Wh Prosody Is Not Focus Prosody in Fukuoka Japanese

JENNIFER L. SMITH
University of North Carolina, Chapel Hill

1 Introduction

One fundamental question concerning the syntax-phonology interface is the extent to which syntactic information is available to the phonology. Influential in this discussion has been the special intonational contour that occurs in Tokyo Japanese *wh* questions. This paper presents quantitative evidence from the Fukuoka dialect of Japanese that demonstrates, more strongly than the Tokyo pattern does, that the phonology of pitch accent and prosodic phrasing is sensitive to *wh* constructions.

In a *wh* construction in Tokyo Japanese, the *wh* element has a particularly high pitch, and the domain following the *wh* element has a reduced pitch range with low overall pitch. Crucially, this special prosody at least tends to correlate with the scope of the *wh* element (Deguchi & Kitagawa 2002; Ishihara 2002; but see also Hirotani 2012).

To appear in: *Japanese/Korean Linguistics 23.*
Edited by Michael Kenstowicz, Ted Levin and Ryo Masuda.

| *Author's prepublication version, February 2014; page numbers will change.*

The Tokyo pattern does not, however, prove conclusively that the phonological grammar is directly sensitive to syntactic [+wh] features. Phonologically, Tokyo *wh* prosody is argued to be an instance of focus prosody (Deguchi & Kitagawa 2002; Ishihara 2002; though see Hwang 2011 for evidence that there may be more to Tokyo *wh* prosody than focus alone). The phonological grammar is known to have access to focus features cross-linguistically (Jackendoff 1972; Truckenbrodt 1995; Selkirk 2002), so if Tokyo Japanese *wh* prosody is subsumed by focus prosody, then it does not present novel implications for the syntax-prosody interface.

According to descriptions by Kubo (1989, 2005, 2010), Fukuoka Japanese, like Tokyo, has special *wh* prosody that tends to correlate with *wh* scope. Crucially, however, the surface realization is different. Fukuoka *wh* prosody involves the deletion of all pitch accents from the *wh* element to the end of the *wh* scope domain, creating a large, unaccented phrase, which surfaces with a high flat tone (for quantitative evidence supporting this description, see Igarashi 2007; Smith 2013). Moreover, Igarashi (2007) and Kubo (2010) present initial evidence that this high flat contour is *not* characteristic of Fukuoka focus prosody. If this is indeed the case, then some mechanism distinct from focus prosody is needed to account for Fukuoka *wh* prosody.

This paper makes two contributions. First, it provides a systematic empirical investigation of Fukuoka focus and *wh* prosody and confirms that the two are distinct. Second, it implements a simplified methodology for diagnosing and comparing pitch accent that does not require accent location to be specified in advance; this methodology has potential applications for further research on pitch accent and intonation across varieties of Japanese.

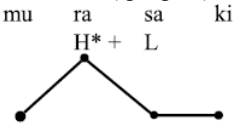
2 Fukuoka Japanese Pitch Accent and Intonation

Many Japanese dialects have lexical pitch accents; a word can be accented (realized with an abrupt fall in pitch) or unaccented, as exemplified in (1).

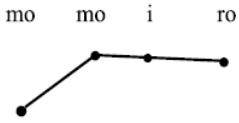
In Tokyo Japanese (Pierrehumbert & Beckman 1988; Venditti 2005), a pitch accent is represented as a /H*+L/ tone melody. An unaccented word has a high, gradually decreasing pitch, as in (1)(b), because of a phrasal H tone. The 'initial lowering' seen in (1)(a–b) is due to a L boundary tone.

(1) Tokyo examples

a. accented ('purple')



b. unaccented ('pink/peach color')



Fukuoka Japanese is much like Tokyo in having a contrast between accented and unaccented words, a /H*+L/ pitch accent, a H phrase tone, and initial lowering (Kubo 1989, 2005). The accentedness or accent location of a particular lexical item may differ between the two, as in Tokyo [tábeta] vs. Fukuoka [tabéta] 'ate'. Another difference is that verbs and adjectives receive a default accent in Fukuoka, but may be unaccented in Tokyo.

Where Fukuoka prosody differs markedly from Tokyo is in the prosody of *wh* constructions, which undergo a process of accent deletion, resulting in a high flat contour resembling that in (1)(b) (Kubo 1989, 2005; Igarashi 2007; Smith 2013). The *wh* word itself surfaces as unaccented, and all material from the *wh* word to end of its semantic/syntactic scope likewise surfaces as unaccented (except that one default accent is inserted at the end of the *wh* scope domain in the case of an embedded question).

The empirical goal of this paper is to determine whether *wh* prosody is an instance of focus prosody in Fukuoka as it is in Tokyo. In particular, does Fukuoka focus prosody cause accent deletion? The next section presents the methodology by which focus prosody and *wh* prosody are to be compared.

3 A Quantitative Diagnostic for Accentedness

Since accent in Japanese is realized as a pitch fall, a quantitative investigation of accent must compare changes in pitch. The measure of pitch change implemented here is a value to be called the *min/max f0 ratio*.[1] This value is determined as follows for each target noun. First, the maximum pitch in the noun, or *max f0*, is measured. Next, the minimum pitch from the max f0 to the end of the noun (plus case particle) is measured; this is the *min f0* value. From these two values, the min/max f0 ratio is calculated.

If a noun is unaccented, it has no abrupt pitch drop, though there may be gradual declination (Ladd 1984); the min and max f0 values are similar, so the min/max f0 ratio is close to 1.0. But if a noun is accented, then it does have a large pitch drop. In this case, the min f0 value is considerably lower than the max f0 value, so the min/max f0 ratio is less than 1.0.

For a noun in a neutral context, where neither a *wh* element nor a focused element precedes, lexical accent status should surface unchanged; accented nouns should have a low min/max f0 ratio, and unaccented nouns should have a min/max f0 ratio near 1.0. In the post-*wh* context, we expect accent deletion (Kubo 1989; Igarashi 2007; Smith 2013), so both (lexically) accented and unaccented nouns should have similar max/min f0 ratios, near

[1] A ratio is used, rather than a difference, for purposes of normalization. Different speakers have different pitch ranges, so a 20 Hz change might be relatively large or small depending on the speaker, but a min/max f0 ratio of 0.8 gives an indication of the magnitude of the pitch change regardless of the level of the starting pitch.

1.0. The question of interest here is: Does the post-focus context show the same pattern as the post-*wh* context, or are the two distinct?

4 Experiment: Design and Procedure

4.1 Materials

Matched sets of sentences were constructed in order to place target nouns (nouns for which the min/max f0 ratio would be measured) in three contexts: *neutral* (2)(a), following neither a *wh* item nor a focus item, to serve as a baseline; *post-wh* (2)(b), following a *wh* item, where accent deletion is expected (Kubo 1989, 2005); and *post-focus* (2)(c), the context of interest.

(2) Representative utterances in three contexts; target nouns in **bold**

a. Yoneyama-ga doyoobi **aniyome-o** yonda tte siran'yatta.
Yoneyama-NOM Sat. s.in.law-ACC called C didn't.know
'(I) didn't know Yoneyama called (my) sister-in-law on Saturday.'

b. dare-ga doyoobi **aniyome-o** yonda ka siran'yatta.
who-NOM Sat. s.in.law-ACC called C didn't.know
'(I) didn't know who called (my) sister-in-law on Saturday.'

c. YONEYAMA-GA doyoobi **aniyome-o** yonda tte siran'yatta.
Yoneyama-NOM Sat. s.in.law-ACC called C didn't.know
'(I) didn't know YONEYAMA called (my) sis.-in-law on Saturday.'

Each target noun consists of four light syllables and is followed by a case particle, either *-o* ACCUSATIVE or *-ni* DATIVE/LOCATIVE. Nouns were chosen with the intention that half would be accented and half would be unaccented. This was generally the case, but there were a small number of differences in lexical accentedness for certain speakers; see (3) below.

4.2 Participants

The utterances examined in this study were produced by seven female speakers of Fukuoka Japanese (the seven speakers who produced Fukuoka prosody in at least 50% of the *wh* utterances analyzed in Smith 2013).

participant	*age*	*place of origin*	*participant*	*age*	*place of origin*
s05	20	Fukuoka city	s10	21	Fukutsu city
s07	20	Fukuoka city	s11	21	Hisayama town
s08	21	Oogori city	s12	22	Fukuoka city
s09	20	Oogori city			

Table 1: Participant information

4.3 Elicitation Procedure

Sentences were elicited via written prompts. Each sentence was presented with a written scenario designed to create a discourse context with the desired information-structure properties; speakers were asked to produce each target sentence as they would utter it if they were a participant in the scenario described. Focus was elicited using scenarios in which the speaker was correcting someone's mistaken assumption. Each participant produced each sentence twice; when possible, if a speech error occurred, an additional repetition was solicited. Participants were recorded at Kyushu University, Fukuoka, in a sound-attenuated room, with a Marantz PMD-660 digital recorder (44.1 kHz) and a Radio Shack 33-3012 head-mounted microphone.

5 Results

5.1 Neutral Context and Accent Classification of Target Nouns

Analysis of the neutral-context items, in which target nouns were produced in neither a post-*wh* nor a post-focus context, confirms that the min/max f0 ratio measure successfully distinguishes accented from unaccented nouns.

Each repetition of each target noun was analyzed for min/max f0 ratio, max f0, and accentedness. The min/max f0 ratio and max f0 value were determined as described above. As for accentedness, the eight target nouns were selected in consultation with a native speaker such that four would be accented and four unaccented. However, participants actually varied a little with respect to the accentedness of the target nouns. Therefore, accentedness was reexamined post hoc separately for each speaker, as follows.

(3) Accentedness for each noun, by speaker (● accented, ○ unaccented)

		intended	s08	s10	s12	s05	s11	s07	s09
onigiri	'rice ball'	●	●	●	●	●	●	●	●
amaguri	'chestnut'	●	●	●	●	●	●	●	●
aomusi	'caterpillar'	●	●	●	●	●	●	●	○
aniyome	'sister-in-law'	●	●	●	●	●	●	○	○
mararia	'malaria'	○	○	○	○	●	○	○	○
yamamori	'full plate'	○	○	○	○	○	●	○	○
yamaimo	'yam'	○	○	○	○	○	○	○	○
muraoka	(name)	○	○	○	○	○	○	○	○

Since each noun appeared in two sentences, and each sentence had two repetitions, there were four min/max f0 ratio values for every target noun. If three or four of the four productions of any noun fell within the range of

values corresponding to the other accent class for that speaker, then the noun was reclassified into the other accent class for that speaker. The results are shown in (3). (See min/max f0 ratio plots by noun for each speaker at <*www.unc.edu/~jlsmith/home/pdf/smith2013_jk23-handout_long.pdf*>.)

The data for each speaker are plotted in (4) and (5). Each point is one repetition of one target noun. Nouns are classified as accented (●) or unaccented (○) for each speaker as in (3). The horizontal axis shows the max f0 value, with higher values to the right. The vertical axis shows the min/max f0 ratio. A ratio of 1.0 (top of plot) indicates no pitch drop, while the larger the pitch drop in a given target noun, the lower the point appears in the plot.

Regression lines are plotted separately for the unaccented (- - -) and accented (—) points in each plot. If unaccented nouns are realized with little or no pitch drop (as expected), they will have a min/max f0 ratio near 1.0 regardless of the max f0 value, so the slope of the regression line is expected to be near horizontal. For accented nouns, on the other hand, the higher the max f0 value, the more range available for a pitch drop, so it is possible that the regression line might slope down to the right.

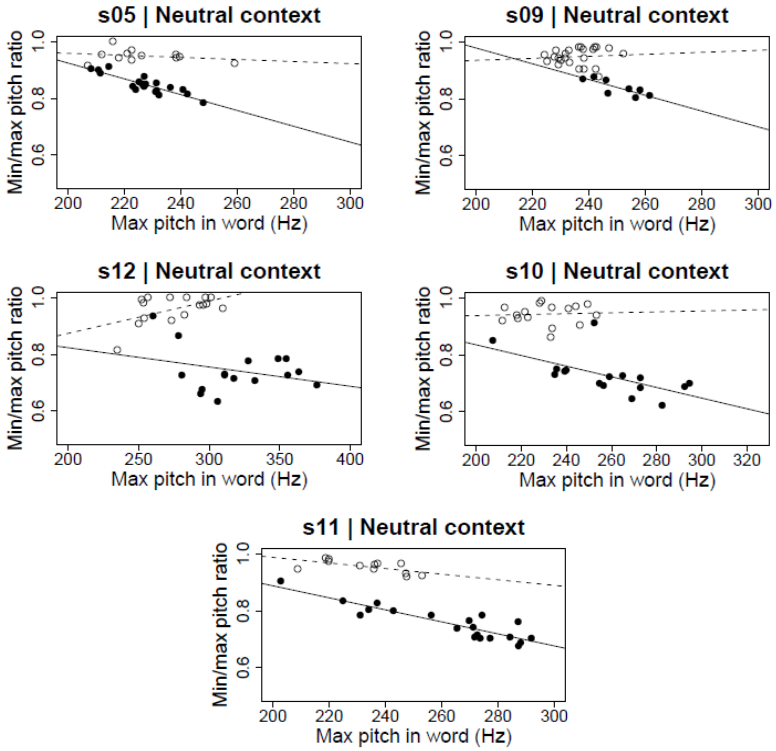
A linear regression analysis was performed to determine whether the min/max f0 ratio is affected by accentedness, by max f0, or by an interaction between the two; see Table 2. For all speakers, the min/max f0 ratio for accented (●) items is different from that for unaccented (○) items (there is a main effect of accentedness).

	accentedness		*acc * max f0*	
s05	$p<0.0001$	**	$p<0.0001$	**
s09	$p<0.0001$	**	$p=0.0494$	*
s12	$p<0.0001$	**	$p=0.038$	*
s10	$p<0.0001$	**	$p=0.0761$	.
s11	$p<0.0001$	**	$p=0.0563$	.
s07	$p<0.0001$	**	$p=0.604$	n.s.
s08	$p=0.001$	**	$p=0.4834$	n.s.

Table 2: Results of linear regression analysis for neutral context

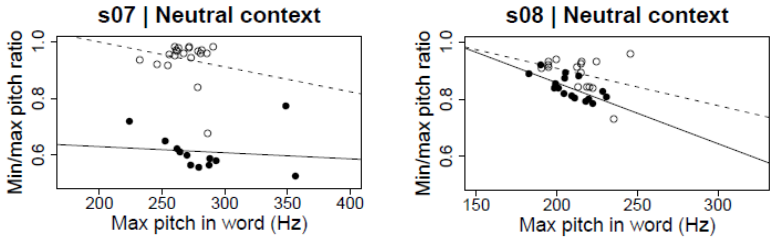
For most speakers, shown in (4), the way that max f0 affects the ratio—the slope of the line—is different for accented (●) vs. unaccented (○) items; there is a significant (s05, s09, s12) or marginal (s10, s11) interaction.

(4) Speakers with an interaction: accentedness * max f0



For the other two speakers (s07, s08), shown in (5), the way that max f0 affects the min/max f0 ratio is not significantly different for accented (●) and unaccented (○) items—the slopes of the lines are not distinct (no interaction), although the min/max f0 ratio itself is still different for accented and unaccented items (main effect of accentedness).

(5) Speakers with only a main effect of accentedness



5.2 Post-Focus Context

An analysis of target nouns in the post-focus context shows that there is no pattern of accent deletion in this context. Just as for the neutral context, each repetition of each target noun was analyzed for min/max f0 ratio, max f0, and accentedness (according to (3), which reflects speakers' productions in the neutral context). A linear regression analysis was carried out to see whether the min/max f0 ratio for nouns in the post-focus context is affected by accentedness, by max f0, or by an interaction between the two (Table 3).

If accent deletion does occur in the post-focus context, there should be no difference in the min/max f0 ratio between unaccented (○) and lexically accented (●) nouns. Contrary to this prediction, however, there is a main effect of accentedness on the min/max f0 ratio for all seven speakers. Thus, accented and unaccented target nouns do differ in amount of pitch fall, indicating that there is no accent deletion in this context.

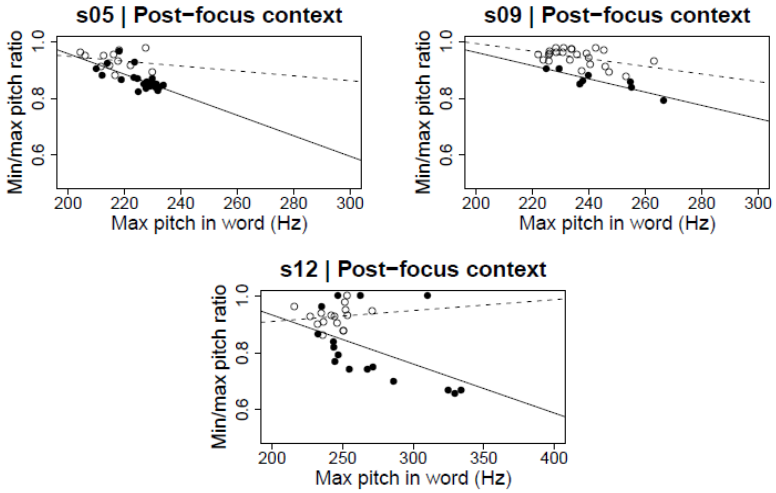
	accentedness		*acc * max f0*	
s05	p=0.0005	**	p=0.0792	.
s07	p=0.0083	**	p=0.249	n.s.
s08	p=0.0004	**	p=0.2944	n.s.
s09	p<0.0001	**	p=0.2408	n.s.
s10	p=0.0011	**	p=0.7935	n.s.
s11	p<0.0001	**	p=0.133	n.s.
s12	p=0.0151	**	p=0.2365	n.s.

Table 3: Results of linear regression analysis for post-focus context[2]

Although the linear-regression analysis shows that no speakers treat unaccented and accented nouns identically in the post-focus context, there are nevertheless some differences among speakers in this context. For three speakers (s05, s09, s12), in (6), unaccented (○) target nouns have a min/max f0 ratio near 1.0. This is the expected pattern, since a ratio near 1.0 means very little pitch fall.

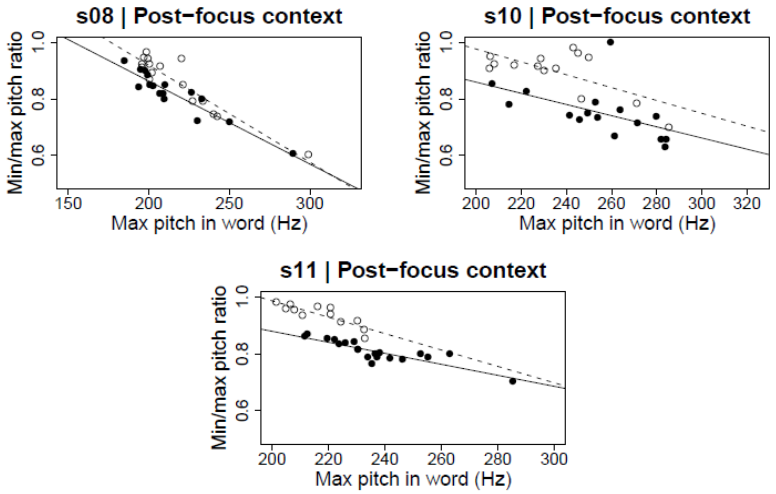
[2]The lack of an interaction, beyond a marginal one for s05, shows that the effect of max f0 on the min/max f0 ratio is not different for unaccented vs. accented nouns. See also (6)–(8).

(6) Speakers with an unaccented (○) ratio near 1.0



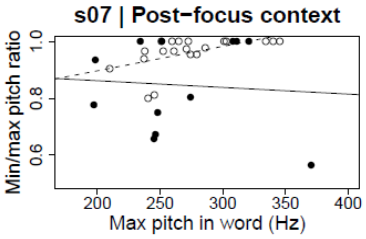
However, for another three speakers (s08, s10, s11), in 0, the min/max f0 ratio for unaccented (○) nouns is lower than the expected 1.0. If anything, these speakers are realizing some unaccented nouns with an accent in the post-focus context—but this is not accent *deletion*.

(7) Speakers with an unaccented (○) ratio lower than 1.0



Data from the final speaker (s07) are shown in (8). Here, six out of twelve *accented* (●) nouns have ratios near 1.0, the value that is expected for *unaccented* nouns. It might therefore seem as though this speaker does realize lexically accented nouns in the post-focus context with accent deletion in some cases, despite an overall significant difference in min/max f0 ratio (pitch fall) for the two classes of nouns even for this speaker.

(8) Speaker with ratio for six accented (●) nouns near 1.0



However, an inspection of these six items reveals that little or no pitch drop is measured after the max f0 within the noun because there is a H tone on the postnominal particle. This phrase-final H tone resembles one realization of focus in Tokyo Japanese (the 'prominence-lending rise'; Maeda & Venditti 1998). In fact, a similar phrase-final H appears in many of the *focused* nouns in the Fukuoka utterances recorded for this study. Thus, s07 seems to have produced six target nouns in the post-focus context as though they too were focused (even though this pattern was not encouraged by the discourse context). What is relevant for the present discussion is that these accented target nouns with a ratio near 1.0 do not indicate accent *deletion*.

In summary, none of the speakers in this study show evidence of a pattern of accent deletion in the post-focus context.

5.3 Post-*wh* Context

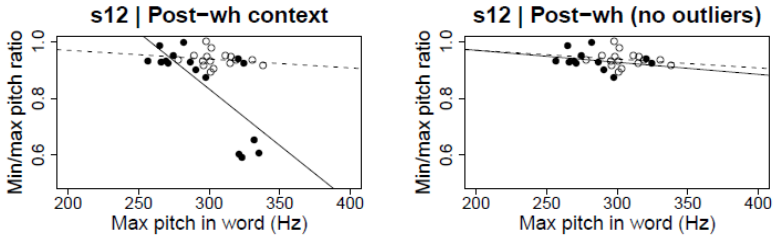
The preceding discussion shows that there is no evidence for accent deletion in the post-focus context. But for this result to serve as evidence that Fukuoka *wh* prosody is distinct from focus prosody, it must also be confirmed that the methodology used above to examine accentedness in the post-focus context *does* find accent deletion in the post-*wh* context.

Indeed, the results for the post-*wh* context, presented in this section, show that Fukuoka *wh* prosody is, overall, distinct from focus prosody. However, in analyzing the post-*wh* items, it is not possible to do exactly the same statistical comparison as for the neutral and post-focus contexts, for two reasons. First, target nouns that were produced with four repetitions in the neutral and post-focus contexts were only produced with two repetitions

in the post-*wh* context (this is because there were additional, different target nouns elicited in the post-*wh* context; unfortunately, except for speaker s12, speaker-specific accentedness information as in (3) is not available for these nouns, so they cannot be included in the statistical analysis for the post-*wh* context). Consequently, even if no significant difference is found between the min/max f0 ratios for unaccented and accented nouns in the post-*wh* context, reduced statistical power due to the smaller data set becomes an alternative explanation for any such lack of statistical significance.

The second complication is that even Fukuoka-typical speakers sometimes produce non-Fukuoka-like *wh* utterances (seen also in Igarashi 2007), perhaps because they are code-switching with the normative Tokyo dialect. Such speakers may have significantly different means or regression-line slopes for accented and unaccented items, but only because a few examples produced with non-Fukuoka prosody are outliers that distort the measures for the accented items. This effect is shown in (9) for speaker s12.[3]

(9) The effect of non-Fukuoka *wh* productions on the statistical analysis



The four accented (●) points at lower right in (9)(a) are from utterances in which s12 did not conform to her usual clear pattern of accent deletion. When these points are included, a linear-regression analysis shows a significant main effect of accentedness (p=0.0006) and a significant interaction between accent and max f0 (p=0.0170), indicating that accented and unaccented target nouns behave differently in the post-*wh* context. However, when these points are excluded, as in (9)(b), there is neither a main effect of accent (p=0.425) nor an interaction (p=0.864). In other words, the apparent difference between accented and unaccented target nouns for speaker s12 in the post-*wh* context is entirely due to those four outliers.

Results of the linear-regression analysis for target nouns in the post-*wh* context for the remaining six speakers are shown in Table 4. For most

[3]The plots in (9) show two repetitions of *sixteen* target nouns (the eight nouns in (3) plus the eight additional nouns recorded only in the post-*wh* context), because for speaker s12, accentedness judgments for all sixteen nouns were collected.

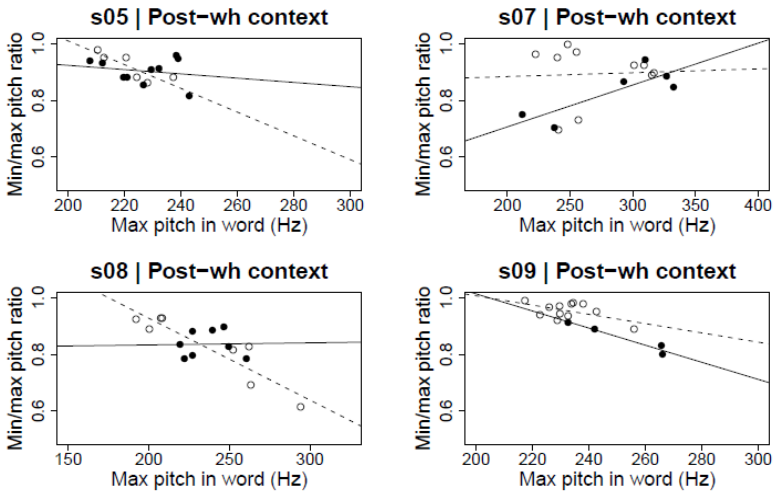
speakers, there is no significant effect of accentedness and no interaction, which is indeed what we would expect in this context if *wh* prosody involves accent deletion.

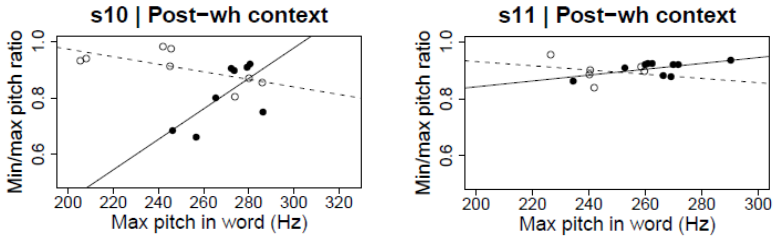
	accentedness		*acc * max f0*	
s05	*p*=0.743	n.s.	*p*=0.148	n.s.
s07	*p*=0.196	n.s.	*p*=0.291	n.s.
s08	*p*=0.1817	n.s.	*p*=0.0556	.
s09	*p*=0.0152	*	*p*=0.2438	n.s.
s10	*p*=0.0295	*	*p*=0.0087	**
s11	*p*=0.432	n.s.	*p*=0.171	n.s.

Table 4: Results of linear regression analysis for post-*wh* context

As shown above, this linear-regression analysis cannot be directly compared to the post-focus analysis. However, visual inspection of the post-*wh* plots in (9) and (10) confirms that for all speakers, the post-*wh* pattern does appear to involve accent deletion, exceptional non-Fukuoka-like utterances aside (see also Smith 2013).

(10) Target nouns in the post-*wh* context





Crucially, the post-*wh* plots in (9) and (10) are very different from the post-focus plots in (6)–(8), where accented and unaccented points form distinct clusters. Thus, *wh* prosody is not an instance of focus prosody in Fukuoka Japanese.

6 Conclusions and Implications

The results of this study show that *wh* prosody is distinct from focus prosody in Fukuoka Japanese. This finding has implications for the syntax-phonology interface: If *wh* constructions influence phonological structure directly and not via focus phonology, then [+wh] features are relevant for the phonological grammar. This finding has potential connections with Richards's (2010) proposal that typological patterns of *wh* movement and *wh* prosody are related, as well as with Kuroda's (2013) discussion of "Rising Prosody" in Tokyo indeterminate constructions. A similar prosodic system is also found in South Kyeongsang Korean (Kubo 2005; Hwang 2011).

Methodologically, the min/max f0 ratio successfully differentiates accented and unaccented words. This method must be employed with care when comparing words of very different lengths or in very different positions in the utterance, because declination (Ladd 1984) could systematically lower minimum pitch or pitch range in longer words or later in an utterance. Still, pitch fall caused by declination will likely be smaller than pitch fall caused by accent in most contexts. Useful next steps would be to calibrate this method against accentedness judgments by native speakers, and to test its usefulness in additional varieties of Japanese and other pitch-accent languages.

Acknowledgments

Thanks above all to the experiment participants and to Tomoyuki Kubo, without whom this project would not have been possible. Thanks also to Yoshi Kitagawa, Satoshi Tomioka, Elliott Moreton, Yosuke Igarashi, the P-Side Research Group at UNC, and the J/K 23 audience for discussion and comments; to Noriyuki Ikeda, Yui Izumo, Naomi Matsunaga, Go Mizumoto, Tsutomu Sakamoto, Kumiko Sato, Maki Takahashi, and Daichi Yasuna-

ga for assistance with experiment design and preparation; to Chris Wiesen of the Odum Institute at UNC for statistics consultation and support; to Shigeto Kawahara for his list of Japanese words with sonorant consonants; and to Mietta Lennes for making Praat scripts available. Additional research support was provided by the Kyushu University Linguistics Department and the UNC Carolina Asia Center.

References

Deguchi, M., and Y. Kitagawa. 2002. Prosody and *Wh*-Questions. *NELS* 32: 73–92.

Hayata, T. 1985. *Hakata hougen no akusento • keitairon* [The accent and morphology of the Hakata dialect]. Fukuoka: Kyushu University Press.

Hirotani, M. 2012. Prosodic Phrasing of Wh-Questions in Tokyo Japanese. *Prosody Matters*, ed. T. Borowsky et al., 446–486. London: Equinox.

Hwang, H. 2011. Distinct Types of Focus and *Wh*-Question Intonation. *ICPhS* 17: 922–925.

Igarashi, Y. 2007. Pitch Accent Deletion and Pitch Range Compression in Fukuoka Japanese. *21st General Meeting of the Phonetic Society of Japan*.

Ishihara, S. 2002. Invisible but Audible Wh-Scope Marking: Wh-Constructions and Deaccenting in Japanese. *WCCFL* 21: 180–193.

Ishihara, S. 2007. Major Phrase, Focus Intonation, Multiple Spell-Out. *Linguistic Review* 24: 137–167.

Jackendoff, R. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge, Mass.: MIT Press.

Kubo, T. 1989. Hukuoka-si hougen no, dare • nani tou no gimonsi o hukumu bun no pitti pataan [The pitch patterns of sentences containing WH-words in the Fukuoka City dialect]. *Kokugogaku* 156: 1–12.

Kubo, T. 2005. Phonology-Syntax Interfaces in Busan Korean and Fukuoka Japanese. *Cross-Linguistic Studies on Tonal Phenomena IV*, ed. S. Kaji, 195–209. Tokyo: ILCAA.

Kubo, T. 2010. Hukuoka hougen ni okeru dousi • keiyousi to gimonsi-gimonbun no akusento ni kansuru oboegaki [Accent in verbs, adjectives, and WH-questions of the Fukuoka dialect]. *Bungaku kenkyuu* 107: 157–183.

Kuroda, S. 2013. Prosody and the Syntax of Indeterminates. *Lingua* 124: 74–95.

Ladd, D. 1984. Declination: A Review and Some Hypotheses. *Phonology* 1: 53–74.

Maeda, K., and J. Venditti. 1998. Phonetic Investigation of Boundary Pitch Movements in Japanese. *ICSLP-98*: paper 0800.

Pierrehumbert, J., and M. Beckman. 1988. *Japanese Tone Structure*. Cambridge, Mass.: MIT Press.

Richards, N. 2010. *Uttering Trees*. Cambridge, Mass.: MIT Press.

Selkirk, E. 2002. Contrastive FOCUS vs. Presentational Focus: Prosodic Evidence from Right Node Raising in English. *Speech Prosody 2002*, ed. B. Bel and I. Marlin, 643-646. Aix-en-Provence: Université de Provence.

Smith, J. 2011. [+wh] Complementizers Drive Phonological Phrasing in Fukuoka Japanese. *NLLT* 29: 545–559.

Smith, J. 2013. Fukuoka Japanese *Wh* Prosody in Production and Perception. *Lingua* 124: 96–130.

Truckenbrodt, H. 1995. Phonological Phrases: Their Relation to Syntax, Focus and Prominence. Doctoral dissertation, MIT.

Venditti, J. 2005. The J_ToBI Model of Japanese Intonation. *Prosodic Typology*, ed. S. Jun, 172–200. Oxford: Oxford University Press.