

Question Intonation in Hong Kong English: Interaction between Cantonese and English

Chen Shuwen, Peggy Pik Ki Mok

The Chinese University of Hong Kong
chenshuwensharon@gmail.com, peggymok@cuhk.edu.hk

ABSTRACT

Different sentence types are cued by various intonation patterns in English. Statements are uttered with a falling pitch while questions are cued by a raising pitch over the whole utterance. The intonation of questions in Cantonese, however, is signalled by a rising pitch at the second half of the last syllable. The current study investigates the intonation of statements and questions in Hong Kong English (HKE) to examine potential interaction of the two donor languages in HKE. Nineteen HKE speakers were recorded reading English and Cantonese sentences of different sentence types. Results showed that the intonation patterns of questions in HKE have mixed characteristics. They were cued by a final rising like Cantonese, but the rising was earlier than that in Cantonese, which may be affected by English.

Keywords: Hong Kong English, intonation, question, final rising.

1. INTRODUCTION

Intonation is employed to signal distinctions in sentence types, such as statements and questions. Cross-linguistically, falling intonation signals certainty, and hence is used often in statements while rising intonation indicates uncertainty, and hence is often used in indicating interrogatives [1].

1.1 English intonation

In English, the distinction in sentence types are distinguished by the global falling and rising of pitch value over the whole utterance. Generally, statements and wh-questions are signalled by a falling pitch, while normal yes-no questions and yes-no questions with a declarative word order (the former will be referred to as yes-no questions and the latter as intonation questions below) are cued by a rising pitch [2]. Acoustic studies like O'Shaughnessy [3] have shown that yes-no questions have a rising F₀, starting from the first accented syllable to the end of the sentence, with a short fall on the non-stressable syllables in the middle. Yes-no questions also have a generally higher F₀ value

than statements. More recent studies have further shown that the F₀ trajectory of statements and intonation questions diverged from the stressed syllable of the first content word [4]. In summary, English statements and wh-questions have a falling pitch over the whole utterance while yes-no questions and intonation questions have a general higher F₀, and a rising F₀ contour from the first accented syllable to the end.

1.2 Cantonese intonation

Cantonese statements also showed declination over the whole utterance. Intonation questions are cued by a rising pitch at the end of the final syllable instead of global raising [5]. Very few studies have examined the intonation of yes-no questions and wh-questions in Cantonese. Chow [6] showed that yes-no questions were signalled by a flat F₀ curve and an optional final rise, while wh-questions behaved more like statements, showing declination, and no final rise was found.

In summary, English questions are cued by a rising pitch from the first stressed syllable and a globally raised pitch, whereas Cantonese questions are cued only by final rising. However, the intonation of HKE, a new variety of English which is influenced by these two languages, is less clear. Only two previous studies using auditory judgment data have given some description of HKE intonation. Yiu [7] demonstrated that there is a low boundary tone at the right edge of statements and a high boundary tone of yes-no questions. Cheng et al. [8] investigated the HKE intonation using a corpus. Although they provided some preliminary data on HKE intonation, no detailed acoustic evidence was given to illustrate the patterns of different sentence types and the possible influence from Cantonese. The current study aims to fill the gap by examining the intonation of different sentence types in HKE using acoustic data, and to investigate the interaction of prosody in interlanguage.

2. METHOD

2.1. Subjects and materials

Nineteen Cantonese-English bilingual speakers

participated in this experiment. They were highly proficient English speakers with Cantonese as their native language. All subjects were undergraduate students from the Chinese University of Hong Kong who received all their education in local schools and had limited experience staying in English-speaking countries.

The subjects were recorded reading eight sets of English sentences, each of which consists of four types of sentences with related contents: 1) a statement, 2) a yes-no question, 3) an intonation question and 4) a wh-question (Table 1). Cantonese sentences of the same types were also recorded for comparison.

Table 1. Examples of one set of statement, yes-no question, intonation question and wh-questions in English and Cantonese.

English Sentences	
statement	They will sell their blue car.
yes-no question	Will they sell their blue car?
intonation question	They will sell their blue car?
wh-question	When will they sell their blue car?
Cantonese Sentences with <i>Jyutping</i> and English translations	
statement	keoi5 dei6 heoi3 daa2 bin1 lou4. 佢地去打邊爐。 They are going to eat hot pot.
yes-no question	keoi5 dei6 heoi3 m4 heoi3 daa2 bin1 lou4? 佢地去唔去打邊爐? Are they going to eat hot pot?
intonation question	keoi5 dei6 heoi3 daa2 bin1 lou4? 佢地去打邊爐? They are going to eat hot pot?
wh-question	keoi5 dei6 soeng2 heoi3 bin1 dou6 daa2 bin1 lou4? 佢地想去邊度打邊爐? Where do they want to eat hot pot?

The recording took place in a sound-treated room and the subjects read each sentence three times in a random order.

2.2. Data analysis

The target syllables were labelled manually in Praat. The duration of each syllable was automatically divided into five equidistant points by a Praat script ProsodyPro ([9]) and the F0 value at each point was tracked. Manual checking of all F0 data was done to correct any anomaly. The duration of each syllable was also measured. The pitch data tracked by Praat

in Hz was converted into semitone using the formula $ST = [\lg(\text{Hz}) - \lg(50)] / \lg(1.059463)$. Transforming Hz to semitone can better reflect listener's perception and also enable comparison across speakers since it normalizes the difference in pitch range between speakers.

3. RESULTS

3.1 Cantonese

Figure 1 shows the F0 trajectory of one set of statement, yes-no question, intonation question and wh-question averaged across nineteen speakers. There are peaks in the pitch contours, which are caused by the high level lexical tone of the syllables (邊 bin1) in those positions. In Cantonese, intonation interacts with lexical tones since both of them manipulate pitch. The pitch of lexical tones is retained to some degree in order to be correctly perceived.

One clear observation of the figure is that statements show declination over the whole sentence and has a falling pitch in the last syllable while all types of questions has a rising F0 value in the second part of the last syllable. The F0 trajectory of statements and intonation questions largely overlap before the last syllable. The pitch value of the same time points in each pair of statements and intonation questions were compared using a one-way ANOVA. No significant difference was found between the same points of statements and intonation questions before the last syllable in all five sets of sentences. This indicates that the distinctive cue of statements and questions lies in the pitch movement of the last syllable instead of the general pitch height. This pattern is in line with previous studies [5].

Different from the findings in Ma et al. [10], lengthened duration of the last syllable in questions is not found consistently. Only two out of the five sets of Cantonese sentences show lengthened duration in questions across speakers. Further investigation is needed to examine the lengthening phenomenon in Cantonese questions.

The pitch value of wh-questions in the current study also shows variance. For the same wh-question which was repeated three times by each speaker, some subjects pronounced them with falling and rising intonations in different trials. This may be due to the omission of sentence final particles, which are widely used to indicate various moods in Cantonese. The lack of sentence final particles as well as the experiment setting may have influenced the subjects to produce sentences differently from natural conversation.

Figure 1. The averaged F0 contours of Cantonese sentences 1) Statement 2) yes-no question 3) intonation question 4) wh-question. The data shown here are F0 contours of the Cantonese sentences in Table 1. Vertical lines indicate syllable boundaries.

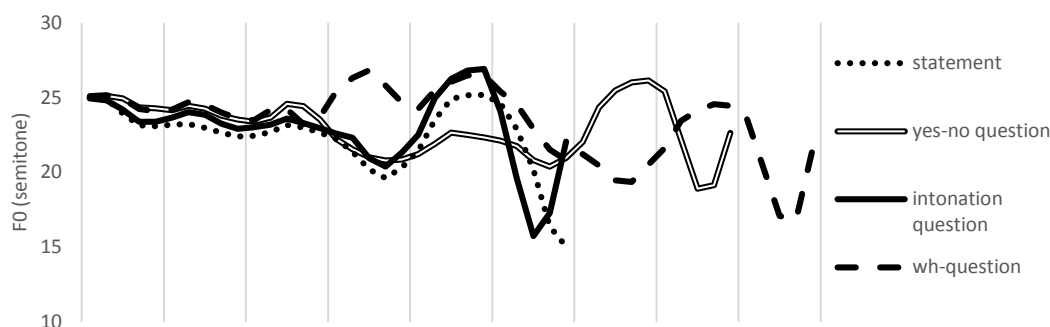
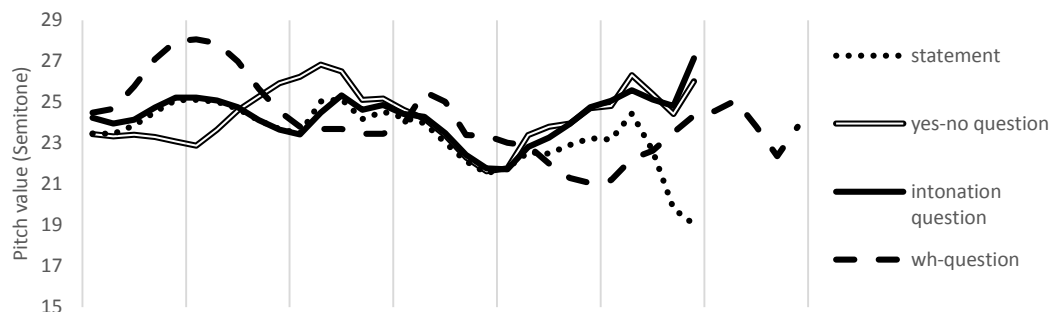


Figure 2. The averaged F0 contours of English sentences 1) Statement 2) yes-no question 3) intonation question 4) wh-question. The data shown here are F0 contours of the English sentences in Table 1. Vertical lines indicate syllable boundaries.



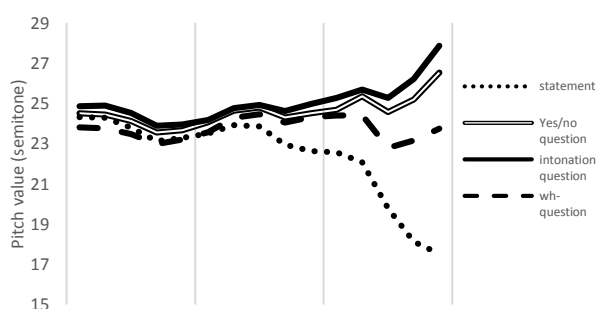
3.2 Hong Kong English

Figure 2 shows the global F0 curves of one set of HKE statements and questions averaged across nineteen speakers. Like English and Cantonese, statements in HKE show declination over the whole utterance. The F0 trajectory of statements, yes-no questions and intonation questions largely overlaps before the last two syllables. One-way ANOVA tests confirmed that there was no significant difference between the same time points of the three types of sentences before the last two syllables in each set of sentences. This indicates that unlike native English, HKE does not show global raising in questions.

Similar to Cantonese, questions in HKE are cued by a rising pitch in the last part of a sentence. Statements show a falling F0, whereas yes-no questions and intonation questions show a final rise. A general tendency of the pitch movement is that the pitch value of the four types of sentences starts to diverge from the second last syllable. We averaged pitch value of the last three syllables of all sentences to compare the difference. As shown in Figure 3, the acoustic cues that distinguish sentence types lie in the last two syllables. After the middle point of the second last syllable, the pitch of statements starts to drop, whereas the F0 value of yes-no questions and

intonation questions starts to rise. A one-way ANOVA showed that there was significant difference between the same measuring points of the four types of sentences from the fourth measuring point in the second last syllable ($p=0.003$). Post hoc tests using the Bonferroni correction revealed that the F0 values of yes-no question and intonation question were significantly higher than that of the statement ($p=0.017$, $p=0.004$) in the fourth measuring points in the second last syllable and the F0 of yes-no question, intonation question and wh-question are significantly higher than statements starting from the fifth points in that syllable ($p<0.001$).

Figure 3. Average F0 value of last three syllables in HKE.

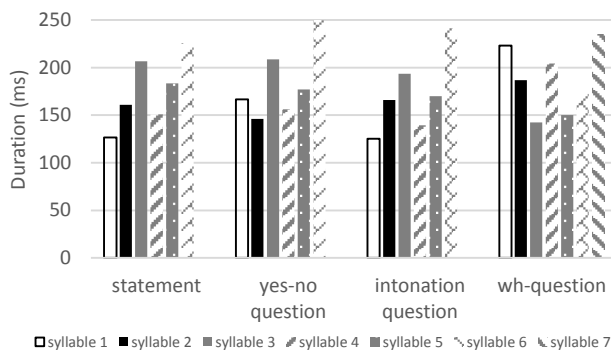


The F0 values of wh-questions are between these of statements and questions. It has a relatively flat pitch contour, not showing declination as statements do, and neither having a substantial F0 rise as yes-no questions and intonation questions do. A final rise in the last syllable is also observed in the wh-questions, but with a smaller degree of rising.

The intonation questions have the steepest rise among all three types of questions, and yes-no questions also show a sharp rise. A one-way ANOVA showed that there was a significant difference between the final F0 values of the four types of sentences. Post hoc test revealed that the final pitch values of intonation question and yes-no question were significantly higher than that of the statement ($p < 0.001$).

As for the duration of each sentence type, no final lengthening was observed in questions. The duration of the last syllable was similar in different sentence types, as shown in Figure 4.

Figure 4. The duration of each syllable for 1) Statement 2) yes-no question 3) intonation question 4) wh-question of the English sentences in Table 1.



4. DISCUSSION

The results of the current study show that sentence types are cued differently in HKE from native English. English questions are cued by a rising pitch from the first stressed syllable while Cantonese questions are cued by a rising pitch at the second half of the last syllable [3][4][5][6]. The question intonation in HKE show mixed characteristics, combining the features of both native English and Cantonese.

Unlike native English, the yes-no questions and intonation questions in HKE did not show a general higher pitch value than statements over the whole sentence. They were cued by a rising pitch in the last part of a sentence, which is an apparent transfer from Cantonese. However, the final rising in HKE was earlier than that in Cantonese. The pitch of

questions and statements started to diverge from the second last syllable. One possible reason is that HKE speakers adopt the prosodic pattern of their dominant language, Cantonese, to distinguish statements and questions in English. But they also realize that native English have an earlier rising in the pitch than Cantonese, which leads to a mixture of two prosodic patterns in HKE.

As for the amplitude of rising, intonation questions had the steepest rising of pitch, which is quite reasonable since the interrogative mood are cued only by intonation. The pitch trajectory of wh-questions was level, not showing declination as statements. Wh-questions also showed a final rising in the last syllable, but with a smaller degree compared to yes-no questions and intonation questions. Also, HKE questions did not show lengthened durations in the last syllable. This is similar to the pattern of native English [11]. However, the results of the current study showed that final lengthening was not robust in Cantonese either. Therefore, it is not sure whether the lack of final lengthening in HKE is influenced by native English or not.

In conclusion, the acoustic cues signalling questions in HKE showed an influence from both native English and Cantonese. This mixed nature was also found in other prosodic dimensions of HKE, like the acoustic cues of narrow focus. Fung and Mok [12] demonstrated that narrow focus in HKE was cued by on-focus F0 range expansion, similar to native English, but exhibited no post-focus compression, which is a transfer from Cantonese.

Together with previous studies, it is shown that the prosodic patterns of HKE adopted the acoustic cues of both donor languages, native English and Cantonese, and mixed them together for various functions, such as marking sentence types and focus. Further studies are needed to examine the pattern of HKE in other prosodic domains such as rhythm and segmental level to see whether this interaction is robust in different levels.

5. ACKNOWLEDGEMENT

We would like to thank all the subjects participated in our experiment. We also want to thank Meeko Mak and Yin Yanjun for helping to label the data.

This work is partially supported by the National Social Science Fund of China (10CYY009) and the Major Program for the National Social Science Fund of China (13&ZD189).

6. REFERENCES

- [1] Gussenhoven, C. (2004). *The phonology of tone and intonation*. Cambridge, MA: Cambridge University Press.
- [2] Roach, P. (2010). *English Phonetics and Phonology Fourth Edition: A Practical Course*. Cambridge, MA: Cambridge University Press.
- [3] Oshaughnessy, D (1979). Linguistic features in fundamental frequency patterns. *Journal of Phonetics*, 7(2), 119-145.
- [4] Liu, F., & Xu, Y. (2007). Question intonation as affected by word stress and focus in English. *Proc. 16th ICPHS Saarbrücken*, 1189-1192.
- [5] Xu, B. R., & Mok, P. (2011). Final rising and global raising in Cantonese intonation. *Proc. 17th ICPHS Hong Kong*, 2173-2176.
- [6] Chow, S (2002). *A phonetic study of the intonation in Hong Kong Cantonese*. Mphil Dissertation, City University of Hong Kong
- [7] Yiu, S.Y.,S (2011). *Intonation of English Spoken in Hong Kong*. Unpublished B.A. thesis, Hong Kong Baptist University.
- [8] Cheng, W., Greaves, C& Warren, M (2008). *A corpus-driven study of discourse intonation: the Hong Kong corpus of spoken English (prosodic)*. Amsterdam: John Benjamins.
- [9] Xu, Y. (2013). ProsodyPro — A Tool for Large-scale Systematic Prosody Analysis. *Proc. Tools and Resources for the Analysis of Speech Prosody (TRASP 2013)*, Aix-en-Provence, France. 7-10.
- [10] Ma, J. K., Ciocca, V., & Whitehill, T. L. (2006). Effect of intonation on Cantonese lexical tones. *The Journal of the Acoustical Society of America*, 120(6), 3978-3987.
- [11] Liu, F. (2009). *Intonation systems of Mandarin and English: A functional approach*. Ph.D Thesis, The University of Chicago.
- [12] Fung, H. & Mok, P. (2014) Realization of narrow focus in Hong Kong English declaratives: a pilot study. *Proc. Speech Prosody Dublin 7*, 964-968.