence 5: [ni ^{HH} -li ^{HH}] vs. [ni ^{HL} -li ^{HL}]
LH vs. HL	Sequence 3: [na ^{LH} -la ^{LH}] vs. [na ^{HL} -la ^{HL}]	Sequence 6: [ni ^{LH} -li ^{LH}] vs. [ni ^{HL} -li ^{HL}]

Results: The judgment results in **Fig 1** show that, in terms of phonotactics, a pair including an illegal syllable ([na^{HH}]) was judged as less distinct than a pair including two legal syllables, cf. *Sequences 1* and 2; in terms of lexical status, a pair including a non-lexical syllable ([li^{HH}]) was judged as less distinct than a pair including two lexical syllables, cf. *Sequences 4* and 5. For two pairs of lexical syllables, no bias showed up for [a]-pairs while a slight preference of HL over LH was observed for [i]-pairs.

The response time data in **Fig 2** show that, when judged as more distinct, a decision for a pair of lexical syllables took less time than one involving the illegal [na^{HH}] or the non-lexical [li^{HH}], cf. *Sequences 1* and 4. In addition, the illegal [na^{HH}] in *Sequence 2* introduced a significant RT difference while the non-lexical [li^{HH}] in *Sequence 4* did not.

Discussion: The judgment results indicated that L1 phonotactics and lexical status influence the evaluation of the relative perceptual distinctiveness of sound pairs. The response time data further suggested a subtle difference in processing an illegal syllable vs. a non-lexical syllable.

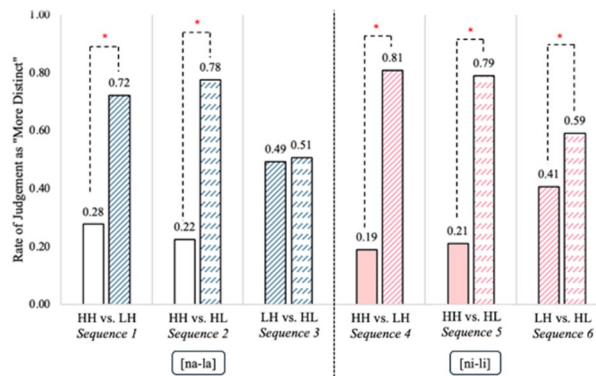


Fig 1. Rates of judging a pair as ‘more distinct’

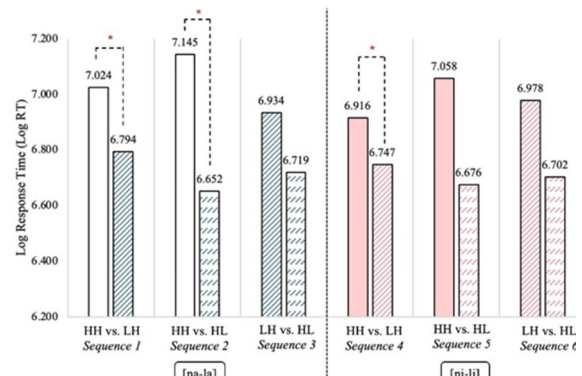


Fig 2. Mean response time when deciding a pair as ‘more distinct’

¹ While [na^{HH}] appears in dictionary as the sound for 那/南, it is rarely known to native speakers.

² While [li^{HH}] corresponds to a Chinese character 哩, it does not form a monosyllabic morpheme.