Phase-based prosody: evidence from pitch-accent distribution in the Japanese verbal domain.

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Introduction. Research on the Japanese phonology/syntax interface has claimed that the CP phase coincides with a significant intonational boundary and have claimed that prosody is computed phase-by-phase (Ishihara 2003, 2004; Kitagawa 2005; Dobashi 2018; *cf.* Match Theory, Selkirk 2011 and Ito and Mester 2013). If CP receives a meaningful intonation contour, a natural question that arises is --- *what about other phases?* Within the framework of Distributed Morphology (Halle 1990; Halle and Marantz 1993; Embick and Noyer 2001), the present study proposes that (i) phase-based prosody also holds in the verbal domain; but (ii), in Tokyo Japanese, the phase domain is the sister node of T, not *v*; and (iii) the pitch-accent in this syntactic domain is modified by phonology and morphology, resulting in superficial complexity.

Data. In Tokyo Japanese, verbs have two different lexical accent patterns, as in (1), traditionally called *non-accented* ('ring' and 'become swollen') and *accented* ('become' and 'clear up'). While the existence/ absence of sentence final particles does not affect the pitch assignment, it is sensitive to other functional projections. First, tense markers affect the pattern in disyllabic verbs, as in (2); *ie.*, *ha.re-ta 'cleared up.'

(1) a. monosyllabic verbs — b. disyllabic verbs

na.r-u(-yo-ne-to)'ring-PRS(-PRT-PRT-C)' — ha.re.r-u(-yo-ne-to)'become swollen-PRS(-PRT-PRT-C)'

na.r-u(-yo-ne-to)'become-PRS(-PRT-PRT-C)' — ha.re.r-u(-yo-ne-to)'clear up-PRS(-PRT-PRT-C)'

(2) na.ʔ-ta(-yo-ne-to)'ring-PST(-PRT-PRT-C)' — ha.re-ta(-yo-ne-to)'become swollen-PST(-PRT-PRT-C)'

na.ʔ-ta(-yo-ne-to)'become-PST(-PRT-PRT-C)' — ha.re-ta(-yo-ne-to)'clear up-PST(-PRT-PRT-C)'

Second, when an auxiliary like 'finish' is attached to create a compound verb, the pitch contour is modified; there emerges a single [%LH…HL%] pitch contour. Besides, the lexical difference is neutralized:

(3) na.r-**i o.wa.**r-u 'ring-**finish**-PRS' — ha.re-**o.wa.r.**-u 'become swollen-**finish**-PRS'

na.r-**i o.wa.**r-u 'become-**finish**-PRS' — ha.re-**o.wa.**r-u 'clear up-**finish**-PRS'

Third, the negation marker *-anak/i* extends the pitch region. Unlike auxiliaries, it maintains the lexical contrast in pitch patterns, as in (4).

(4) na.r-a na.-k a.ʔ-ta 'ring-NEG-BE-PST' — ha.re-na.-k a.ʔ-ta 'become swollen-NEG-BE-PST'

na.r-a na -k a.ʔ-ta 'become-NEG-BE-PST' — ha.re-na -k a.ʔ-ta 'clear up-NEG-BE-PST'

Notice that, in (4), the negation marker is accompanied with do/be-support at T, namely *ar-* 'be' (*aʔ-* = an allomorph), which never gets a high-pitch contour. Unlike English, this do/be-support does not appear in the present tense (*na.r-a na.k a.r-u 'ring-NEG-BE-PRS'). As shown below, what is known as the present tense marker *-u* does not appear in the negative environment, nor does the do/be-support *ar-*.

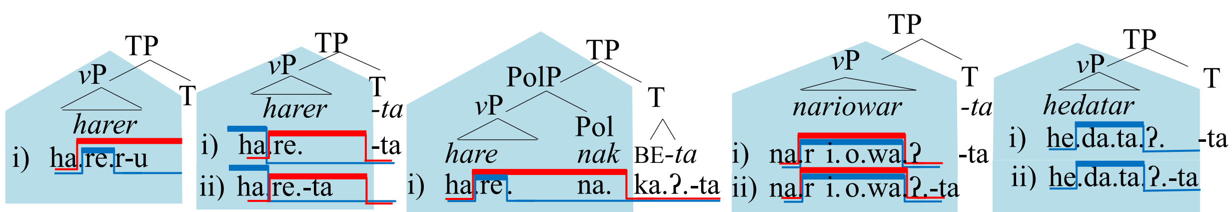
(5) na.r-a na.i 'ring-NEG-BE-PST' — ha.re-na.i 'become swollen-NEG-BE-PST'

na.r-a na.i 'become-NEG-BE-PST' — ha.re-na.i 'clear up-NEG-BE-PST'

Analysis. First, in Tokyo Japanese, there is a PF requirement that lexical phases need to be marked with a single intonation contour (SINGLE PITCH-CONTOUR HYPOTHESIS). There is some debate in the literature regarding which functional categories constitute phase heads (Chomsky 2000, 2001; Legate 2003, 2014; McGinnis 2005). As for Tokyo Japanese, I argue that the idea that the sister node of T counts as a relevant phase domain explains the pitch accent pattern. This hypothesis predicts that there should exist other phenomena that are associated with this domain. This prediction is, indeed, borne out by the fact that, unlike English, (i) ellipsis (*e.g.*, [$_{\text{TP}}$ [$_{\text{PolP}}$ ~~ik-imas-en~~] des-ita]-ne) and (ii) *soo* 'so'-replacement (*e.g.*, [$_{\text{TP}}$ [$_{\text{PolP}}$ soo] des-ita]-ne) target Pol(arity)P rather than *v*P.

Second, although an approximate pitch-contour domain is determined by the Spell-Out domain, the final decision of the shape of the pitch-contour is subject to interactions among morpho-phonological constraints/operations in two steps, as illustrated in (6) (Trommer 2001; Wolf 2008; Sande 2017).

(6) a. (= (1)) b. (= (2)) c. (= (4)) d. (= (3)) e.



(Step i) The phonological constraints in the tableau below reflect the PF-requirement of the Single-pitch Contour Hypothesis; *cf*. the tableau focuses on how the pitch is assigned for simplicity sake, though, in this step, other phonological constraints are assumed as well (*e.g.*, to determine the allomorphs). Generally, the constraints are about the pitch of the edge of the phase domain, as in (7), which says that HL/LH pitch contour should appear *inside* the domain (the same constraints are assumed for a more specific environment, *i.e.*, the compound). In addition, unaccented verbs (*e.g.*, *hare-* 'become swollen') have a lexical requirement that H L pitch sequence should *sandwich* the phase boundary, as in (8).

(7) General constraints: a. [$_{\text{phase domain}}$ …. H L] b. [L H … $_{\text{phase domain}}$]

(8) Lexical requirement: [$_{\text{phase domain}}$ …. H] L

	Anti-homophony	Indent-IO	(7) b	(7) a
[ha.re.r-u] 'become swollen-PRS'		*!	*	*
[ha.re.r-u] 'become swollen-PRS'		*!		
☞ [ha.re.r-u] 'become swollen-PRS'			*	
[ha.re.r-u] 'clear up-PRS'			*	*
☞ [ha.re.r-u] 'clear up-PRS'				
[ha.re.r-u] 'clear up-PRS'	*!		*	
[ha.re]-ta 'become swollen-PST'		*!		*
☞ [ha.re]-ta 'become swollen-PST' †			*	

	(7)a for compounds	(7)b for compounds	Anti-homophony	Indent-IO	(7) b	(7) a
☞ [ha.re]-ta 'clear up-PST'						*
[ha.re]-ta 'clear up-PST'			*!		*	
☞ [ha.re -na]-ka.ʔ.-ta 'clear up-NEG-be-PST'						
☞ [ha.re -na]-ka.ʔ.-ta 'become swollen-NEG-be-PST'						*
☞ [na.ri.o.wa.ʔ.]-ta 'ring/become-finish-PST' †				(*)		
[na.ri.o.wa.ʔ.]-ta 'ring/become-finish-PST'	*!		*	(*)		
☞ [na.ku.na.ʔ.]-ta 'pass away-PST' †						*
☞ [he.da.ta.ʔ.]-ta 'become distant-PST' †						

An Input-Output Identity constraint (Prince and Smolensky 1993) ensures that roots with lexically assigned accent retain their input accent pattern (for anti-homophony, see, *e.g.*, Ichimura 2006). The lexical contrast in the compound is ignored because of the high priority of the creation of [%LH···HL%] contour in the compound, resulting in the neutralization in (6)d. As for non-compound trisyllabic verbs, this model predicts, for example, he.da.ta.ʔ.-ta 'became distant' (accented) and na.ku.na.ʔ.ta 'passed away' (non-accented), as in (6)e, which is exactly how they are pronounced. **(Step ii)** The past-tense affix without do-support (*e.g.*, those with † in the tableau) needs to be lowered to *v* and enter the blue-colored region, as in (6)b and d. Since the pitch-contour is already created in (Step i), this results in ha.re-ta 'became swollen,' not *ha.re-ta. When we have a negation and thus do-support in the narrow syntax (Embick and Noyer 2001), the lowering does not happen as in (6)c. The present tense does not have a tense morpheme, so neither do-support nor lowering take place, resulting in the difference in pitch contour between (6)a and (6)b.

Implications. Three implications are in order. First, the idea of phase-oriented prosodic domain is empirically extended outside the C region, as argued previously. Second, the study predicts a typology between *v*-as-the-phase-head languages and T-as-the-phase-head languages, which should correlate with the prosodic domain formation and the ellipsis/replacement pattern. Finally, the phonological operations are applied much earlier than are traditionally assumed, or at least in parallel with morphological processes (Step i, *i.e.*, the phonological stage, is followed by a morphological lowering in Step ii), contributing to a growing body of literature with similar conclusions (Trommer 2001; Richards 2017; Rolle, manuscript).

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