PHONOLOGICAL ANALYSIS

Tone assignment in Hong Kong English

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This article provides an argument for Hong Kong English being a tonal language and informs the growing literature on word- and phrase-level prosody interactions. By teasing apart tonal effects that come from intonation and those that come from the word boundary, a clear picture emerges that H tones are assigned in all combinations to HKE di- and trisyllabic words. Tone spreading and blocking across words can also be seen in HKE, but syllables lexically specified for H never give up their tones. Complexity in HKE tone patterns arises when the H tones interact with boundary tones, such as the declarative final L% and the word-initial M.*

Keywords: tone, boundary, intonation, Hong Kong, English

1. Introduction. The English spoken in Hong Kong is a contact variety first noted in seventeenth-century Macau (Bolton 2003:139), when the English traded with China through the waters near the Yue (Cantonese)-speaking areas. This variety of English then found nurturing soil in Hong Kong, annexed to the British via the Convention of Chuanpi (1840) and later the Treaty of Nanjing (1842), both documents under the custody of the Republic of China government, now in Taiwan.

The tonal properties of Hong Kong English (HKE) words were first articulated in Luke 2000 and subsequently studied in Wee 2008, Cheung 2009, and Gussenhoven 2012, 2014. With reference to these earlier works, and based on first-hand data collected, this article demonstrates that (i) at the word level, high tones are lexically assigned to particular syllables of HKE words; (ii) word-initial boundaries are marked by mid tones (M); (iii) utterance right-edge boundaries are marked by a low tone (L%); and (iv) the tones of the remaining syllables are derived by spreading or interpolation, depending on their positions. The first two points have hitherto not been explicitly articulated and serve to complement extant literature in accounting for data that have slipped through the cracks. The third point supports Cheung (2009), contra Gussenhoven (2012), showing how a boundary-tone understanding of L% provides not only a more comprehensive but also a simpler account of the data. The final point provides a handle on an otherwise slippery aspect of the HKE pitch/tone patterns. Together, the HKE facts contribute a particularly instructive example of word- and phrase-level prosody interactions, echoing Gordon (2014).

Before we move on, a few words of caution with regard to studying HKE as a variety of English are in order. Research on any variety of English is often confronted with the difficulty of explaining what that variety is and how one can understand the variations in that given variety. In relatively new Englishes such as HKE, even the phonetic description of the data needs some attention.

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Whether there is such a variety as HKE remains a matter of some debate (Luke & Richards 1982, Tay 1991, Johnson 1994), although recent works have argued in favor of its existence (Bolton & Lim 2000, Chan 2000, Bolton 2002, 2003:Ch. 4, Pang 2003). For the present purposes, it suffices to note that the English spoken by Hong Kongers has such a strong and distinct character that it has allowed exploitation by comedians to create humor. Anyone familiar with Hong Kong will be able to identify HKE.

Thus, at least from the phonological point of view, the English spoken in Hong Kong may be justifiably treated as a variety in its own right. This approach is taken notably by Hung (2000, 2005), though tones are not mentioned in his studies. This article uses the term ‘Hong Kong English’ as reflective of its phonological distinctness and is noncommittal about whether HKE is a full variety of English on a par with American, Indian, Singapore, or Philippine Englishes.¹

This article is structured as follows: first, the methodology employed in the present study is presented (§2), followed by the basic tonal description of HKE (§3). The meat of the article is §4, which provides the main analysis of the HKE tonal data. Section 5 then takes a look back at the earlier works that have served as the foundation for the present one, explaining the areas that might have once obfuscated a clearer articulation of HKE tonal patterns. With the analysis in place, §6 takes a side glance at Cantonese and British English to see how and if they might be related to the HKE tone patterns. The section also includes a brief look at Singapore English tone patterns, which appear uncannily like those of HKE at first blush but might be more amenable to a stress analysis. A conclusion is offered in §7.

2. METHODOLOGY. While the tones of HKE are readily perceivable, the impressionistic description of tone on which this article is based was corroborated through an acoustic study. Using Praat (version 5.3.23; Boersma & Weenink 2012), recordings were collected at a sampling frequency of 22,050 Hz from four males and four females, ages eighteen to twenty, who are from middle-income families and who use English fairly regularly in their daily lives (mostly at the university). The patterns reported here were consistent across the eight speakers whose data were consulted for this article. Recordings were also presented anonymously to at least two other native Hong Kongers to judge whether they sound typical of Hong Kong spoken English. For the recordings, each word was produced three times as a single utterance to obtain utterance-initial, -medial, and -final F0 patterns. A prompt of ‘What you wanted to say was …’ was used to cue subjects to utter each triplet as a single utterance.

Using Xu’s (2012) TimeNormalizedF0 Praat script, F0 frequencies were taken at every 10% interval for the rhyme of every syllable and manually checked against broadband spectrograms in Praat. This procedure generated mean F0 frequencies across speakers (mean time-normalized F0) at each 10% interval point. F0 values in Hertz were converted into logarithmic z-scores (LZ) using the formula LZ = (F0i − M)/SD, where F0i is the sampling point, M is the mean F0 of all sampling points, and SD the standard deviation around M, all in log10 (following Zhu 1999, used also in Ishihara 2000). This allows for the different vocal ranges of the speakers to be compared on the same scale. In all of the cases presented here, the tone profiles of the words were created by averaging the LZ for each of the interval points across speakers with the standard deviation provided.

¹ Even when one concentrates only on phonological issues, HKE has internal variation. This is hardly surprising, since such variation is found in every other language. To the extent that I have been able to determine, however, tonal variations do not go beyond the patterns presented in this article.
3. Basic descriptions of HKE tones. One aspect on which all previous studies of tone in HKE agree is that there are H(igh) tones, M(id) tones, and L(ow) tones, as exemplified in words like *clockwise* and *before* in Figures 1a and 1b. In addition to these, it can also be shown that falling tone contours are also found in HKE, exemplified in *before* in Fig. 1b and also in monosyllabic words like *plan* in Fig. 1c.

As the figures show, the H, M, and L tones are quite clearly distinct, as is the F(alling) tone in Figs. 1b and 1c. The F tone was not reported in Luke 2000 and hence not taken up by Gussenhoven (2012), who based his analysis on Luke’s data. Luke (2000) reported only H tones for monosyllabic words, though all of his examples were words ending with obstruents, which would have masked the final half of a falling contour. In HKE, all final obstruents are voiceless (Hung 2000); distinctions between words like *bid* and *bit* are made by aspirating the final segment, a strategy different from British or American varieties where the vowel [ɪ] might lengthen slightly to cue voicing of the final obstruent. However, the falling tone was reported in Wee 2008 and Cheung 2009. I return to the issue of the falling tone in §4.3 and §5.1. It suffices for now that the labels H, M, and L are uncontroversial in the description of HKE pitch patterns, to which one may add F as shown in Figs. 1b and 1c.

There is one other issue that needs to be sorted out before a coherent description of tone in HKE words is possible. There are syllables that show gradual pitch declinations suggestive of interpolation from H toward a final L, as shown in Figure 2.

The examples in Figs. 2a and 2b exemplify the fact that post-H nonfinal syllables have pitch values that are derived by interpolating from H to a final L, a process found to be similar to one observed in the interpolation from lexical H to boundary L% in Japanese (Pierrehumbert & Beckman 1988:37–46). I return to the status of L and ex-
plain that it is a boundary tone L% in §4.3 and §5.1. For now, I interpret figures like 2a and 2b as evidence for an analysis in which post-H nonfinal syllables receive no tone at the phonological level, as in 1.

(1) Atonal syllables in HKE: Post-H syllables in HKE are toneless (tonelessness henceforth indicated as ‘o’).

Without a commitment to whether or not the H, M, L, and F tones are phonological, the tone patterns of HKE words are exhaustively listed in 2, 3, and 4 below, accompanied by tableaux indicating the unattested surface combinations.

(2) Monosyllabic HKE words: F-type only
   i. plan
   ii. pinch
   iii. tree

(3) Disyllabic HKE words
   a. H-L type
      i. apple
      ii. clockwise
      iii. greeted
   b. H-F type
      i. sometimes
      ii. outsell
      iii. giraffe
   c. M-F type
      i. create
      ii. inborn
      iii. before

<table>
<thead>
<tr>
<th>2nd σ</th>
<th>1st σ</th>
<th>-H</th>
<th>-M</th>
<th>-L</th>
<th>-F</th>
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<tbody>
<tr>
<td>H-</td>
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<td>*</td>
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<td>*</td>
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<tr>
<td>M-</td>
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<td>(3a)</td>
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<tr>
<td>L-</td>
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<td>*</td>
<td></td>
<td></td>
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<td>(3b)</td>
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<tr>
<td>F-</td>
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<td>(3c)</td>
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<tr>
<td>o-</td>
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<td>*</td>
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(4) Trisyllabic HKE words
   a. H-o-L type
      i. yesterday
      ii. beautiful
      iii. popular
   b. H-M-F type
      i. runaway
      ii. roundabout
      iii. go-between
   c. H-H-L type
      i. kidnapper
      ii. handwriting
      iii. newspaper
   d. H-H-F type
      i. undersold
      ii. overwrite
      iii. kangaroo
   e. M-H-L type
      i. prohibit
      ii. emergence
      iii. erotic
   f. M-H-F type
      i. about-turn
      ii. Repulse Bay
      iii. alarm clock

Figure 2. F0 profiles showing gradual pitch declinations suggestive of interpolation from H toward a final L.
The question confronting any full-fledged analysis of HKE tones is how to account for all of the gray cells in the tableaux in 3 and 4, while generating all of the attested sequences. Following Gussenhoven’s (2012:4) advice that ‘analyzing the tonal system of a language without taking the intonation into account can be risky [since] … pitch phenomena may be assigned to lexical tones that belong to intonational tones’, the next section concentrates first on the H tone, followed by the M tone and then the L tone, before subsequent sections piece them together.

4. ELEMENTS OF THE HKE TONE SYSTEM.

4.1. H tone as lexical assignment. Assuming a compositional approach to contour tones, the F tone can be construed as an H-L sequence. In HKE, this move is supported by the fact that F is found only in the final positions of examples like those given in 2–4 and has the same distribution as L. Also, when suffixes are added to F-toned words, the tone clearly splits into H and L. For example, pinch is F while pincher is H-L; overwrite is H-H-F while overwriting is H-H-H-L.

(5) pinch vs. pin-cher

<table>
<thead>
<tr>
<th></th>
<th>H</th>
<th>L</th>
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<tr>
<td>o-ver-write vs. o-ver-writ-ing</td>
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<tr>
<th></th>
<th>H</th>
<th>H</th>
<th>L</th>
</tr>
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</table>

If the L and M tones are removed from the examples so that these syllables are now notated as toneless ‘o’ for convenience, the H-tone patterns of HKE can now be more clearly discerned, as seen in 6.

(6) H in HKE words

a. Monosyllabic words: H (e.g. 2)
b. Disyllabic words: H-o (e.g. 3a), H-H (e.g. 3b), o-H (e.g. 3c)
c. Trisyllabic words: H-o-o (e.g. 4a), H-o-H (e.g. 4b), H-H-o (e.g. 4c), H-H-H (e.g. 4d), o-H-o (e.g. 4e), o-H-H (e.g. 4f), o-o-H (e.g. 4g)
An interesting feature of the list in 6 is that all words apparently must have at least one H tone, a requirement stated as 7, which applies to content but not function words, as is seen in §4.5 below.

(7) Obligatory H: An HKE word must contain at least one H.

From 7, one can see that all possible combinations of H-tone assignments are attested in 6. In monosyllabic words, there is only one possibility. In disyllabic words, H is assigned to the first, second, or both syllables. In trisyllabic words, H is assigned to any one of the three syllables, to any two of the three, or to all, giving a total of seven possibilities. The completeness of all tone-assignment possibilities suggests that H is lexically assigned and probably is part of the lexical stipulation of each given word.

The observation that H-assignment covers all possible combinations of di- and trisyllabic sequences suggests that, contra Gussenhoven (2012, 2014), HKE is a tone language that is different from both a prototypical ‘stress’ language like American or British English, with a single syllable that is more prominent than others, and a ‘pitch accent’ language like Japanese, with a limit of one pitch accent per word (see Hyman 2006, 2009 on the typology of prominence systems). A more reasonable approach would be to assume that H tones in HKE are lexical in nature. Further evidence for the lexical nature of tone in HKE comes from Lo’s (2015) experiment demonstrating that HKE speakers are unable to recognize words if the H tone is relocated to other positions.

4.2. M as word-initial boundary. Unlike H, M is not lexically assigned, even though it can be demonstrated to be a tone that operates at the word level. Looking back at 3 and 4, one can see that the distribution of the M tone is restricted, occurring only word-initially (i) in monomorphemic words like those in 3c, 4e–g and (ii) in compounds like those in 4b, which have the morphological structure in 8.

(8) a. [word [word run] [word away]]
   b. [word [word round] [word about]]
   c. [word [word go] [word between]]

From 8, one can conclude that M must be attributed to the word level. Realizing that M is associated with the word level offers a natural explanation for the other M-initial tone types in HKE (i.e. 3c, 4e–g). The question is if it is wise to treat M as a lexical tone underlyingly specified for some words. Such an approach, however, is undermined by the regularity in the distribution of M: M is always word-initial. A more reasonable approach would be to treat M as a word-initial boundary tone,3 to be assigned to all words unless that syllable is already underlyingly specified for H.

Thus M and H are different in that H is really part of the lexical tone and M is derivable by rule, even though both are projected at the word level. There is some phonetic evidence in favor of treating H and M differently, which comes from a comparative study with Cantonese to be presented in §6.

4.3. L as utterance boundary. The issue of the L tone is the most complicated feature of the tone system of HKE. Cheung (2009) believes that it is an utterance boundary tone, a view not shared by Gussenhoven (2012, 2014). In this article, in agreement with Cheung (2009), I argue that the L tone is a boundary tone and should be represented as L% for the following reasons. First, L occurs only in the ultima, as seen in the lists of

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3 Given the behavior of compounds, it might be more accurate to think of the domain of M as the root, but not root-initial. M will surface on prefixes such as en– in enrich or non– in nonlinear. For current purposes, what matters is first that M and L operate on two different prosodic levels, and second that M is not a lexical specification, unlike H.
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words given in 2, 3, and 4. Second, the distributions of L and F are the same; that is, F also occurs in the ultima. If L is really an utterance-final L%, F can easily be treated as a concatenation of H and L% on the same syllable, as was done in §4.1. Finally, syllables with L tone lose that L when followed by another word, as do syllables with F tone. In both cases, the word-final syllable that originally carried the L in isolation receives an H tone instead, displacing the L tone to the end of the utterance, as in 9.

(9) Displacement of L to final positions

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<tbody>
<tr>
<td>a.</td>
<td>proudly</td>
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<tr>
<td>b.</td>
<td>chosen</td>
</tr>
<tr>
<td>c.</td>
<td>kangaroo</td>
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<tr>
<td>d.</td>
<td>proudly chosen</td>
</tr>
<tr>
<td>e.</td>
<td>chosen proudly</td>
</tr>
<tr>
<td>f.</td>
<td>proudly chosen kangaroo</td>
</tr>
<tr>
<td>g.</td>
<td>kangaroo chosen proudly</td>
</tr>
<tr>
<td>h.</td>
<td>student chosen proudly</td>
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In 9a,b, proudly and chosen both have the tone pattern H-L. Note how the concatenation of the words into single utterances in 9d–h push L rightward to the edge, even for F-final words like kangaroo.

The most straightforward treatment for the L and F tones in HKE would be to recognize the utterance-final boundary tone as L%, which may combine with final H to form F. Utterance boundary tones are not novel and have been observed in Japanese (Pierrehumbert & Beckman 1988, but see Duanmu 2008 for an excellent update), Mexican Spanish (Prieto et al. 1996), Yoruba (Laniran 1992), Kipare (Herman 1996), and Southern German (Truckenbrodt 2004), among many other languages. In all of these cases the declarative utterance boundary tone is L%.

With the basics of H, M, and L% in place, we can now deal with the patterns of tone alternation in HKE.

4.4. Tone spreading. In 9 above, we saw how both F and L alternate with H. In the case of F, the analysis advanced in §4.3 is that the alternating syllable starts with an H tone but surfaces as F when combined with the utterance-final L%. However, that does not explain how words like proudly in 9a, with the tone sequence HL, would surface as HH in 9d.

Recalling 2a,b, we have seen how H transitions to L% across intervening toneless syllables. As it turns out, H tones can spread rightward, leading to neutralizations of otherwise different input tonal sequences in longer word strings, a phenomenon also noted in Luke 2000, Cheung 2009, and Gussenhoven 2012.

(10) a. /H-o/ and /H-H/ neutralize to [H-H]

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<tr>
<td>greeted /H-o/ ~ greeted [H-H] him [H]</td>
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<td>outsell /H-H/ ~ outsell [H-H] him [H]</td>
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b. /M-H/ alternates between [M-F] and [M-H]

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<tr>
<td>before [M-F] ~ before [M-H] him [H]</td>
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<tr>
<td>beautiful /H-o-o/ ~ beautiful [H-H-H] girl [H]</td>
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<tr>
<td>newspaper /H-H-o/ ~ newspaper [H-H-H] vendor [H-o]</td>
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<tr>
<td>overwrite /H-H-H/ ~ overwrite [H-H-H] this [H]</td>
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d. /M-H-o/ and /M-H-H/ neutralize to [M-H-H]

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<tr>
<td>prohibit /M-H-o/ ~ prohibit [M-H-H] alcohol [H-o-o]</td>
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</table>
e. /H-M-H/ alternates between [H-M-F] and [H-M-H] 
runaway [H-M-F] ~ runaway [H-M-H] bride [H]
f. /M-M-H/ alternates between [M-M-F] and [M-M-H] 
recommend [M-M-F] ~ recommend [M-M-H] him [H]

As mentioned above, the alternations between word-final H and F are not surprising, since such an alternation could be derived simply by concatenation of H + L%. The interesting observation in 10 is the alternation between toneless syllables (which get transitional tones) and H. Crucially, an H tone surfaces only if there is another nonboundary tone to its right; when there is no further tone to the right, as in utterance-final position, a syllable not carrying an underlying H remains toneless. At first blush the data in 10 thus suggest that the toneless syllables get H by interpolation between the surrounding H tones. This is essentially the position taken by Cheung (2009). This approach will not work, however, because of data like 11.

(11) a. overhead + projector → overhead projector 
   H-o-o M-H-o H-H-H M-H-L% 
b. beautiful + before → beautiful before 
   H-o-o M-H H-H-H M-HL% 
c. glory + newspaper → glory newspaper 
   H-o H-H-o H-H H-H-L%

In 11, toneless syllables receive H even when the following tone is M, so the source must come from the left and is not attributable to pitch plateauing of syllables sandwiched by Hs. The examples in 11a,b show that M blocks the spread of H.

If one reconsiders 4g, M also appears to be capable of spreading rightward. HKE tri-syllabic words of the M-M-F type, like introduce and comprehend, indicate that both the initial and the medial M have very similar F0 profiles, shown in Figure 3.

The pitch trace in Fig. 3 is taken from utterance-final position. In other positions, profiles of both initial and peninitial M are likewise similar. The pitch profile suggests that the tone of the medial syllable is indeed an M and not a transitory tone from the initial M to the following H. A simple way to capture this is to assume that M is associated to all pre-H syllables in HKE. Thus, both syllables, in- and -tro-, would be associated to a single M tone; the same applies to com- and -pre- in comprehend. There is some support for this multiple linking of M. As it turns out, both introduce and comprehend have the tonal variants M-M-H and H-H-H, but never *M-H-H or *H-M-H.

To summarize, the patterns of HKE tone can be captured by the principles in 12.
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(12) Principles of tones in HKE
   a. Syllables in HKE are underlyingly specified for H.
   b. Associate M to any word-initial syllable that is not underlyingly H.
   c. Associate L% to utterance-final position.
   d. H-spread: Except for the H nearest the utterance-final boundary, spread H rightward to an adjacent toneless syllable.
   e. M-spread: Spread M rightward to all pre-H syllables.
   f. Except for the utterance-final syllable, HKE bans contour tones.

If one looks at 12 carefully, F tone is licensed only in utterance-final position, and all other syllables receive either M or H tones but not a contour tone through spreading. Syllables between the final H and the L% remain unassigned for tone and hence receive transitory pitch profiles as a result of interpolation. Another important feature of both H- and M-tone spreading is the requirement that there be another (nonboundary) tone to the right of the spreading tone. This condition ensures that syllables following the rightmost H or M in an utterance remain toneless and receive their surface F0 values through interpolation between the rightmost lexical tone and the final boundary tone. The principles in 12 correctly predict all of the tone patterns in HKE.

4.5. Complementarity but nonidentity of M and L. In §4.2 it was suggested that M is a word-initial boundary tone. Such a position, if tenable, should address two residual issues. First, an explanation is needed as to why M would not concatenate with H-initial words to produce a rising tone. Following Zhang (2001), contour tones are unlikely in nonfinal positions because these syllables do not undergo final lengthening. Therefore, unless the nonfinal syllable is for some reason lengthened, there is a principled reason as to why all nonfinal syllables do not carry contour tones in HKE. This position is supported in HKE by the observation that only utterance-final syllables may bear contour tones (i.e. F, via concatenation of H + L%).

Second, M and L% appear complementary, which in turn leads one to query whether M could be an utterance-level boundary tone parallel to L% but positioned at the left edge of an utterance rather than the right edge. It is, in fact, easy to demonstrate that M is not an utterance boundary marker like L%, since it surfaces utterance-medially at the beginning of words.

To demonstrate that L% and M are associated with different levels of prosodic constituents, an introduction to some properties of function words in HKE is in order. It is worth noting that the tones of HKE function words are different from the lexical ones discussed in the preceding sections. I do not attempt to offer a full treatment of HKE function words in this article, but describe their tone patterns in the hope that they shed light on the word vs. utterance distinction. This is done in 13, which is complemented by a summary of the descriptions in Table 1.

(13) HKE tones on function words
   a. Pronouns that serve as syntactic arguments (e.g. him, her, he, she, it, they, them, theirs, mine, hers)\(^4\) behave like monosyllabic lexical words; that is, they are assigned H and can become F when concatenated with boundary L%.
   b. Demonstratives (e.g. these, those, that, this), even when used as determiners, behave like monosyllabic lexical words; that is, they are assigned H and can become F when concatenated with boundary L%.

\(^4\) This includes his as the masculine version of hers.
c. Pronouns that serve as possessors (e.g. his $X$, my $X$, her $X$) and determiners (e.g. a, an, the) receive M tones.5
d. Modals (e.g. may, might, can, could, shall, should, must, will, would, and also auxiliaries like do and have) receive M tones, even in isolation.
e. Negator not receives H and behaves much like other monosyllabic lexical words.
f. Negation clitic n’t assigns H to its host, overriding the H assignment stated in (e). The clitic surfaces as H utterance-medially, but L% utterance-finally.6
g. Monosyllabic prepositions (e.g. in, on, with) receive M in all instances,7 except through, whose tone patterns behave like those of a lexical word.
h. Disyllabic prepositions (e.g. under, between, across, beside, along, against) behave like disyllabic lexical words.

<table>
<thead>
<tr>
<th>Pronouns</th>
<th>H</th>
<th>M</th>
<th>L%</th>
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<tbody>
<tr>
<td>Demonstratives</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possessors</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Modals</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>not</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n’t</td>
<td></td>
<td>Assigns H to stem</td>
<td></td>
</tr>
<tr>
<td>Prepositions (σ)</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Prepositions (σσ)</td>
<td>oH/Ho</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. HKE tones on function words.

Table 1 shows that none of the function words are L%, per se, while several are M, thus further substantiating §4’s claim that M is a word-level tone in contrast to L%, which is an utterance boundary tone. Certain classes of function words differ from content words, however, in lacking a lexical H tone and instead receiving the default word boundary tone M.8

Further evidence for the utterance-level status of L% is found in multiword sentences in which an L% is limited to utterance-final position, unlike M and H, which may occur consecutively, as shown in 14.

(14) a. The situation looks better.
   M H HH H H H L% 9
   b. John is in the house.
   H M M M H-L%

There is one final piece of evidence showing that M and L are not the same. This is to be found in words like emergence (o-H-o type) uttered three times in a single breath.

5 Uttering these words in isolation is hard to imagine, but this can happen if the speaker is truncating from a fuller phrase like his cat. In such cases, the tone is still M.
6 As to how the n’t gets an H tone, a number of guesses are possible. My hypothesis is that it is stipulated that H must be associated to its host, thus triggering delinking from the clitic, which surfaces as L%. As a light syllable lacking a vowel, it is too short to accommodate F.
7 When ending a sentence, however, monosyllabic prepositions get F tones, behaving like monosyllabic words.
8 I owe this beautiful argument to Diana Archangeli, who made this clear to me by suggesting that the information be laid out in a table.
9 H spreads, as discussed in §4.4.
With *emergence*, we can plot the downtrend of the M syllable *e*- and compare that with *-gence*. If indeed the fall is gradual from the first three M syllables to the final *-gence*, then it is possible that L% is the effect of downtrend. Conversely, if there is a sharp fall toward *-gence*, the claim that L% is part of downtrend with M is untenable.

![Graph showing the pitch drop at the end of *-mer*- and *-gence*](image)

**Figure 4.** *Emergence* uttered three times in a single breath (sample from female, age twenty).

In Figure 4, vertical dotted lines present approximate syllable boundaries. Across the graph, a finely dotted line traces the projection of the tones for the three M syllables corresponding to *e*- in *emergence* before ending in the final syllable *-gence*. As explained in earlier sections, the *-gence* in initial and medial articulations will get a tone that is interpolated from the H of *-mer*- to the M of *e*- (which is exactly as shown here). The final *-gence* shows a very sharp drop (so steep, it ended up as creaky voice here and also for many of the informants), indicating that this is not part of the expected projection if we followed the three preceding M tones. If indeed M and L% are the same and the L% is really just downtrend from M, Fig. 4 is certainly not what is expected.

Since M can be derived by rule, the tone rules of HKE can be updated to reflect another potential source of surface tone for syllables not lexically marked for tone. Toneless syllables thus receive M in word-initial position, M or H through rightward tone spreading in utterance-nonfinal words, or L% at an utterance boundary. Syllables not receiving tone from one of these sources (or from lexical marking of tone) have a surface tone pattern reflecting interpolation from a preceding tone to a following L%.

Before closing the section, there is one more property of HKE tone that can be observed in examples like those in 14, which contain strings of consecutive H or M tones. In HKE, a sequence of H or M tones is subject to downturn drift such that an H tone following another H tone or an M tone following another M tone is uttered with slightly lower F0 than the preceding one in the sequence. This effect is exemplified in Figure 5, which contains three tokens of a single word produced as a single utterance.

5. **Earlier studies of HKE tone.** The first report on the tonal patterns of HKE came from Luke (2000), and that data set formed the basis for Gussenhoven’s (2012) analysis. Within that intervening span of a dozen years, the one major work is Cheung 2009, which revealed a number of inadequacies in Luke’s work, particularly in separating word-level tone from phrase-level intonation, as well as the interpolating character of pitch profiles of syllables between H and L% (Gordon 2014). This section takes a look at these earlier works and their relation to the present article.

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10 The pitch-drop at the end of *-mer*- , which likely is due to the affricate onset of *-gence*, is a phonetic effect that does not threaten the interpolation story.
On the nature of the L tone in HKE. By and large, the data descriptions of all three authors are similar, but for one major difference: L. First, in Luke’s (2000) report, H is assigned to stressed syllables so that syllables after the final ‘stress’ receive L tones (more on stress later in §5.2). Thus, a word like holiday in Luke’s notation is H-L-L (which interestingly is incongruent with the pitch tracks provided in his paper’s appendix), and one can figure that interestingly will have L tones starting from the antepenult. As we have seen in Fig. 2, this claim is simply not supported by acoustic analysis, which is more consistent with an analysis positing a final L% preceded by syllables that have a transitory pitch from a preceding H (or M). The position adopted in this article is in agreement with Cheung (2009), whose set of pitch tracks also led her to disagree with Luke in this aspect.

Second, still related to L, Luke reports no F tones at all and an H tone in all monosyllabic words. All of his examples, however, are words ending with obstruents, and since obstruents are systematically voiceless in HKE, the final half of the falling contour, if there were one, would have been obfuscated. The absence of F is supported by Gussenhoven (2012), who provided Chinese and tea as examples where the final syllables are H rather than F. Though Chinese has a final obstruent [s], tea is arguably more interesting in that there is no final obstruent to mask the F. On this ground, Gussenhoven (2012) argues that the L is lexically assigned. Gussenhoven’s argument is that if tea is not F, then it follows that L cannot be a boundary tone.

To tighten his case, Gussenhoven created recordings by having his subject (female, age twenty-seven) read single-word visual stimuli that contained either no punctuation (declarative), a question mark (interrogative), or an exclamation mark (emphatic) in order to obtain readings for various kinds of intonation. His results were that tea sans punctuation was a flat H, tea with question mark was a high-rising contour, and tea with the exclamation mark was HL. From these, Gussenhoven postulates that the declarative has no tone boundary \( \emptyset \) (though later in Gussenhoven 2014, he suggests that the declarative boundary may be \( \emptyset \) or L%), the interrogative has an H%, and the emphatic declarative L%.

Though insightful, Gussenhoven’s claims raise a couple of issues. First, it is hard to determine under his analysis whether L is a lexical tone or a boundary tone, or if there are two different Ls. If there is a lexical tone L, its very restricted distribution, occurring only in utterance-final position, needs to be explained. Second, one is left pondering why a period was not used in Gussenhoven’s elicitation of the simple declarative. Unpunctuated words potentially lead to readings that a speaker might interpret as unfin-

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Gussenhoven (2014) actually claims that the L is assigned to syllables after the primary stress. The primary stress is the syllable that receives one of the H tones. One problem with this approach is that post-(primary stress) H nonfinal syllables are not L.
ished and hence may not be treated as utterance-final. My own recordings from eight subjects balanced for gender were consistently associated with F in monosyllables that were either open or closed by sonorants. Recall in §2 that I took pains to ensure a declarative reading by using a frame and by having the speakers read each word three times as a single utterance. In an attempt to square my data with Gussenhoven’s, I replicated his experiment by collecting single-word readings for the words tea, which is itself a final syllable with an H tone, apple, whose final syllable is not H, and yesterday, which has a toneless penult. The first two words were also found in Gussenhoven’s experiment. These three words together allow the examination of the effects any intonation boundary tones may have on the various HKE lexical tone types. Two female native HKE speakers (ages twenty-one and twenty-nine) were asked to provide recordings varying across seven punctuation types: (i) sans punctuation, (ii) ellipsis ‘…’, (iii) comma ‘,’ (iv) period ‘.’, (v) exclamation ‘!’, (vi) double exclamations ‘!!’, and (vi) question ‘?’.

The results of the F0 profiles are schematized in 15.

(15) Intonation productions

a. Without punctuation ‘X’
   i. tea ii. apple iii. yesterday
   Variant 1 Variant 2

b. With ellipsis ‘X…’
   i. tea ii. apple iii. yesterday
   Variant 1 Variant 2

c. With comma ‘X,’
   i. tea ii. apple iii. yesterday
   Variant 1 Variant 2

d. With period ‘X.’
   i. tea ii. apple iii. yesterday

e. With exclamation ‘X!’
   i. tea ii. apple iii. yesterday

f. With double exclamation ‘X!!’
   i. tea ii. apple iii. yesterday

g. With question mark ‘X?’
   i. tea ii. apple iii. yesterday
Evidently, the profiles in 15d–g are stable and consistent across speakers. In 15d–f, it can clearly be seen that degrees of emphatic intonation trigger exaggerated versions with respect to pitch interval and duration (also intensity, though not shown here) of the simple declarative that is indicated by the period.

The variation seen in 15a–c is interesting and can also be observed across HKE speakers in more natural settings. To better understand whether 15a–c are indeed free variants, judgments were solicited from HKE speakers about whether they felt a particular recording could be paired with any of the three punctuations in 15a–c. The results were positive that speakers found the F0 profiles compatible with all three intonation types, but preferred for the ellipsis to have the longest duration, followed by the comma. The one without punctuation is shortest.

One can also infer from 15g that the interrogative is marked by a rise% (or LH% bitonal sequence), contra Gussenhoven’s (2012, 2014) postulation that it is H%. The interrogative boundary is associated with a rise, because otherwise one cannot explain the profile for yesterday. Tea is ambiguous in its tonal analysis but plausibly reflects a combination of a lexical H followed by an upstepped H% (possibly resulting from elimination of the L component of LH% in the face of tonal crowding).

In summary, with a fuller understanding enabled by the data in 15, it appears that L in HKE is better understood as a boundary tone than a lexical tone.

5.2. On the H and M tones in HKE. Cheung’s (2009) account of HKE correctly recognized the transitional pitch interpolation between the rightmost H and the L%. In Cheung’s analysis, however, the H tones are indicative of stress. For Cheung, HKE words are marked for stresses, which surface as H. According to her, all syllables sandwiched between H tones receive H tone through spreading, an operation that applies across words and phrases, to be blocked only by L%, as illustrated in 16.

(16) Stress-guided H-spreading in Cheung 2009

<table>
<thead>
<tr>
<th>Stress</th>
<th>First stressed σ</th>
<th>Last stressed σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syllable string</td>
<td>The ir(regular situation looks threatening)</td>
<td>]</td>
</tr>
<tr>
<td>Tonal string</td>
<td>H</td>
<td>L%</td>
</tr>
</tbody>
</table>

Cheung attributes the span of H tones in a sentence like The irregular situation looks threatening to syllables she identifies as carrying either primary or secondary stress. Such plateaus of H tones are also found in British English (Wells 2006:113, and Urban North British in Ladd 2008:128), though I explain later in this section that the situation in HKE is probably not best thought of in terms of metrical stress.

Unlike Cheung, I derive the pattern in 16 differently, first by identifying irregular as having the o-H-o-o tone pattern, situation as H-o-H-o (or possibly H-H-H-o), looks as H, and threatening as H-o-o. The span of H tones would still be obtained through H-spreading, and the association of L% would be treated the same as by Cheung. The difference between my position and Cheung’s lies in (i) whether H is assigned lexically as tone or metrically as stress and (ii) if spreading crosses word boundaries. In Cheung’s analysis, M is treated as a default pitch for toneless syllables.

12 See also Yiu’s (2015) phonetic study showing that there is a target H% at the boundary for interrogatives, though the data presented therein would also be consistent with a rise interpretation. Chen and Mok’s (2015) phonetic study of the HKE question intonation also shows a clear rising contour even when following a high-toned syllable such as car.
With respect to the second point, §4.4 and §4.5 have shown that M is capable of blocking H spreading, contrary to Cheung’s assumption that M is merely a default pitch. As we have seen, M is probably best treated as a word-initial boundary tone. This is a relatively minor difference between Cheung’s treatment and that advocated here, and Cheung’s account can be easily tweaked to accommodate the effects of M.

Cheung’s treatment of H as metrical warrants scrutiny. The obligatoriness of an H tone in an HKE word may argue in favor of a stress-based analysis in which high tone is the tonal manifestation of stress inherited from standard varieties of English. Such an approach would be consistent with the common crosslinguistic link between high tone and stress (de Lacy 1999, 2002). For example, in Lithuanian, H is inserted on the stressed syllable; in Digo Zulu, the H tone moves to the stressed syllable; in Golin Mixtec, stress assignment avoids syllables with low tones; in Vedic Sanskrit, H is deleted from unstressed syllables (Yip 2002:97).

My suspicion is that the stress-based account of HKE tone is highly intuitive because the historical origin of HKE likely biases the analyst in favor of treating HKE like English. In fact, there are a number of arguments against a metrical treatment of HKE. First, as seen in §3, the H tone occurs in all combinations for di- and trisyllabic words. In a metrical system, one would not expect the possibility of adjacent H tones, as in cases like *sometimes* or any of the examples in 3b, 4c, d.

Second, stress is highly elusive for HKE speakers, many of whom are unable to identify which syllables are stressed. Literature on stress in HKE (notably Hung 2005 and Setter et al. 2010) has not presented any evidence for stress, phonetic or phonological, instead merely indicating the syllables the researchers believed were stressed. In fact, Hung (2005) gives evidence to the contrary, reporting that there are no prosodic differences between *progress* and *progress*, *conduct* and *conduct*, and other cases where stress would make a syntactic category distinction. This is true even among highly educated HKE speakers who had American or British English-speaking teachers and ample access to Hollywood movies and American television. This is true also of many who are English professors at the university. Among the speakers I interviewed, those who were able to inform me where stresses fell in certain words said they had to learn it by rote, citing *maintenance* as an example. These speakers report that they had to learn the pronunciation *maintenance* because otherwise they would have read it as *maintainance*.

Third, HKE speakers do not apply vowel reduction or diphthongization automatically even with stress-attracting suffixation. *Theatricality* is a hard word for many HKE speakers, often coming out as [ti.e.tri.ka.li.ti], with an H on the first syllable and pitch falling via interpolation until the L% in [ti]. Again, HKE speakers who pronounced *theatricality* with a fuller vowel [æ] reported that they had to learn it by explicit instruction. These words are not isolated cases, and the patterns can be easily verified with the use of nonce words.

Fourth, tones can spread, but not stress. And it can be shown that the spread of H tones in HKE is not of the same nature as the spreading of the high-pitch correlate of stress that is sometimes observed in varieties of English where stress is clearly employed. Wells (2006:209) provides an example with the utterance *Well, ‘make up your mind*, the accent falling on ‘make and ‘mind. This utterance may have, among other possible pitch profiles, one in which high pitch spans from *make* to *mind*, which ends in a fall so that it sounds something like well, *MAKE UP YOUR MIND***. In this case, we see the spread of the high-pitch correlate of stress, though stress itself does not spread. Further, Wells (2006:213) observes a downstep between *must* and ‘*make* in you ‘*really must ‘make up your mind*.
HKE tone displays very different behavior. In HKE, the H spreads rightward to the end of a polysyllabic word even if the initial syllable of the next word is M (recall 11a, *overhead projector*, where H from *o-* spreads to *-head* even though *pro-* is M). This is therefore not the same kind of plateauing effect, due to being sandwiched by Hs. The H spreading in HKE can be blocked by M. More importantly, H spreading in HKE is not sensitive to metrical alterations due to focal contrast. In standard varieties of English, an utterance like *the princess yelled, not the princess yelled* would have shifted stress and a concomitant shift of H pitch. In HKE, however, the utterance would have the tone sequence M-H-H-F, H-M-H-H-F, where *princess* and *princes* are both H-H. Even if the need for contrast were removed, *princess* would still be H-H. To create the desired focus, HKE speakers would change the volume and duration of the contrasted syllables, spreading H tone according to the rules governing tone spread in HKE, oblivious to metrical alterations.

In sum, the distribution of H in HKE, the elusiveness of stress, the absence of other stress-related phenomena like vowel and length alternations, the insensitivity of H-spreading in HKE to metrical shifts, and the divergence between H-tone spreading in HKE English and stress-associated H-tone plateauing in certain varieties of English all work against a metrical treatment of the H tone in HKE. Thus, even if the H tone might have historically come from a transparent mapping of English stress, the pitch patterns in modern HKE behave in ways that require an analysis that is not reminiscent of a stress language.

In summary, while insightful in certain respects, earlier accounts of HKE tone fail to provide the empirical coverage afforded by the analysis proposed in this article.

6. SINO-ANGLO ANGLES ON HKE TONOLGY. The preceding sections have described at length the tonal patterns in HKE, both at the word level and at the intonation level. This section attempts to relate HKE tones to two of its source languages, Cantonese and British English, with a side glance at another variety of English, Singapore English, with superficially similar properties to those found in HKE.

6.1. TONE FROM CANTONESE. Given that HKE developed in a context where a tone language (Cantonese) is spoken, it is reasonable to wonder if indeed the tones of Cantonese have transferred into HKE. Cantonese has six different tones, listed and exemplified in Table 2.

<table>
<thead>
<tr>
<th>TONE CATEGORY</th>
<th>TONE CONTOUR</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High flat</td>
<td>‘divide’</td>
</tr>
<tr>
<td>2</td>
<td>High rising</td>
<td>‘powder’</td>
</tr>
<tr>
<td>3</td>
<td>Mid</td>
<td>‘sleep’</td>
</tr>
<tr>
<td>4</td>
<td>Very low flat/falling</td>
<td>‘grave’</td>
</tr>
<tr>
<td>5</td>
<td>Low rising</td>
<td>‘anger’</td>
</tr>
<tr>
<td>6</td>
<td>Low flat</td>
<td>‘portion’</td>
</tr>
</tbody>
</table>

Table 2. Cantonese tones for the syllable [fən].

The relevant tones for comparison with the HKE tones H, M, and L would be tone 1, tone 3, tone 4, and tone 6. An experiment reported in Wee 2013 and Wee & Liang 2015 found that only F0 values of the HKE H tone matched those of Cantonese tone 1. The M tone in HKE appeared sometimes to match tone 3 for some speakers, but never tone 6, and the L tone did not correspond phonetically to either tone 4 or tone 6. This result is predicted by the present analysis because H is the only lexical tone in HKE, akin to the lexical tones that are underlying stipulated for Cantonese words. The HKE L% is a
boundary tone and therefore unsurprisingly has no Cantonese correspondence. The M tone is assigned at the word level in HKE, but it is not a lexical tone. Presumably that is why M appears to match the Cantonese tone 3 for some speakers but not all.

6.2. Prosody marks from English. Section 5 argued that the H tone in HKE is tonal, and the preceding subsection has suggested that the H tone could have come from Cantonese. Even if H in HKE is unlike stress marking, it is still possible that it had an English source, a position that is at least partially substantiated in a comparison of the two varieties (17). Primary stress is marked with a double underline and secondary stress with a single underline.

(17) Comparison between HKE and English stress

<table>
<thead>
<tr>
<th>HKE</th>
<th>Wells (1990) British English</th>
<th>OED14</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-o</td>
<td>glory, clockwise, greeted</td>
<td></td>
</tr>
<tr>
<td>H-H</td>
<td>sometimes, outsell, inborn</td>
<td>inborn</td>
</tr>
<tr>
<td>o-H</td>
<td>create, giraffe, before</td>
<td></td>
</tr>
<tr>
<td>H-o-o</td>
<td>testify, beautiful, popular</td>
<td></td>
</tr>
<tr>
<td>H-o-H</td>
<td>runaway, roundabout, go-between</td>
<td>runaway, roundabout, go-between</td>
</tr>
<tr>
<td>H-H-o</td>
<td>kidnapper, handwriting, newspaper</td>
<td>kidnapper, handwriting</td>
</tr>
<tr>
<td>H-H-H</td>
<td>undersold, overwrite, kangaroo</td>
<td>overwrite, kangaroo</td>
</tr>
<tr>
<td>o-H-o</td>
<td>prohibit, emergence, erotic</td>
<td></td>
</tr>
<tr>
<td>o-H-H</td>
<td>about-turn, Repulse Bay, alarm clock</td>
<td>about-turn</td>
</tr>
<tr>
<td>o-o-H</td>
<td>comprehend, dislocate, recommend</td>
<td>comprehend</td>
</tr>
</tbody>
</table>

Cases where the Oxford English Dictionary (OED) differs from Wells 1990 are provided in the rightmost column. Wells and the OED differ primarily in that the former provides secondary stresses; there are, however, some words in which there are other differences, as in 17b,g where the locus of primary stress appears to be different. Considering the stress patterns in both Wells and the OED, it is possible that the H tone of HKE words corresponded to the stresses of a particular English pronunciation, perhaps depending on when the word entered HKE.15

Wee and Cheung’s (2015) study of the nineteenth-century Cantonese-English instructor revealed that English words in that period were transliterated in such a way that stressed syllables received Cantonese tones that are likely to have been higher than the surrounding unstressed syllables. These very same syllables appear to have evolved into H-toned syllables in modern HKE. Despite the apparent close mapping between stress and H tone, it is not necessarily the case that modern HKE H tones are indicative of stress, though they may have had such functional beginnings. The crucial consideration to note is that what is history is history. Even if stresses were productively transferred into HKE

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13 With the exception of Repulse Bay, which was not listed. British English is chosen as the primary basis for comparison because it is the model used in Hong Kong schools.

14 Oxford English Dictionary (http://www.oed.com, accessed 8 September 2013). Stresses for runaway and roundabout are indicated as US pronunciations. Thanks to the associate editor whose remarks guided me in this direction.

15 Familiarity with Hong Kong’s colonial past might lead one to wonder, at the risk of committing the comparative fallacy (see Mohanan 1992 for particularly enlightening reasons to be careful when studying non-native varieties of Englishes), if one could test for H-shifts the way stress shifts with class I suffixes like theatre, theatrical, theatricality. This is actually rather tricky to do for HKE speakers, because we do not know if HKE speakers make a distinction between class I and class II affixation even if we know they make a distinction between affix and stem. I remain agnostic on this front given that it has been subject to inadequate research.
as H a century or so ago, modern HKE could easily have grammaticized that mapping as tone. In support of this prosodic transfer from stress to tone, modern HKE speakers seem unable to identify if a syllable is stressed, but they can readily point out if a syllable has a higher pitch. In addition, tones appear stable even when truncation applies to shortened words. For example, consider the school subject combining physics [fi:.siks] (with tone H-L), chemistry [kʰe.m.mi.stri] (H-M-L), and biology [bai.o.la.ti] (M-H-M-L), which is referred to in HKE as phy-chem-bi [fi:.kʰe.bi] with the tone pattern H-H-M/L, where the final syllable [bai] surfaces as L% if utterance-final (see also Silverman 1992:310, ex. 40). Similarly, professional (M-H-M-L) is shortened to pro (M),16 sorry (H-L) is truncated in HKE as sor (H), and financial secretary (M-H-H#H-M-M-M-L) is fin sec [fin.sek] (M-H). The final case is especially interesting because the shift [fai] → [fin]17 had no impact on the tonal manifestation of the first syllable. In all of the cases, the tones appear to be assigned before truncation applies. These all suggest that perhaps the H tones are part of the lexical specifications of the HKE words. Indeed, as has been demonstrated in preceding sections, treating HKE as tonal provides more comprehensive coverage of the data.

6.3. SINGAPORE ENGLISH AS A COUSIN. Sharing Hong Kong’s historical and demographic background is Singapore, also a former British colony with a strong Chinese presence. What is different about Singapore is that there is great diversity even across the ethnic Chinese, so Cantonese was not the dominant Chinese language in Singapore. There is also a significant presence of Malay and a handful of Indian languages, which together make it difficult to discern the linguistic sources of various phonological aspects of Singapore English (henceforth SgE; see Lim 2009, 2011, 2014, and Ng 2012 for discussion).

Of particular interest is Ng 2011, whose descriptions of SgE tone patterns are given in 18.

(18) Singapore English tone patterns (adapted from Ng 2011)
   a. High tone (H) is assigned to the final syllable of the phonological word.
   b. Mid tone (M) spans all nonfinal stressed syllables.
   c. Low tone (L) is assigned to initial unstressed syllables.
   d. Remaining unstressed syllables receive mid tone by rightward spreading from stressed syllables (e.g. sée (H), Énglish (MH), élephant (MMH), În-
donéśia (MMMH), macíne (LH), hibíscus (LMH), Améríca (LMMH)).

In Ng’s account, the stressed syllables, indicated with an accent in 18, receive M tones that spread until the penultimate syllable. Final syllables receive H, and initial syllables, if unstressed, receive L. Ng’s main phonetic evidence for stress in SgE comes from vowel intensity, albeit noting the absence of pitch and duration correlates as well as the paucity of studies to support any claim of stress perception by SgE speakers.

Interestingly, SgE has a stretch of Ms that appear to be a parallel of the span of Hs in HKE. If indeed SgE tones are analyzable as stress, one might explore the same strategies for HKE. However, the M-span inside an SgE word is never broken, which would mask any tone assignation that might look like the type found in HKE, where given a trisyllabic word, all possible combinations (seven total) of H assignment are attested. For this reason, while it might be possible to maintain a stress-based analysis for SgE,

16 Interestingly, pro does not surface as F, suggesting that it was truncated in HKE rather than borrowed straight from the English pro.

17 Not a case of vowel reduction, but a case of spelling pronunciation.
one might be tempted to see if the pitch patterns in SgE might also yield to a tonal treatment parallel to HKE.

7. CONCLUSION. Hong Kong English has a distinctive tonal flavor that first caught the attention of linguists at the turn of the millennium. This article began with a phonetic description of the basic F0 profiles of its basic tones, describable as H(igh), M(id), and L(ow).

From the full set of pitch patterns found in di- and trisyllabic HKE words, it is possible to discern that HKE uses H tone lexically in combination with any string of syllables. By identifying the declarative utterance final as an L% and the word-initial boundary as M, all of the pitch patterns of HKE can be easily derived. In so doing, this article informs a growing literature on the importance of separating pitch effects at the word level from those that apply to the phrase or utterance.

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