In most varieties of English interrogatives and declaratives are distinguished with multiple cues: syntax, wh- question words and intonation. Nonetheless, a simple alteration of the intonation from a fall to a rise is enough to turn a declarative into an interrogative, without altering the syntax. Thus, the sentence “He plays with Sue” with a falling intonation signals a declarative while “He plays with Sue?” with a rising intonation signals an interrogative. However, in some varieties of English rises can occur for both declaratives and interrogatives [1], [2].

Nonetheless, perception studies indicate that interrogative and declarative rises can be perceptually distinguished. However, the results paint a complex picture with interactions between pitch height, position of pitch differences (pitch accent vs. boundary tone) and speaker gender. Specifically, in rises that differed only in the boundary tone, the pitch height of the boundary drove the interpretation; higher boundary tones shifted the identification toward an interrogative and lower pitch height toward a declarative interpretation. However, in the middle of the continuum, a speaker gender bias was apparent with more interrogative responses for the female speaker and chance level for the male speaker. In contrast, rises that differed only in pitch accent height showed speaker gender biases for all pitch steps in that regardless of pitch height of the pitch accent all rises by the female speaker were interpreted as declaratives, whereas all rises by the male speaker were again at chance level.

These results raise the question of whether L2 speakers of Australian English are sensitive to the different functions of rises as this is pivotal for communication if contextual information is absent. In particular, the question arises whether speakers of a tone language, such as Mandarin, are aware that rises can serve two discourse functions in Australian English. While Mandarin learners should be sensitive to subtle pitch differences as a function of their language background [3], [4], they do not use intonation in the same way as Australian native speakers. Even though interrogatives in Mandarin can also be marked solely by intonation without question particles or syntax, Mandarin does not use boundary tones. Instead, a global f0 raise is applied to the whole utterance to signal an interrogative [5]. However, since the question particles occur in utterance-final position, Mandarin learners presumably pay attention to the final syllable and might thus capture even small pitch differences. Indeed, a recent perceptual discrimination study of rises with Mandarin learners of Australian English [7] showed that Mandarin listeners were only able to discriminate between rises that differed in the pitch height of the boundary tone, but not if they differed in the height of the pitch accent. The authors hypothesised that this result is related to the use of intonation in Mandarin interrogatives. As a consequence, listeners only pay attention to the pitch height at the beginning and end of an utterance but not the middle where the manipulation occurred. Additionally, because the dual function of rises does not occur in either General American or Standard British English, the two varieties most frequently taught abroad, Mandarin listeners might not be able to interpret these acoustic differences.

In this study we aim to establish whether Mandarin learners are sensitive to the dual function of rises as declaratives and interrogatives in an identification task. We predicted (H1) that Mandarin listeners who had already lived in Australia for some time would be sensitive to rises that differ in boundary tones and would thus use overall pitch height as an indicator for the function of an utterance. Thus, we expect a similar pattern to that found by [6] in Australian monolinguals, with pitch height merely shifting the probabilities of an identification. However, (H2) in pitch accent position, we expect Mandarin learners to identify all rises as interrogatives, regardless of the height of the pitch accent. This then would reflect the inability to perceive pitch accent height differences found by [7].

The stimuli consist of a carrier sentence ‘He often plays with…’ with manipulated pitch height in 2 semitone steps (ST) either at the pitch accent or the boundary of a trisyllabic CVCV.CV target word (Fig. 1). 18 Mandarin learners of English who had lived in Australia for less than 3 years participated in the experiment. All subjects had an IELTS score above 6.5 and reported normal hearing.

Results show that H1 is borne out by the data. Mandarin listeners are sensitive to pitch height of the boundary tone as a factor in determining the discourse function of an utterance. In particular, higher pitch in the boundary tone gradually shifts listeners’ interpretation toward an interrogative response. In contrast, lower pitch height at the boundary of a rise results in more declarative responses. As such,
the identification pattern found here is comparable to that of Australian English listeners (Fig. 2, for comparison see [6]). However, as predicted in H2, Mandarin listeners were more likely to interpret rises that differed only in pitch accent as interrogatives (Fig. 3). This suggests that for Mandarin learners the perceptual space of rises is more likely to be reserved for the linguistic category of interrogatives. Additionally, the speaker gender bias that was observed in Australian English listeners [6] is not present in Mandarin listeners. Further research is needed to look at whether and how Mandarin learners use pitch in production to distinguish between interrogatives and declaratives. We will discuss these results in light of phonological theories.

![Carrier sentence](Image)

**Fig. 1** Schematic representation of pitch accent (top) and boundary tone manipulations (bottom), in 2 semitone (ST) steps

![Response graph](Image)

**Fig. 2** **Boundary tone:** Declarative/Interrogative responses (in %) according to pitch step and speaker gender

**Fig. 3** **Pitch accent:** Declarative/Interrogative responses (in %) according to pitch step and speaker gender

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**Bibliography**


