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Pitch accent and tonal alignment in Kagoshima Japanese

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Abstract: While recent work has made it abundantly clear that the metrical foot is fundamental for any understanding of the accent pattern of Japanese and its dialects, other features of these pitch accent systems are directly linked to the constraints aligning tonal melodies with prosodic structure. This paper presents some results on the microvariation in the pitch accent systems of the dialects of Kagoshima Prefecture: the main Kagoshima City dialect, and the separate dialects of Koshikijima island and the southernmost Kikaijima island (Ryukyu archipelago). All these dialects, except for the Kagoshima City dialect, are in serious decline in terms of numbers of speakers. We show that the accentual microvariation in Kagoshima Japanese is due to a simple reranking of the basic constraints aligning the accentual melodies HL and H. The difference in tone-bearing unit between dialects (syllable- vs. mora-counting behavior), difficult to analyze as a parameter setting, follows from the ranking of constraints against tonal contours on moras and syllables.

Keywords: tone bearing unit, microvariation, syllable, mora, optimality theory

1 Introduction

In an important series of papers, Haruo Kubozono has established the fact that the bimoraic foot plays an irreducible role in explaining the accent pattern of Japanese and its dialects (Kubozono 1988, Kubozono 1989, Kubozono 1995, Kubozono 2009).¹

¹ We would like to thank the UC Santa Cruz Accent Project team members Nick Kalivoda and Jeff Adler for discussion, assistance, and collaboration in developing the OT analysis of the Kagoshima dialects. Their poster presentation on the factorial typology of pitch-accent alignment at the 2017 Japanese-Korean conference in Honolulu was of great help to us. We are also indebted to Haruo Kubozono and Larry Hyman and other participants of the conference for comments and discussion. Part of the research reported on here was supported by the NINJAL

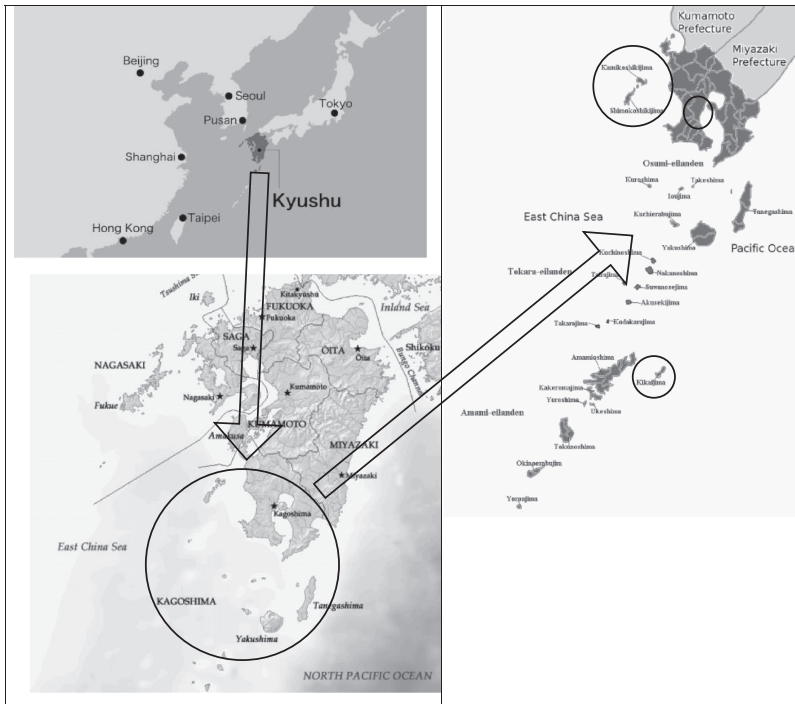
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Here we make a complementary point: Some features of pitch accent systems are irreducibly tonal in nature. They follow from the constraints dealing with the alignment of tonal melodies with prosodic structure.

Our case study focuses on the pitch accent systems of some of the dialects spoken in Kagoshima Prefecture located in Kyushu, Japan, generally called ‘Kagoshima Japanese’ in this paper (see the maps in (1)). All data and generalizations are taken from Kubozono’s work (Kubozono 2012, Kubozono 2016; etc.). We begin by laying out the basic facts found in the dialect of Kagoshima City (historically, Satsuma), and develop its basic analysis. We then turn to minimally different accent systems found in some of the dialects spoken on the islands west and south of the mainland of Kagoshima, and extend the analysis to capture the microvariation in these systems.

(1)²



collaborative research project *Cross-linguistic Studies of Japanese Prosody and Grammar*. Detailed comments and suggestions by Clemens Poppe, Jen Smith, and Yu Tanaka on an earlier version of this paper led to many improvements.

² Sources: <http://www.cruisetrain-sevenstars.com/wp-content/uploads/concept1-e1494301033914.jpg>, <https://upload.wikimedia.org/wikipedia/commons/4/4f/Kyushumap-en.png>, https://en.wikipedia.org/wiki/Satsunan_Islands

Different from Tokyo or Kansai Japanese, where the number of possible accentual patterns increases with the length of the word³ (“multi-pattern systems”, in the terminology of Uwano (1999)), the dialects of Kagoshima Japanese have only two patterns, regardless of the length of the word (“N-pattern systems”). The first is the HL pattern (also called “Type A”), which aligns a H(igh) L(ow) sequence with the end of the word, preceded by a sequence of L-toned syllables. The second is the H pattern (also called “Type B”) which consists in a final H tone, also preceded by L-toned syllables. Within the overall context of Japanese dialects, the HL pattern corresponds diachronically to what is called “accented” elsewhere (e.g. in Kansai or Tokyo Japanese), the H pattern to “unaccented” (Shibatani 1990, 181–184). For our purposes here, we follow the tonal analysis of Kubozono (2012) and simply take the two tonal melodies as lexically given. In a more general vein, we build on the well-known arguments of Poser (1984) and Pulleyblank (1986) against a diacritic representation of accent in Japanese and elsewhere and take its underlying representation to be strictly tonal (see also Pierrehumbert and Beckman (1988, 121–134) and Ito and Mester (2018) on the tonal structure of the Tokyo accent).

The two patterns are illustrated for the dialect spoken in and around Kagoshima City in (2) (examples from Kubozono 2012; here and throughout, we indicate H-toned moras by superscription). As the examples illustrate, the tones are in the general case aligned syllable-by-syllable in this dialect.

- | | | |
|-----|--|--|
| (2) | a. HL Pattern: #L ₀ ^H L# | b. H Pattern: #L ₀ ^H # |
| | a.me | a.me |
| | sa. ^{ka} .na | i.no. ^{chi} |
| | o. ^{na} .go | o.to. ^{ko} |
| | ke.da. ^{mo} .no | ni.wa.to. ^{ri} |
| | a.ma. ^{za} .ke | a.sa.ga. ^o |
| | na.tsu.ya. ^{su} .mi | ha.ru.ya.su. ^{mi} |
| | <i>candy</i> | <i>rain</i> |
| | <i>fish</i> | <i>life</i> |
| | <i>woman</i> | <i>man</i> |
| | <i>wild animal</i> | <i>chicken</i> |
| | <i>sweet rice wine</i> | <i>morning glory (flower)</i> |
| | <i>summer holiday</i> | <i>spring holiday</i> |

As further morphology gets added at the end of the word, the tones migrate rightwards, as shown in (3a,b).

³ Although lexical accent in Tokyo and Kansai Japanese can in principle fall on any syllable, accent location in words longer than 4 moras is mostly antepenultimate (McCawley 1977, see Ito and Mester 2016 for an OT analysis).

- | | | | |
|-----|----|---|--|
| (3) | a. | HL Pattern | Gloss |
| | | mi.ya. ^{za} .ki | <i>Miyazaki</i> |
| | | mi.ya.za. ^{ki} .ken | <i>Miyazaki prefecture</i> |
| | | mi.ya.za.ki. ^{ken} .min | <i>Miyazaki prefecture residents</i> |
| | | mi.ya.za.ki. ^{ken} .mo | <i>also Miyazaki prefecture</i> |
| | | mi.ya.za.ki.ken.min. ^{ka} .ra | <i>from Miyazaki prefecture</i> |
| | | mi.ya.za.ki.ken.min.ka. ^{ra} .mo | <i>also from Miyazaki prefecture residents</i> |
| | b. | H Pattern | |
| | | na.ga.sa. ^{ki} | <i>Nagasaki</i> |
| | | na.ga.sa.ki. ^{ken} | <i>Nagasaki prefecture</i> |
| | | na.ga.sa.ki.ken. ^{min} | <i>Nagasaki prefecture residents</i> |
| | | na.ga.sa.ki.ken. ^{mo} | <i>also Nagasaki prefecture</i> |
| | | na.ga.sa.ki.ken.min.ka. ^{ra} | <i>from Nagasaki prefecture residents</i> |
| | | na.ga.sa.ki.ken.min.ka.ra. ^{mo} | <i>also from Nagasaki prefecture residents</i> |

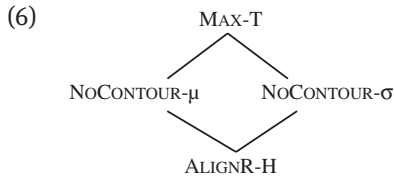
In monosyllabic words (4), we notice a different kind of alignment of the HL melody: Here both tones are realized on the single syllable, even when it is monomoraic (indicated by the notation k_i).

- | | | | | | |
|-----|----|-------------------------|-----------------|---------------------------------------|----------------------|
| (4) | HL | <u>.^{sa}n.</u> | <i>three</i> | <u>.^{san}.mo.</u> | <i>also three</i> |
| | | <u>.^{ki}.</u> | <i>spirit</i> | <u>.^{ki}.mo.</u> | <i>also spirit</i> |
| | H | <u>.^{sen}.</u> | <i>thousand</i> | <u>.^{sen}.^{mo}.</u> | <i>also thousand</i> |
| | | <u>.^{ki}.</u> | <i>tree</i> | <u>.^{ki}.^{mo}.</u> | <i>also tree</i> |

2 Basic analysis of Kagoshima City accent

The basic analysis of Kagoshima City accent is straightforward: it needs to accomplish a rightward alignment of the tonal melody. Associating more than one tone to a mora or a syllable is avoided, but not at the price of deleting a tone. These demands are expressed by the constraints in (5), which are ranked as in (6).

(5) MAX-TONE		If tone T is part of the input, T is part of the output.
NOCONTOUR- σ	* T ₁ T ₂ σ	A syllable (σ) does not carry more than one tone. One violation for every additional tone associated with σ .
NOCONTOUR- μ	* T ₁ T ₂ μ	A mora (μ) does not carry more than one tone. One violation for every additional tone associated with μ .
ALIGNRIGHT-HIGH ALIGN(H,R, ω ,R/ μ)		H is aligned with the right word edge. One violation for every μ intervening between the rightmost μ associated to H and the right edge of ω .



It will be convenient to assume that the tonal melodies are part of the input. Given the existence of the constraints against tonal contours on moras and syllables, it turns out that they already do most of the work traditionally assigned to a stipulation on representations allowing languages to differ in TBU (tone bearing unit, mora vs. syllable). Since a representational distinction between languages with moras and languages without moras has also been very much in doubt since the work of Gordon (2002) and others, familiar Occamite principles of rational inquiry compel us, unless other evidence for variation in TBU emerges, to adopt what appears to be the minimalist theory, viz., that tones are always associated to moras in outputs. Mora counting vs. syllable counting behavior then emerge from the grammar, in the form of different rankings of constraints on contours with respect to other constraints, not from representational differences in TBU.

With these basic prerequisites in place, the tableaux in (7) and (8) illustrate the gist of our analysis. In HL words like *miya^za^ki*, aligning H all the way to the right by deleting L is ruled out by MAX-T (7b), and associating both tones to the last syllable/mora by the NOCONTOUR constraints (7c). Modulo these factors, H is aligned as far to the right as possible, so (7a) beats (7d). We are assuming that the syllables preceding the H-toned syllable in a word, which are described as low, receive their pitch specifications in another way, e.g. by spreading from an initial %L boundary tone, or by phonetic interpolation between this boundary %L and the H peak. Only careful instrumental investigation will be able to tell which interpretation is the correct one.⁴

(7)

/miyazaki, HL/	Max -T	NoCont -H	NoCont -σ	AlignR -H
a. ► miya ^H zaki ^L				*
b. miyaza ^H ki [∅]	*!			
c. miyaza ^H ki ^L		*!	*!	
d. mi ^H ya ^L zaki				**!

When the word melody is the single tone H, this tone is aligned with the last syllable (8).

(8)

/nagasaki, H/	Max -T	NoCont -H	NoCont -σ	AlignR -H
► nagasa ^H ki				
naga ^H saki				*!

⁴ Thanks to Clemens Poppe for pointing us to the very interesting instrumental work on Kagoshima and other dialects by Ishihara (2012).

As further morphemes get added at the end, the tones “migrate” towards the right, as shown in (9). The syllable-counting pattern arises because the NOCONTOUR constraints dominate ALIGNRIGHT-H.

(9)

<i>/miyazaki-ken, HL/ Miyazaki prefecture</i>	Max -T	NoCont -μ	NoCont -σ	AlignR -H
$\begin{array}{c} \text{H L} \\ \quad \backslash \\ \blacktriangleright \text{miyaza} \text{ki} \text{ken} \end{array}$				**
$\begin{array}{c} \text{H } \emptyset \\ \\ \text{miyazakike}^n \end{array}$	*!			
$\begin{array}{c} \text{H L} \\ \backslash \quad / \\ \text{miyazakike}^n \end{array}$		*!	*!	
$\begin{array}{c} \text{H L} \\ \quad \\ \text{miyazaki} \text{ke}^n \end{array}$			*!	*

In monosyllabic words, as in (10) and (11), tonal faithfulness overrules the NOCONTOUR constraints, resulting in two tones crowded into one syllable, violating NOCONTOUR at the syllable level in (10) and both at the mora and syllable levels in (11).

(10)

<i>/san, HL/ three</i>	Max -T	NoCont -μ	NoCont -σ	AlignR -H
$\begin{array}{c} \text{H L} \\ \quad \\ \blacktriangleright \text{sa}^n \end{array}$			*	*
$\begin{array}{c} \text{H } \emptyset \\ \backslash \\ \text{san} \end{array}$	*!			

(11)

<i>/ki, HL/ spirit</i>	Max -T	NoCont -μ	NoCont -σ	AlignR -H
$\begin{array}{c} \text{H L} \\ \backslash \quad / \\ \blacktriangleright \text{k}^i \end{array}$		*	*	
$\begin{array}{c} \text{H } \emptyset \\ \\ \text{ki} \end{array}$	*!			

As seen in (11), the Kagoshima City dialect allows tonal contours both on bimoraic and on monomoraic monosyllables. We would not be surprised, however, if a

dialect turned up where contours can only occur on bimoraic monosyllables: This kind of behavior is well-known from the typology of stress, where a significant number of languages have quantity-insensitive stress (“syllable-counting”) but still allow monosyllabic words, with the added restriction that such monosyllables have to have two moras (“mora-counting”). This rhythmic type is known as the “generalized trochee” (Kager 1992; Hayes 1995). A simple bifurcation of languages into syllable-counting and mora-counting, as proposed by Trubetzkoy (1939) and applied to Japanese by Sibata (1961), is therefore valid only as a first approximation. In fact, Kubozono (2018) shows that the Kagoshima City dialect with its quantity-insensitive pitch accent system is in other respects thoroughly quantity-sensitive.

In single-toned monosyllabic words, the NOCONTOUR constraints are not violated since only one lexical tone H needs to be mapped, as shown in (12) and (13).

(12)

<i>/sen, H⁵/</i> <i>thousand</i>	Max -T	NoCont -H	NoCont -σ	AlignR -H
\blacktriangleright $\begin{array}{c} \text{H} \\ \diagdown \\ \text{sen} \end{array}$				
$\begin{array}{c} \text{H} \\ \\ \text{se}_n \end{array}$				*!

(13)

<i>/ki, HL/</i> <i>spirit</i>	Max -T	NoCont -H	NoCont -σ	AlignR -H
\blacktriangleright $\begin{array}{c} \text{H L} \\ \diagdown \diagup \\ \text{k}_i \end{array}$		*	*	
$\begin{array}{c} \text{H } \emptyset \\ \\ \text{ki} \end{array}$	*!			

3 Microvariation in Kagoshima dialects

On the islands off the Kagoshima coast we encounter a dialect continuum with a large number of local varieties, most of them highly endangered. Some of these have been described in recent work by Kubozono, but the literature goes back several decades. They are broadly very similar to the Kagoshima City dialect, but differ in interesting ways that will allow us to extend and sharpen our analysis.

5 We will see later that another candidate, *seⁿ*, is ruled out in the full analysis by a constraint requiring H to be linked to the head mora of a syllable.

We begin by juxtaposing Kagoshima City forms of HL and H words with their counterparts in the dialect of Kikaijima in the South, a Ryukyuan language, and in the dialect spoken on Koshikijima in the West.

(14) HL# (Type A)

Kagoshima City dialect	Kikaijima dialect	Koshikijima dialect	Gloss
a.me	a.me	a.me	<i>candy</i>
o. ^{to} .ko	o. ^{to} .ko	o. ^{to} .ko	<i>man</i>
pe.kin	pe.ki _n	pe.ki _n	<i>Beijing</i>
ha.wai	ha.wai	ha.wai	<i>Hawaii</i>
in.do	i ⁿ .do	i ⁿ .do	<i>India</i>
mi.ya.za.ki	mi.ya.za.ki	mi.ya.za.ki	<i>Miyazaki</i>
mi.ya.za.ki.ken	mi.ya.za.ki.ke _n	mi.ya.za.ki.ke _n	<i>Miyazaki prefecture</i>
mi.ya.za.ki.ken.min	mi.ya.za.ki.ken.mi _n	mi.ya.za.ki.ken.mi _n	<i>Miyazaki pref. residents</i>
mi.ya.za.ki.ken.mo	mi.ya.za.ki.ke ⁿ .mo	mi.ya.za.ki.ke _n .mo	<i>also Miyazaki pref. residents</i>

(15) H# (Type B):

Kagoshima City dialect	Kikaijima dialect	Koshikijima dialect	
a.me	a.me	a.me	<i>rain</i>
i.no.chi	i.no.chi	i.no.chi	<i>life</i>
ni.hon	ni.ho ⁿ	ni.ho ⁿ	<i>Japan</i>
na.ga.sa.ki	na.ga.sa.ki	na.ga.sa.ki	<i>Nagasaki</i>
na.ga.sa.ki.ken	na.ga.sa.ki.ke _n	na.ga.sa.ki.ke _n	<i>Nagasaki prefecture</i>
na.ga.sa.ki.ken.min	na.ga.sa.ki.ken.mi _n	na.ga.sa.ki.ken.mi _n	<i>Nagasaki pref. residents</i>
na.ga.sa.ki.ken.min.mo	na.ga.sa.ki.ken.mi _n .mo	na.ga.sa.ki.ken.min.mo	<i>also Nagasaki pref. residents</i>

There are two main differences between the Kagoshima City dialect and the two island dialects. First, whereas Kagoshima City is, roughly speaking, syllable counting, the island dialects are mora-counting (*pekin* vs. *pe^ki_n*, etc.). We will closely scrutinize these patterns, and provide an analysis. Second, whereas in Kagoshima City words begin with a stretch of L-toned material leading up to the accented H-toned syllable, in the island dialects the leading string of syllables is H-toned, leaving a buffer—one L-toned mora/syllable, with some complications—before the accentual H. In (14) and (15), we indicate this stretch of high pitch by superscription. We can understand this as a %H initial boundary tone, spread to the right by ALIGNRIGHT-H, which is dominated by the OCP (Obligatory Contour Principle), preventing the leading H from becoming fully adjacent to the accentual

H. In order to focus on what all the dialects have in common, we abstract away from this initial stretch of high pitch characteristic of the island dialects.

What does it mean for a language to be syllable-counting? Does it mean that phonological representations in this language have only syllables, and no moras? The same question needs to be answered for mora-counting behavior: Does it mean there are only moras, no syllables—a reasonable question in light of recent arguments against the syllable in Japanese in Labrune (2012) (but see also Kubozono 2003, and the counterarguments in Kawahara 2016)? And would only a language with mixed behavior have both syllables and moras? Given the results of cross-linguistic work on the typology of syllable weight, such ideas are unlikely to match phonological reality, where uniform weight criteria across whole languages are rather the exception, and by no means the rule (see Gordon 2002 and work cited there).

In (16), we compare the tonal patterns for monosyllabic words in the three dialects. In HL-words consisting of a bimoraic syllable (16a), all dialects show a falling pitch pattern, with each tone associated to a mora. In HL-words consisting of a monomoraic syllable (16b), Kagoshima City associates both tones to this mora, resulting in a falling pattern on a single mora, whereas Kikaijima and Koshikijima delete the L tone. H-words consisting of a bimoraic syllable (16c) have an H associated to both moras in Kagoshima City, whereas in Kikaijima and Koshikijima the H associates to the second mora exclusively. Finally, H-words consisting of a monomoraic syllable (16d) associate H to this single mora in all three dialects.






(16)	Kagoshima City dialect	Kikaijima Dialect ⁶	Koshikijima dialect	Gloss
a. HL#	sa _n	sa _n	sa _n	<i>three</i>
b.	k _l	ki	ki	<i>spirit</i>
c. H#	sen	se ⁿ	se ⁿ	<i>thousand</i>
d.	ki	ki	ki	<i>tree</i>

In (5) we have already encountered the constraints that regulate the association of tones to prosodic structure, viz., NOCONTOUR- μ and NOCONTOUR- σ . We assume that, unless proven otherwise, the universal (or at least unmarked) tone-bearing unit is the mora. In situations where only one tone can appear in the domain of a syllable, this is so because the constraint NOCONTOUR- σ is active, not because tones literally associate to syllables. The basic analysis of the Kagoshima City

⁶ There are further sonority restrictions in Kikaijima that we are not dealing with here. Thus, according to Uwano (2016), moraic nasals are tone-bearers, but not moraic geminates.

dialect in Section 2 rested on these two constraints, complemented by MAX-TONE and ALIGNRIGHT-H (see (5)–(13)). We now introduce three more constraints, FINAL-T, NOMULTILINK-H, and H-TO-HEAD, assembling the whole analysis in (17).

(17) List of all constraints in our analysis

MAX-TONE		If tone T is part of the input, T is part of the output.
NOCONTOUR- σ	* T ₁ T ₂  σ	A syllable is not associated with more than one tone. One violation for every additional tone associated with σ .
NOCONTOUR- μ	* T ₁ T ₂  μ	A mora is not associated with more than one tone. One violation for every additional tone associated with μ .
ALIGNRIGHT-HIGH ALIGN(H,R, ω ,R/ μ)		Align H tone to the right word edge. One violation for every μ intervening between the rightmost μ associated to H and the right edge of ω .
FINAL-T	* T  μ ω	The word-final mora is marked by a tone. One violation for every word-final μ not linked to a tone.
H-TO-HEAD	* H  $[\mu \dots]_{\sigma}$	H is associated to a syllable head. One violation for every H not linked to the head (first) μ of a syllable.
NOMULTILINK-H	* H  $\mu \mu$	H is associated to no more than one μ . One violation for every additional μ associated to H.

FINAL-T can be more formally stated as ALIGN(ω ,R,T,R/ μ), which should be compared to ALIGNRIGHT-HIGH = ALIGN(H,R, ω ,R, μ). Whereas ALIGNR-H is aligning upwards and gradiently violable in ω , FINAL-T is aligning downwards and categorical in any single ω . Such pairs of corresponding upward/downward aligning constraints on edges are a characteristic feature of classical Alignment Theory (McCarthy and Prince 1993), compare FOOT-TO- ω alignment (ALL-FT-RIGHT/LEFT) vs. ω -TO-FOOT alignment (INITIAL/FINAL-Ft).

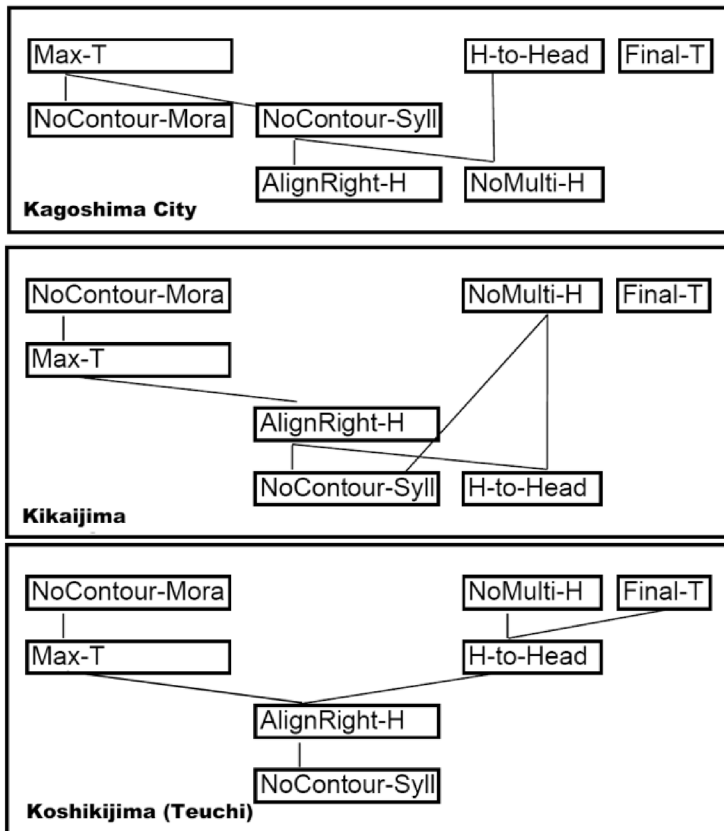
The constraint NOMULTILINK-H ensures that the accentual H is a peak and not a plateau and also plays a role in other pitch accent systems, such as that of Classical Greek (Ito and Mester 2017). It does not apply to the leading boundary %H, which spreads in the island dialects (see the discussion above). H-TO-HEAD is the constraint, familiar from Tokyo Japanese (McCawley 1968), requiring H to be licensed by the head mora of the syllable.

Constraints that do not play a role in the current analysis—for example, other standard faithfulness constraint such as DEP-T (see Alderete 1999) or NOMULTILINK-L—are not included in the constraint system since our goal is to explore the typology of the overall system, and for this purpose it is essential to reduce the constraint set to its minimum size. We probed our analysis of the Kagoshima

microvariation with OTWorkplace (Prince et al. 2015) in order to investigate the precise nature of the proposed constraints, to verify their crucial rankings and non-rankings, and to study the whole class of languages predicted when all possible rankings of the constraints are considered (known in OT as “factorial typology”).⁷

With the seven tonal constraints in (17), and relevant candidate sets of words of different prosodic profiles, our analysis predicts, as ascertained by means of OTWorkplace, 53 distinct languages, three of which are the dialects of Kagoshima City, Kikaijima, and Koshikijima.

(18)



⁷ In the words of its creators, “OTWorkplace is a software suite which uses Excel as a platform for interactive research with the analytical tools of modern rigorous OT”. The program is open-source and distributed without charge, downloadable from <https://sites.google.com/site/otworkplace/>. We would like to thank Alan Prince and Naz Merchant for help with the OTWorkplace analysis.

Abstracting away from the leading H in the island dialects (henceforth, it is not indicated in examples), all three dialects have the same outcome in words ending in two light syllables, as in (19).

(19)	Kagoshima City dialect	Kikaijima dialect	Koshikijima dialect
	mi.ya. ^{Za} .ki	mi.ya. ^{Za} .ki	mi.ya. ^{Za} .ki
	na.ga.sa.ki	na.ga.sa.ki	na.ga.sa.ki

The reason is that all three dialects share the ranking in (20), so tones and moras will line up in a right-to-left one-to-one fashion.

(20) MAX-T >> ALIGNRIGHT-H

In (21)–(23), we show, with examples, that this ranking obtains in the grammars of all three dialects. So, for the inputs /miyazaki, HL/ and /nagasaki, H/, there is no variation across the dialects.

(21) [Kagoshima City]

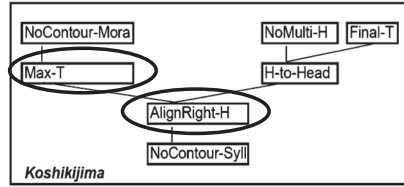
	Final-T	Max-T	NoCont-μ	NoCont-σ	AlignR-H	H-to-Head	NoMulti-H
/miyazaki, HL/							
▶ miya ^{Za} ki					*		
miyaza ^{ki}	*!						
mi ^Y a ^{Za} ki	*!				**		
/nagasaki, H/							
▶ nagasa ^{ki}							
naga ^{Sa} ki	*!				*		

(22) [Kikaijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	AlignR-H	H-to-Head	NoCont-σ
/miyazaki, HL/							
▶ miya ^{Za} ki					*		
miyaza ^{ki}				*!			
mi ^Y a ^{Za} ki	*!				**		
/nagasaki, H/							
▶ nagasa ^{ki}							
naga ^{Sa} ki	*!				*		

(23) [Koshikijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	H-to-Head	AlignR-H	NoCont-σ
/miyazaki, HL/							
▶ miyazaki						*	
miyazaki				*!			
miYa ^a zaki		*!				**	
/nagasaki, H/							
▶ nagasaki							
naga ^a saki	*!					*	



When we turn to polysyllabic words ending in a heavy syllable, a basic difference emerges: the tones (HL or H) map syllable-by-syllable in Kagoshima City, but mora-by-mora in the two island dialects (24). This is because NOCONTOUR-σ is active in Kagoshima City, but inactive in Kikaijima and Koshikijima, where it is dominated by ALIGNRIGHT-H. This makes the Kagoshima City dialect a “syllable” and not a “mora” dialect.

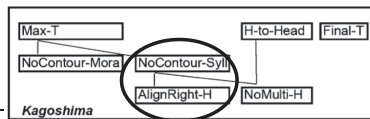
(24)

	Kagoshima City dialect	Kikaijima dialect	Koshikijima dialect
a. HL	mi.ya.za.ki.ke _n	mi.ya.za.ki.ke _n	mi.ya.za.ki.ke _n
b.	mi.ya.za.ki.ke _n .mi _n	mi.ya.za.ki.ke _n .mi _n	mi.ya.za.ki.ke _n .mi _n
c. H	na.ga.sa.ki.ke _n	na.ga.sa.ki.ke ⁿ	na.ga.sa.ki.ke ⁿ
d.	na.ga.sa.ki.ke _n .mi _n	na.ga.sa.ki.ke _n .mi ⁿ	na.ga.sa.ki.ke _n .mi ⁿ
	NOCONTOUR-σ >> ALIGNRIGHT-H	ALIGNRIGHT-H >> NOCONTOUR-σ	

The different outcomes are shown in tableaux (25)-(26), where we contrast Kagoshima City with Koshikijima (which shows the same behavior as Kikaijima).

(25) [Kagoshima City]

	Final-T	H-to-Head	Max-T	NoCont-μ	NoCont-σ	AlignR-H	NoMulti-H
/miyazaki-ken, HL/ Miyazaki prefecture							
▶ miyazaki ^k ken					**	**	
miyazaki ^k e _n					*!	*	
/miyazaki-ken-min, HL/ Miyazaki pref. residents							
▶ miyazaki ^k e _n mi _n					**	*	*
miyazakiken ^m i _n					*!	*	



(26) [Koshikijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	H-to-Head	AlignR-H	NoCont-σ
/miyazaki-ken, HL/ <i>Miyazaki prefecture</i>							
miyazaki ^k ken						**!	
▶ miyazaki ^k en						*	*
/miyazaki-ken-min, HL/ <i>Miyazaki pref. residents</i>							
miyazaki ^k en ^{mi} n	*!					**	
▶ miyazakiken ^{mi} n						*	*

But Kikaijima and Koshikijima are not alike in every respect. An important difference is that H-TO-HEAD is inactive in Kikaijima (dominated by ALIGNRIGHT-H), but active in Koshikijima. This leads to differences in HL-words with a heavy penult and a light ultima, as in (27d). Here Kikaijima, but not Koshikijima, shifts the H to the head (first) mora of the penult, as shown in the tableaux in (28)-(29).⁸

(27)

	Kikaijima dialect	Koshikijima dialect
a.	mi.ya. ^z a.ki	mi.ya. ^z a.ki
b.	mi.ya.za.ki. ^k en	mi.ya.za.ki. ^k en
c.	mi.ya.za.ki.ken. ^{mi} n	mi.ya.za.ki.ken. ^{mi} n
d.	mi.ya.za.ki.ke ⁿ .mo	mi.ya.za.ki. ^k en.mo
	ALIGNRIGHT-H >> H-TO-HEAD	H-TO-HEAD >> ALIGNRIGHT-H

(28) [Kikaijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	AlignR-H	H-to-Head	NoCont-σ
/miyazakiken-mo, HL/ <i>also Miyazaki prefecture</i>							
miyazaki ^k en ^{mi} mo	*!				*		
▶ miyazakike ⁿ mo					*	*	*
Miyazaki ^k en ^{mi} mo ⁹					**!		*

⁸ This contrast does not arise in H-words with a final heavy syllable due to the action of another constraint, see (36)–(38) below.

⁹ The candidate *miyazaki^ken^{mi}mo* does not violate FINAL-T, because the final L has spread to the last syllable *mo*. Constraints, such as NO-MULTI-L, against spreading L-tones, are not active in these systems. An alternative candidate without spreading and lacking any tone on the last syllable *mo* would violate FINAL-T and lose to the candidate with spreading.

(29) [Koshikijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	H-to-Head	AlignR-H	NoCont-σ
/miyazakiken-mo, HL/ also Miyazaki prefecture							
miyazakikenmo	*						
miyazakike ⁿ mo					*!	*	*
▶ miyazakike ⁿ mo					**!	**	*

Koshikijima (Teuchi)

Another property setting Kikaijima and Koshikijima apart from Kagoshima City is that NOMULTILINK-H is active in the former, but inactive in the latter. This also contributes to making the Kagoshima City dialect a syllable counter, and we find the three different outcomes in (30)–(32).

(30) [Kikaijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	AlignR-H	H-to-Head	NoCont-σ
/miyazakiken-mo, HL/ also Miyazaki prefecture							
miyazakikenmo	*!				*		
▶ miyazakike ⁿ mo					*	*	*
miyazakike ⁿ mo					**!	**	*

Kikaijima

(31) [Koshikijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	H-to-Head	AlignR-H	NoCont-σ
/miyazakiken-mo, HL/ also Miyazaki prefecture							
miyazakikenmo	*!				*		
miyazakike ⁿ mo					*!	*	*
▶ miyazakike ⁿ mo					**!	**	*

Koshikijima (Teuchi)

(32) [Kagoshima City]

	Final-T	H-to-Head	Max-T	NoCont-μ	NoCont-σ	AlignR-H	NoMulti-H
/miyazakiken-mo, HL/ also Miyazaki prefecture							
▶ miyazakikenmo						*	*
miyazakike ⁿ mo	*!				*	*	*
miyazakike ⁿ mo					*!	**	*

Kagoshima City

It is also instructive to compare the dialects in terms of the tonal patterns assigned to short words. Here, all of a sudden, the syllable-counting Kagoshima City dialect crams the two tones H and L into the single mora *k_i*, whereas the other two dialects delete the L (33) and do not show a fall on the single mora. This is due to the fact that NOCONTOUR-μ is active in Kikaijima and Koshikijima, but inactive in Kagoshima City, where it is dominated by MAX-T.

(33)

	Kagoshima City dialect	Kikaijima dialect	Koshikijima dialect	Gloss
#HL#	sa _n	sa _n	sa _n	<i>three</i>
	k _i	ki	ki	<i>spirit</i>
#H#	sen	se ⁿ	se ⁿ	<i>thousand</i>
	ki	ki	ki	<i>tree</i>
	MAX-T >> NOCONTOUR-μ	NOCONTOUR-μ >> MAX-T		

In (34)-(35), we show contrasting tableaux for Kagoshima City and Kikaijima.

(34) [Kagoshima City]

	Final-T	H-to-Head	Max-T	NoCont-μ	NoCont-σ	AlignR-H	NoMulti-H
/san, HL/ <i>three</i>							
▶ sa _n				*	*		
san			*!				*
/ki, HL/ <i>spirit</i>							
▶ k _i				*	*		
ki			*!				

(35) [Kikaijima]

	NoMulti-H	Final-T	NoCont-μ	Max-T	AlignR-H	H-to-Head	NoCont-σ
/san, HL/ <i>three</i>							
▶ sa _n				*	*		*
san	*!		*				
/ki, HL/ <i>spirit</i>							
k _i			*!				*
▶ ki			*				

In all three dialects, FINAL-T is undominated. Consequently, in H-words ending in a heavy syllable, H always has a link to the final mora, irrespective of whether it is also linked to the prefinal mora, as in Kagoshima City (36), or not, as in Kikaijima (37) and Koshikijima (38).

(36)	[Kagoshima City]	Final-T	H-to-Head	Max-T	NoCont-μ	NoCont-σ	AlignR-H	NoMulti-H	
	/sen, H/ thousand								Kagoshima City
	▶ sen							*	
(37)	Se _n ¹⁰	*				*	*		
	se ⁿ	*!				*			

	[Kikaijima]	NoMulti-H	Final-T	NoCont-μ	Max-T	AlignR-H	H-to-Head	NoCont-σ	
	/sen, H/ thousand								Kikaijima
	sen	*!							
(38)	se _n		*			*	*	*	
	▶ se ⁿ					*	*	*	

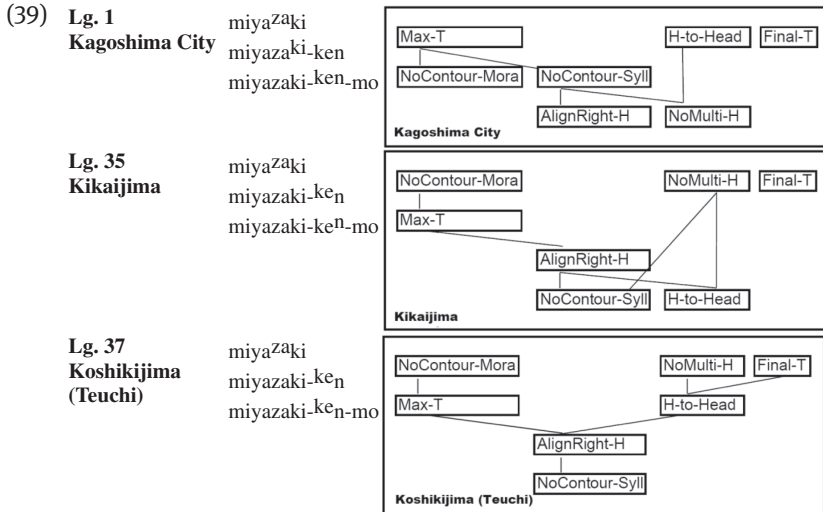
	[Koshikijima]	NoMulti-H	Final-T	NoCont-μ	Max-T	H-to-Head	AlignR-H	NoCont-σ	
	/sen, H/ thousand								Koshikijima (Teuchi)
	sen	*!							
	se _n		*!			*	*	*	
	▶ se ⁿ					*	*	*	

Especially interesting here are the facts in Koshikijima: We saw earlier in (29) that within a heavy penult the H shifts from a penultimate non-head mora to the preceding head mora, yielding *miyazaki^{ke}nmo* instead of *miyazakikeⁿmo*, the corresponding form in Kikaijima (28). This happens because H-TO-HEAD ≫ ALIGNRIGHT-H in Koshikijima, but not in Kikaijima. But FINAL-T dominates H-TO-HEAD in Koshikijima, as does NOMULTILINK-H, which means that in

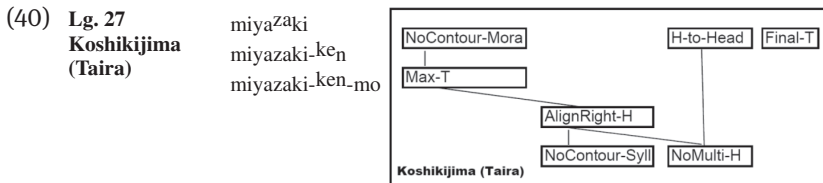
10 A reviewer points out that an alternative candidate with a final inserted L would be the winner without a high-ranking DEP-T constraint. Since none of the known dialects resort to insertion of tones, these candidates are not included.

final syllables shifting the H is not an option, and neither is spreading. As they say, the Lord of OT is subtle, but not mean.

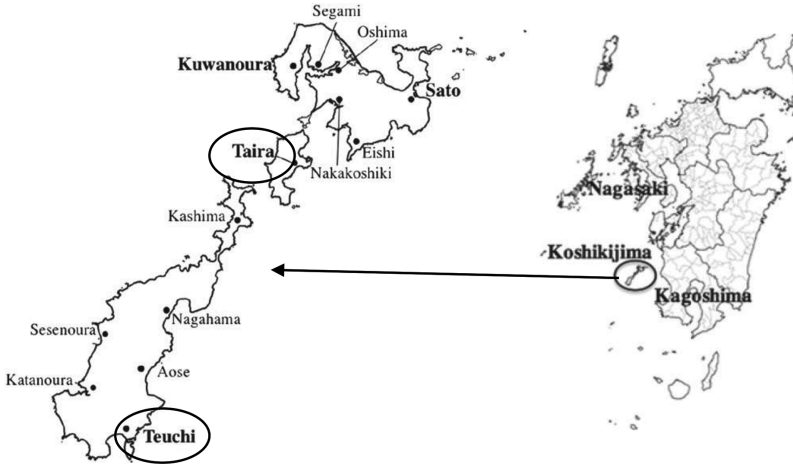
We have so far seen the grammars of three related dialects, as shown in (39), with some illustrative examples.



The factorial typology produced by the constraint system consists of 53 languages, most of which are unattested (or at least so far undescribed, as far as we know). This is as expected, since this is a typology of possible, not of actual languages. One of these additional languages is Lg. 27, with the grammar in (40). We interpret it as strong support for our approach that Lg. 27 in fact exists, it is another dialect spoken on the Koshikijima islands, that of Taira (the Koshikijima dialect seen so far is the one of Teuchi). The geographic location of the two dialects can be seen in map (41) (from Kubozono 2016, the source of this data).



(41)



The difference between the two Koshikijima dialects is that whereas the Teuchi dialect, under the pressure of H-TO-HEAD, shifts the H tone within the penult from *n* to *ke* in *miyazaki.keⁿ-mo*, the Taira dialect spreads it (*miyazaki.keⁿ-mo*). In both dialects, H-TO-HEAD is active. In Teuchi, NOMULTILINK-H dominates ALIGNR-H and NOCONTOUR-σ (42). In Taira, ALIGNRIGHT-H dominates NOCONTOUR-σ and NOMULTILINK-H (43).

(42)

[Koshikijima Teuchi] <i>/miyazakiken-mo, HL/ also Miyazaki prefecture</i>	NoMulti-H	H-to-Head	AlignR-H	NoCont-σ
miyazaki ^{keⁿ} mo	*!		*	
miyazaki ^{keⁿ} mo		*!	*	*
► miyazaki ^{keⁿ} mo			**	*

Koshikijima (Teuchi)

(43)

[Koshikijima Taira] <i>/miyazakiken-mo, HL also Miyazaki prefecture</i>	AlignR-H	NoCont-σ	H-to-Head	NoMulti-H
► miyazaki ^{keⁿ} mo	*			*
miyazaki ^{keⁿ} mo	*	*	*!	
miyazaki ^{keⁿ} mo	**!	*		

Koshikijima (Taira)

There are of course other languages in the typology that share properties with the four discussed so far, we show some of them with illustrative examples in

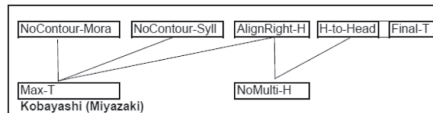
(44) (H tone is here indicated by capitalization). As can be seen, these differ in small ways from the known dialects. For example, Lg#2 is like the Kagoshima City dialect except that it does not allow a HL-melody on a monomoraic word, and instead deletes the L tone (since NOCONTOUR-M dominates MAX-T).

(44)

Inputs- >	/miyazaki, HL/	/nagasaki, H/	/miyazaki-ken, HL/	/miyazaki-ken-min, HL/	/san, HL/	/sen, H/	/miyazaki-ken-mo, HL/	/ki, HL/ spirit	/ki, H/ tree	
Lg#1	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	'SA-n	'SEN	miyazaki-KEN-mo	'KI-	'KI-	Kagoshima City
Lg#2	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	'SA-n	'SEN	miyazaki-KEN-mo	'KI-	'KI-	
Lg#3	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	'SA-n	se-N	miyazaki-KEN-mo	'KI-	'KI-	
Lg#4	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	'SA-n	se-N	miyazaki-KEN-mo	'KI-	'KI-	
Lg#5	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	'SAN	'SEN	miyazaki-KEN-mo	'KI-	'KI-	
Lg#6	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	'SAN	'SEN	miyazaki-ken-MO	'KI-	'KI-	
Lg#8	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	sa-Nn	'SEN	miyazaki-KEN-mo	'KI-	'KI-	
Lg#9	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-KEN-min	sa-Nn	se-N	miyazaki-KEN-mo	'KI-	'KI-	
Lg#10	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-KE-nmo	'KI-	'KI-	
Lg#11	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-KE-nmo	'KI-	'KI-	
Lg#12	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-ken-MO	'KI-	'KI-	
Lg#18	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-n-mo	'KI-	'KI-	
Lg#19	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-n-mo	'KI-	'KI-	
Lg#20	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-nmo	'KI-	'KI-	
Lg#21	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-nmo	'KI-	'KI-	
Lg#22	miya-ZA-ki	nagasa-KI	miyaza-KI-ken	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-ken-MO	'KI-	'KI-	
Lg#26	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-KEN-mo	'KI-	'KI-	
Lg#27	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-KE-nmo	'KI-	'KI-	Taira
Lg#28	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-KE-nmo	'KI-	'KI-	
Lg#29	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	'SEN	miyazaki-KE-nmo	'KI-	'KI-	
Lg#32	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KEN-mo	'KI-	'KI-	
Lg#33	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-nmo	'KI-	'KI-	
Lg#34	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-n-mo	'KI-	'KI-	
Lg#35	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-n-mo	'KI-	'KI-	Kikajima
Lg#36	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-nmo	'KI-	'KI-	
Lg#37	miya-ZA-ki	nagasa-KI	miyazaki-KE-n	miyazaki-ken-MI-n	'SA-n	se-N	miyazaki-KE-nmo	'KI-	'KI-	Teuchi

Another language in the overall typology that actually exists is Lg. 53, with the grammar in (45). This is the more distantly related dialect of Kobayashi in Miyazaki Prefecture, which puts a high tone on the final syllable of every word.¹¹

- (45) Lg. 53 Kobayashi miyaza^{ki}
 (Miyazaki) miyazaki-ken
 miyazaki-ken-mo



¹¹ Since ALIGNRIGHT-HIGH>>MAX-TONE, the L of the HL melody will never be realized, and in the actual grammar of the dialect inputs will therefore never be specified for HL.

(46) Microvariation:

Lg. 1	Kagoshima City	miya ^z a _{ki}	miyaza ^{ki} -ken	miyazaki-ken-mo
Lg. 27	Taira Koshikijima	miya ^z a _{ki}	miyazaki-ke _n	miyazaki-ken-mo
Lg. 35	Teuchi Koshikijima	miya ^z a _{ki}	miyazaki-ke _n	miyazaki-ke _n -mo
Lg. 37	Kikaijima	miya ^z a _{ki}	miyazaki-ke _n	miyazaki-ke ⁿ -mo
Lg. 53	Kobayashi (Miyazaki)	miyaza ^{ki}	miyazaki-ken	miyazaki-ken-mo

This section has presented OT analyses of pitch-accent patterns in a series of closely related dialects, and investigated the factorial typology and the corresponding typological implications. The microvariation patterns are captured in a straightforward way by the interaction of a set of markedness and faithfulness constraints that are fairly uncontroversial and adopted in one way or another in previous work on tone. Future investigation may reveal that additional repair strategies are possible, which would expand the typology.¹²

4 Conclusion

This paper has focused on the basic autosegmental constraints governing accentual melodies: Tonal alignment (ALIGNRIGHT-H, FINAL-T), head licensing (H-TO-HEAD), culminativity/anti-spreading (NOMULTILINK-H), NOCONTOUR (syllable, mora), and tonal faithfulness (MAX-T).

The accentual microvariation in Kagoshima Japanese dialects discovered in recent work by Haruo Kubozono has revealed itself as due to a simple reranking of the basic constraints dealing with the alignment of the accentual melodies HL and H. Syllable and mora structures are the same in the dialect continuum—syllable- vs. mora-counting behavior is not a parameter setting, but follows from the ranking of constraints against tonal contours on moras and syllables. These constraints can be defeated by faithfulness, as seen in Kagoshima City monosyllabic words.

¹² For example, Jennifer Smith notes that adding DEP- μ allows for languages that lengthen monomoraic words with HL-melodies. In the same vein, Yu Tanaka further considers the interesting potential dialect that realizes /ki, HL/ as [ki:] with a long vowel but /ki, H/ as [ki] with a short vowel, with MAX-T and NOCONTOUR- μ outranking DEP- μ . No lengthening in /ki, H/ ensures that it is not simply a requirement on minimal word length. If such a dialect is found, it would serve as additional evidence for the constraint NOCONTOUR- μ .

Our goal here was to provide an analysis of the accentual melodies that these dialects have in common, and we abstracted away from the initial stretches of high pitch characteristic of the island dialects (as seen in (14) and (15)). The next stage of our exploration would be to investigate the properties of these initial stretches (prima facie involving an initial %H boundary tone, spreading, and OCP blocking), with the goal of providing an integrated analysis that combines the constraints of the accentual melodies proposed here, leading to a more sophisticated understanding of the typology of accentual systems.

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