Spelling-Out Inverse Scope in Japanese: Intonation and Scope-Prosody Correspondence

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1. Scope Rigidity, Inverse Scope and Rise-Fall Intonation in Japanese

It is widely acknowledged in the literature (Kuroda 1970; Hoji 1985) that Japanese is a surface scope-rigid language, i.e., a language which reflects relative scope between a pair of quantifiers through their relative structural order in surface structure. As first pointed out by Kitagawa (1994:228–229) and later discussed by Watanabe (2000), however, this characterization is a gross over-simplification, since the rigidity-sensitive scope calculation is known to be readily overridden by prosodic manipulations. To illustrate Kitagawa's/Watanabe's observation, consider examples in (1a–c) and (2a, b).

(1) a. Dareka-ga daremo-o damasita. (∃ » ∀, ?*∀ » ∃)
someone-NOM everyone-ACC deceived
'Someone deceived everyone.'

b. Daremo-o$_i$ dareka-ga t_i damasita. (∃ » ∀, ∀ » ∃)
everyone-ACC someone-NOM deceived
'lit. Everyone, someone deceived.'

c. Dare**KA**-ga daremo-o damasita. (∃ » ∀, ∀ » ∃, with focus on *dareka*)
someone-NOM everyone-ACC deceived
'Someone deceived everyone.'

(from Kitagawa 1994:228, with a minor modification)

(2) a. Dareka-ga daremo-o sonkeisiteiru. (∃ » ∀, * ∀ » ∃)
someone-NOM everyone-ACC admire
'Someone admires everyone.'

An earlier version of this paper was presented at the second meeting of the Tokai Area Circle of Syntax held at Chukyo University (December 2017) and at the sixth workshop on "Phonological Externalizations of Morphosyntactic Features: Universals and Variables" held at Niigata University (February 2018). We wish to thank Yoshi Dobashi, Gen Fujita, Nobu Goto, Shintaro Hayashi, Tokizaki Hisao, Shinsuke Homma, Jiro Inaba, Shin-Ichi Kitada, Masashi Nomura, Yuta Sakamoto, and the other audience members on those venues for invaluable comments and/or challenging questions. We thank Keely New for proofreading this paper. This research has been supported by the Singapore Ministry of Education Academic Research Fund Tier 1 grant (R-103-000-152-115) (Sato) as well as by the Grant-in-Aid for Young Scientists (B) (grant #: 26770170) (Maeda).

b. Dare**KA**-ga daremo-o sonkeisiteiru. (∃ » ∀, ∀ » ∃)
someone-NOM everyone-ACC admire
'Someone admires everyone.' (Watanabe 2000:12, 14)

In (1a), *dareka-ga* 'someone-NOM' unambiguously takes scope over *daremo-o* 'everyone-ACC', a pattern which truthfully reflects the scope rigidity pattern of Japanese, given that the former is structurally higher than the latter. The other interpretation, where the universal quantifier takes scope over the existential quantifier, is obtained by scrambling the former over the latter, as in (1b). Kitagawa points out, however, that the inverse scope interpretation can actually be obtained even under the basic SOV order if rise-fall focus intonation is imposed on the subject, as indicated in (1c) with capital KA. Watanabe (2000:14) echoes a similar observation, citing examples such as (2a, b).

Kitagawa (1994) and Watanabe (2000) further observe that the prosodically controlled availability of the inverse scope interpretation also manifests itself in subjects accompanied by numeral quantifiers or disjunctive markers, as shown in (3c) and (5b), respectively. Let us start with a case of inverse scope involving a numerally quantified subject.

(3) a. Sannin-no zyosee-ga hutari-no dansee-o syootaisita. (3»2, ?*2»3)
three-GEN female-NOM two-GEN male-ACC invited
'Three females invited two males.'

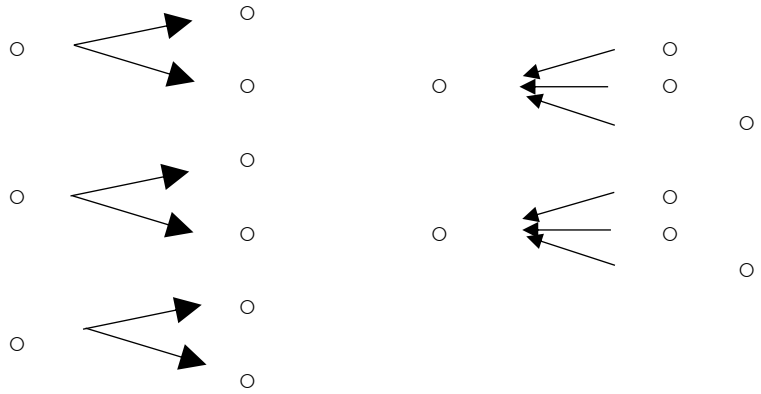
b. [Hutari-no dansee-o]$_i$ sannin-no zyosee-ga t_i syootaisita. (3»2, 2»3)
two-GEN man-ACC three-GEN woman-NOM invited
'lit. Two males, three females invited.'

c. **SANNIN**-no zyosee-ga hutari-no dansee-o syootaisita. (3»2, 2»3, with
three-GEN female-NOM two-GEN male-ACC invited focus on *sannin*)
'Three females invited two males.'

(from Kitagawa 1994:228, with a minor modification)

The example in (3a) only allows the surface scope reading where the numeral quantified subject *sannin-no zyosee-ga* 'three females-NOM' takes scope over another numeral quantified object *hutari-no dansee-o* 'two males-ACC'. This scope reading is visually depicted in (4a). On the other hand, the inverse scope reading, schematically depicted in (4b), may be obtained in one of two ways. One way is to scramble the quantified object over the quantified subject, as shown in (3b). The other way is to superimpose a rise-fall focus intonation on the quantifier *sannin* 'three', as indicated in (3c).

(4) a. 3 » 2 (Surface Scope) b. 2 » 3 (Inverse Scope)



3 Females **6 Males** 2 Males **6 Females**

(adopted from Kitagawa 1994:229)

Now, the example in (5b) illustrates the prosodically governed inverse scope reading with the disjunctive subject. In (5a), the disjunctive subject *John ka Mary-ga* 'either John or Mary-NOM' necessarily takes wide scope over the universally quantified object *daremo-o* 'everyone-ACC', in conformity with the scope-rigidity characterization of Japanese. In Japanese, the disjunction marker *ka* may be repeated a second time to follow the second conjunct to yield the surface string *John ka Mary-ka-ga* 'either John or Mary-NOM', as shown in (5b). Watanabe notes that in this case, the inverse scope reading is available with focus rise-fall intonation on the second occurrence of the disjunctive marker.[1]

(5) a. [John ka Mary]-ga daremo-o sonkeisiteiru. (or » every, *every » or)
John or Mary-NOM everyone-ACC admire
'John or Mary admires everyone.'

b. [John ka Mary-**KA**]-ga daremo-o sonkeisiteiru. (or » every, every » or)
John or Mary-or-NOM everyone-ACC admire
'John or Mary admires everyone.' (Watanabe 2000:14)

To the best of our knowledge, the scope-prosody correspondence, as illustrated in (1c), (2b), (3c) and (5b), has received scant attention in the literature, except for some occasional brief remarks and references such as Kitagawa (1994) and Watanabe (2000). The primary objective of this paper, therefore, is to rectify this situation and highlight its theoretical implications for contemporary theories of the syntax-prosody interface within a particular context of Phase Theory. We develop

[1] One important question that remains to be investigated about the inverse scope interpretation in the examples discussed so far is what expression in subject position should receive focal stress to bring about the relevant interpretation. The exact position of focal stress seems to be different in each case. For example, focal stress falls on the question particle *ka* in (1c) and (2b), on the numeral quantifier *sannin* 'three' in (3c), and on the second occurrence of the disjunction marker *–ka* (not the first occurrence thereof) in (5b). We need to leave a detailed investigation of this question for another occasion.

an explicit analysis of the correspondence in question within the recent general phase-theoretic approach to the syntax-prosody mapping outlined by such works as Ishihara (2007) and Kratzer and Selkirk (2007). More specifically, we argue for an appropriately updated version of Reinhart's (1978)/May's (1985) Scope Principle as a principle falling within the realm of the syntax-phonology interface, and propose that scope interaction may obtain iff a pair of quantifiers are interpreted dependently within the same Spell-Out domain in Japanese, which we take to be Major Phase (hereafter MaP), following the lead of Ishihara (2007).

Our analysis allows for an illuminating explanation not only for Kitagawa's/Watanabe's observation illustrated above, but also for several other scope-related phenomena in Japanese pertaining to partial negation, reconstruction effects of long-distance scrambling on scope, and new scope relations created by so-called particle stranding ellipsis. One of the important architectural implications of our proposed analysis is that the language faculty must admit *buffers*, or some memory storage points to temporarily store derivationally processed information, for the syntax-external phonological computations to modify the default outcome of purely mechanical computations to a limited extent, so that both local and semi-global phonological operations may closely interact to yield both canonical and "marked" scope facts attested.

2. Spelling-Out Major Phrases and Scope-Prosody Correspondence

In this section, we will outline a phase-theoretic approach to the scope-prosody correspondence proposed by Ishihara (2007) as our starting point to develop our analysis of inverse scope in Japanese.

Ishihara's theory is designed to capture scope facts noted by Miyagawa (2001, 2003). Consider (6):

(6) a. Zen'in-ga sono tesuto-o uke-nakat-ta. (*Neg » all, all » Neg)
all-NOM that test-ACC take-NEG-PAST
'All did not take that test.'

b. [Sono tesuto-o]$_i$ zen'in-ga t_i uke-nakat-ta. (Neg » all, all » Neg)
that test-ACC all-NOM take-NEG-PAST
'That test, all didn't take.' (Miyagawa 2003:183–184)

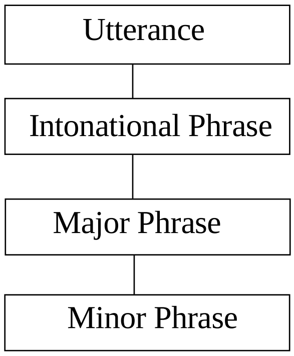
In (6a), which represents the SOV order, the subject *zen'in-ga* 'everyone-NOM' must take wide scope over the negation contained within the verbal complex. On the other hand, in (6b), which represents the OSV order, the same subject can exhibit scope interactions with the negation.

Ishihara (2007) puts forth a phase-theoretic analysis of this scope fact. It is commonly assumed since the ground-breaking work by Selkirk (1978, 1984, 1986, 1996) (see also Nespor and Vogel 1986), prosodic structure consists of the hierarchically layered prosodic constituents, as in (7), motivated for languages such as English and Italian. Kawahara and Shinya (2008) observe that Japanese prosodic hierarchy takes the form in (8).

(7) Selkirk (1978, 1984, 1986, 1996) on Prosodic Hierarchy (see also Nespor and Vogel 1986)

(	$)_U$	U = utterance
($)_{IntP}$	($)_{IntP}$	IntP = intonational phrase
($)_\varphi$ ($)_\varphi$	($)_\varphi$	φ = phonological phrase
(ω ω $)_C$ (ω $)_C$ (ω $)_C$	(ω ω $)_C$ (ω $)_C$ (ω $)_C$	C = clitic group
		ω = prosodic word

(8) Kawahara and Shinya (2008) on Japanese Prosodic Hiearchy



Our major concern here is the Major Phrase/MaP, defined as the domain of downstep, i.e., the compression of pitch range triggered by lexical pitch accent. See Ishihara (2015) for further discussions on prosodic hierarchies in Japanese. Ishihara (2007) proposes the hypothesis in (9), which states that Spell-Out domains in a cyclic spell-out model of syntax correspond to MaPs in the prosodic representation. In developing this hypothesis, he assumes that what undergoes transfer is the phase itself (phasal spell-out) (Chomsky 2000), not the complement of a phase head (phasal complement spell-out) (Chomsky 2001, 2004): see Fox and Pesetsky (2005), Sato (2012), Bošković (2016a, b) and Saito (2017) for other evidence for the Phasal Spell-Out Model.

(9) MaP = MSO Hypothesis (Ishihara 2007:144)
Spell-out domains are mapped onto prosody as MaPs.

According to this hypothesis, then, *v*Ps and CPs in a phase-based syntactic computation are mapped on prosody as MaP in the corresponding phonological representation. Ishihara follows Hirotani's (2004) Syntax-Prosody Correspondence, as defined in (10), and proposes that the scope of a quantificational expression must be limited within the MaP which contains the expression.

(10) Syntax-Prosody Correspondence (Hirotani 2004:7)
The scope of a term X should not extend beyond the Major (phonological) Phrase (MaP) containing X.

Let us consider now how Ishihara's (2007) phase-based theory of the scope-prosody correspondence accounts for Miyagawa's observation in (6a, b). (11) and (12) are schematic prosodic representations for the example in (6a) and for the example in (6b), respectively.

(11) MaP phrasing for (6a) (unambiguous: all » Neg)

[$_{TP}$ **zen'in**-ga$_i$ [$_{vP}$ t_i sono tesuto-o uke-**nakat**-ta]]

(**zen'in**-ga)$_{MaP}$ (sono tesuto-o uke-**nakat**-ta)$_{MaP}$

(12) MaP phrasing for (6b) (ambiguous: Neg » all, all » Neg)

a. [$_{TP}$ [sono tesuto-o]$_i$ [$_{vP}$ t_i **zen'in**-ga [$_{VP}$ t_i uke-**nakat**-ta]]]

(sono tesuto-o)$_{MaP}$ (**zen'in-ga** uke-**nakat**-ta)$_{MaP}$

b. [$_{CP}$ [sono tesuto-o]$_i$ [$_{TP}$ **zen'in**-ga$_j$ [$_{vP}$ t_i t_j [$_{VP}$ t_i uke-**nakat**-ta]]]]

(sono tesuto-o **zen'in-ga**)$_{MaP}$ (uke-**nakat**-ta)$_{MaP}$

(Ishihara 2007:147)

Miyagawa (2001, 2003) assumes that in the SOV order in (6a), the subject moves from [Spec, *v*P] to [Spec, TP] to satisfy the EPP-feature of T. This syntactic derivation is illustrated in the first line of (11). The root TP (or CP) and *v*P in this derivation are now mapped to two separate MaPs, as per the MaP = MSO Hypothesis in (9), as shown in the second line of (11). In this derivation, the negation and the universally quantified subject are contained within the two MaPs. The Syntax-Prosody Scope Correspondence in (10) now dictates that the scope of negation

cannot extend beyond the MaP which contains it. This derivation thus yields the unambiguous interpretation where the subject takes scope over the negation. [2, 3]

For the OSV order in (6b), on the other hand, Miyagawa hypothesizes two possible syntactic derivations. In one derivation, the direct object undergoes scrambling over the subject to [Spec, TP] to satisfy the EPP-feature of T so that the subject stays in [Spec, *v*P]. In the other derivation, the subject does move to [Spec, TP] to check the EPP-feature of T, but this movement is followed by A′-scrambling of the direct object to [Spec, CP]. The former derivation yields the skeletal syntactic structure shown in the first line of (12a), whereas the latter derivation yields the skeletal syntactic structure shown in the first line of (12b). After the syntax-prosody mapping takes place, as dictated by the derivational mapping theory in (9), the two syntactic structures yield two different prosodic representations shown in the second line of (12a) and (12b). In the prosodic representation in (12a), the two quantified expressions are contained within the same Spell-Out domain/MaP. This prosodic phrasing thus yields the Neg » all interpretation in (6b), in conformity with the Scope-Prosody Correspondence rule in (10). In the prosodic representation in (12b), on the other hand, the two quantifiers are contained within two different Spell-Out domains/MaPs. This phrasing then unambiguously yields the all » Neg interpretation. It follows then that only the OSV order, but not the SOV order, can yield scope interactions.

The important take-away from our review of Ishihara's theory of scope-prosody correspondence is two-fold. One is the derivational system of syntax-prosody mapping whereby *v*Ps and CPs in a phase-

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[2] To be precise, Miyagawa (2001, 2003) assume that the negation is within the V-*v*-T complex under T, as shown in (ia). Therefore, Ishihara's system, strictly followed, would locate the negation in the same MaP as the quantified subject for (6a), as shown in (ib).

(i) a. [$_{TP}$ **zen'in**-ga$_i$ [$_{vP}$ t_i sono tesuto-o] uke-**nakat**-ta]
b. (**zen'in**-ga (sono tesuto-o)$_{MaP}$ uke-**nakat**-ta))$_{MaP}$
c. (**zen'in**-ga) $_{MaP}$ (sono tesuto-o)$_{MaP}$ (uke-**nakat**-ta)$_{MaP}$

This mapping, in turn, would predict then that (6a) should be scopally ambiguous, contrary to facts. For the purposes of this paper, we simply follow Ishihara (2007) and assume that the verb and negation both stay within the *v*P in Japanese, leaving a careful review of controversial evidence in the literature concerning their syntactic position for another occasion.

Alternatively, it is not implausible to assume that the verb and negation move to the T position in overt syntax, as proposed by Miyagawa (2001, 2003), to yield the representation in (1b), but given the Strict Layer Hypothesis (Selkirk 1984, 1986; Nespor and Vogel 1986) that a prosodic constituent of a particular level is not allowed to dominate a constituent of the same level, the verbal complex could end up creating a third MaP to avoid the violation of the non-recursiveness constraint, as shown in (ic). Under this representation, the quantified subject obligatorily takes wides scope over the negation, as desired. See note 3 and section 3 for our discussion of how relative scope is fixed between a pair of quantifiers in two different MaPs.

[3] As far as we can determine, Ishihara (2007:143) does not specify what mechanism is responsible for the assignment of relative scope for those configurations like (11) where a pair of quantifiers are contained within two different MaPs or why a quantifier in the "higher"/"leftward" MaP (e.g., *zen'in-ga* 'all-NOM' in (11)) takes scope over another quantifier in the "lower"/"rightward" MaP (e.g., *nai* 'not' in (11)). We will come back to this question in section 3.1 when we introduce May's (1985) Scope Principle.

theoretic derivation are mapped onto prosody as MaPs in the prosodic computation. The other is the intuition that a pair of quantifiers can scopally interact when they are contained within the same MaP.

In the next section, we develop a new system of scope-prosody correspondence which represents a fruitful integration of these assumptions with some other independently motivated principles of focus-driven prosodic restructuring to account for the prosody-sensitive distribution of inverse scope in Japanese.

3. Phase Theory and Phonological (Re-) phrasing

In this section, we review the Scope Principle originally developed by Reinhart (1976, 1978) and May (1985) and propose that this principle be more properly located as a condition constraining scope interaction between a pair of quantifiers at the syntax-phonology interface. Building on this revision of the Scope Principle suggested, we show that Kitagawa's/Wanatabe's observations regarding inverse scope in Japanese, reviewed in section 1, are straightforwardly explained through the tight interaction of a phase-based mapping of syntactic derivations proposed in Ishihara (2007) with focus-driven prosodic restructuring independently motivated in the literature (Nagahara 1994). We further show that our analysis also correctly predicts a range of other scope phenomena pertaining to partial negation in basic SOV sentences, particle-stranding ellipsis as well as the prosody-sensitive distribution of wide vs. narrow scope readings of the topic marker –*wa* (Kato 1988; Nakanishi 2003).

3.1. *Reinhart's (1978)/May's (1985) Scope Principle and Scope Ambiguities*

Reinhart (1976, 1978) proposes that scope ambiguity is possible if each of the quantified expressions is in the domain of the other. This Scope Principle is defined in (13). The notion of "domain" which is central in identifying scope assignment is defined through c-command, as shown in (14).

(13) A logical structure in which a quantifier binding a variable *x* has wide scope over a quantifier binding a (distinct) variable *y* is a possible interpretation for a given sentence S just in case in the surface structure of S the quantified expression (QE) corresponding to *y* is in the domain of the QE corresponding to *x*. (Reinhart 1978:118)

(14) The domain of a node A consists of all and only the nodes dominated by the (non-unary) branching node α which most immediately dominates A. (Reinhart 1978:107)

To see how Reinhart's Scope Principle works, consider the scope facts in (15a–c). The example in (15a) only allows the reading where the existential subject takes scope over the locative PP whereas the example in (15b) is scopally ambiguous with the subject quantifier taking wide scope over the locative PP or vice versa.

(15) a. Some reporters put tape-recorders in every room. (∃ » ∀, * ∀ » ∃)
b. Some reporters worship Carter in every town. (∃ » ∀, ∀ » ∃)
c. In every room some reporters put tape-recorders. (∃ » ∀, ∀ » ∃)

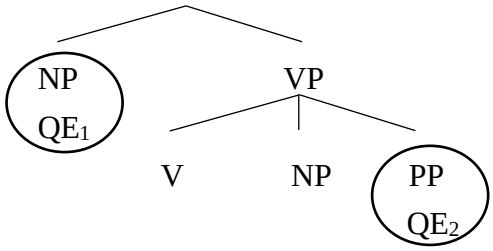
(adopted from Reinhart 1978:121, 122)

Reinhart presents an independent piece of evidence from pseudocleft constructions to show that the PP *in every room* in (15a) is contained within the VP whereas the PP *in every town he visits* in (15b) is outside the VP. Ross (1973) observes that the presuppositional *what*-clause of a pseudo-cleft construction can only contain VP-external materials in it. Keeping this observation in mind, consider examples in (16a, b).

(16) a. * What some reporters did <u>in every room</u> was put tape-recorders.
b. What some reporters do <u>in every town</u> is worship Carter. (Reinhart 1978:121)

The ungrammaticality of the example in (16a) shows that *in every room* in (15a) is VP-internal, as shown in the tree structure in (17a). The example in (15a) then only allows the ∃ » ∀ reading because the quantified subject asymmetrically c-commands the quantified PP, as shown in (17a). On the other hand, the grammaticality of the example in (16b) indicates that *in every town* is VP-external, as indicated in the tree structure in (17b). The example in (15b) then is scopally ambiguous because the two quantifiers c-command each other, as shown in (17b).

(17) a.



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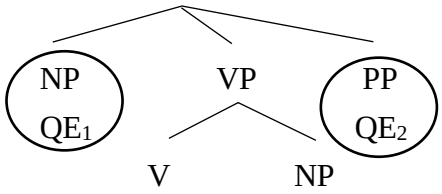

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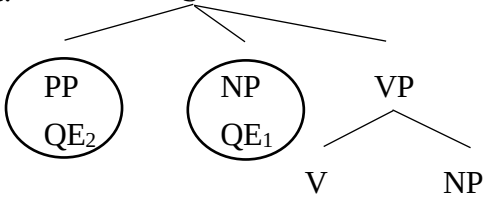


(Reinhart 1978:121, 122)

Reinhart further observes that the scope ambiguity is obtained by fronting the PP to the sentence-initial position, as witnessed in (15c). The Scope Principle correctly predicts this result as well since the fronted PP is now in a mutual c-command relationship with the subject, as shown in (17c).

May's (1985) version of Scope Principle stands on the definitions of three key concepts regarding scope assignment, Σ-sequence and government given in (18), (19) and (20), respectively.

(18) Members of Σ-sequences are free to take any type of relative scope relation…The intent of the Scope Principle is that an LF-representation containing quantifiers forming a Σ-sequence is compatible either with there being interpretive dependencies among the member quantifiers of that sequence … or with the quantifiers being interpreted independently of one another… (May 1985:34)

(19) Let us call a class of occurrences of operators ψ a Σ-sequence if and only if for any O_i, $O_j \in \psi$, O_i governs O_j, where "operator" means "phrases in A′-positions at LF." (May 1985:34)

(20) α *governs* β $=_{df}$ α c-commands β and β c-commands α, and there are no maximal projection boundaries between α and β. (May 1985:33)

May's version of Scope Principle also shares the intuition a Reinhart's version that a pair of quantifiers can show scope interaction when they are in the mutual c-command relationship.

To illustrate how May's Scope Principle works, consider (21a).

(21) a. Every student admires some professor. (∃ » ∀, ∀ » ∃)
b. [$_{S'}$ [$_S$ some professor$_3$ [$_S$ every student$_2$ [$_S$ e_2 admires e_3]]]]
c. Σ-sequence = {some professor$_3$, every student$_2$} (May 1985:35)

The two quantifiers in the subject and object positions in (21a) undergo Quantifier Raising to the S-adjoined positions at LF, as shown in (21b). Here, the two quantified expressions are members of the same Σ-sequence because they govern, or mutually c-command, each other. In accordance with the Scope Principle, then, (21a) permits a dependency interpretation in which either the *every*-phrase or the *some*-phrase has broader scope (as well as with an interpretation in which these phrases have no interpretive dependency). Compare the example in (21a) now with (22).

(22) [$_{S'}$ Everyone believes [$_{S'}$ that someone is a spy]]. (*∃ » ∀, ∀ » ∃) (May 1985:35)

Here, the two quantifiers are located within two different clauses. Since the two quantifiers do not govern and hence do not belong to the same Σ-sequence, the Scope Principle is not satisfied. May assumes that in those structures where the principle is not met, "the grammar will make available only a dependent interpretation, [with] relative scope order being fixed simply as a function of

constituency, determined in a 'top-to-bottom' fashion, from structurally superior to structurally inferior phrases." (p. 35).

3.2. *Spelling-Out and Rephrasing Inverse Scope in Japanese*

We follow the spirit of Reinhart's (1976, 1978)/May's (1985) intuition behind their respective formulations of Scope Principle that a pair of quantifiers are scopally interactive within the mutual c-command domain. We propose, however, that this principle is better formulated as a condition governing scope-prosody correspondence at the level of the syntax-prosody. More concretely, we propose that a pair of quantifiers exhibits scope interaction only when they are Spelled-Out together within the same MaP, following the original idea due to Ishihara (2007).

Our proposed rendition of the Scope Principle provides a straightforward explanation for the prosody-sensitive distribution of inverse scope readings. It is commonly assumed since Selkirk and Tateishi (1991) that the left edge of an XP in the syntactic representation is aligned with the left edge of a MaP in the prosodic representation, as stated in (23), a pattern that is derived as a natural consequence of the phase-based mapping proposed by Ishihara (2007). It is also known, however, that this default phrasing is masked by focus in Japanese. The constraint in (24a) states that the left edge of a focused constituent must be aligned with a left MaP boundary. The constraint in (24b) requires that there be no intervening MaP between any focused constituent and the end of a sentence.

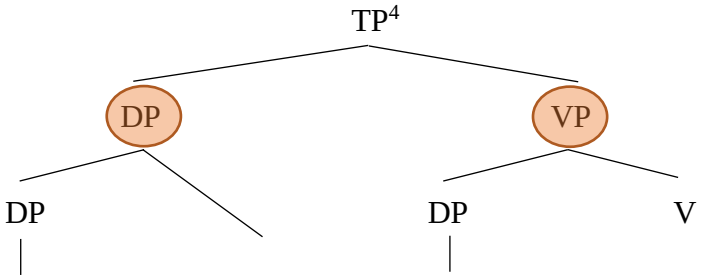
(23) XP-Alignment Analysis (Selkirk and Tateishi 1991:529)
Major Phrase: {Left, XP}

(24) MaP rephrasing by focus
a. FOCUS-LEFT-EDGE (Pierrehumbert and Beckman 1988)
Left edge of focus = left [MaP] edge
b. FOCUS-TO-END (Nagahara 1994:42)
No intervening [MaP boundary] between any focus constituent and the end of sentence.

To illustrate the interaction of the constraints in (24a, b) with the default phrasing algorithm in (23), consider the sentence (25). This sentence, when uttered normally, is phrased as in (25a). This is because the left edge of a syntactic XP is aligned with a MaP boundary, with the sentence-final verb being included in the same MaP with its preceding direct object, as required by the Left Edge Alignment constraint in (23). This prosodic representation is drastically changed in to ways when some constituent in the sentence, say *aniyome-ga* 'sister-in-law-NOM', is assigned focus. First, the constraint in (24a) forces the insertion of an additional MaP boundary immediately preceding the focused subject, as indicated by the bold left-hand round bracket. Second, the constraint in (24b) forces a single MaP starting from the beginning of the focused

subject to be stretched to the end of the utterance. These two constraints thus give rise to yield the revised prosodic structure shown in (25b).

(25) Aoyama-no aniyome-ga erímaki-o anda.
Aoyama-GEN sister-in-law-NOM scarf-ACC knitted
'Aoyama's sister-in-law knitted a scarf.'
a. No focus (= default MaP phrasing)
b. Focus on *aníyome-ga* 'sister-in-law-NOM'



a. (Aóyama-GEN aníyome-NOM) (erímaki-ACC ánda)
b. (Aóyama-GEN) **(aníyome[FOC]**-NOM erímaki-ACC ánda) (Ishihara 2007:151)

It is crucial for our present purposes that the default prosodic phrasing, as directed by the Left Edge Alignment Constraint, is subject to focus-sensitive adjustments, so that a pair of XPs that belonged to two different MaPs now can join as the members of the same derived MaP thanks to focus-driven prosodic restructuring. We now show how this prosodic restructuring works in tandem with our own prosody-based definition of Scope Principle to account for the inverse scope puzzle introduced in section 1. The examples in (2) are repeated here as (26).

(26) a. Dareka-ga daremo-o sonkeisiteiru. (∃ » ∀, * ∀ » ∃) (=2)
someone-NOM everyone-ACC admire
'Someone admires everyone.'
b. Dare**KA**-ga daremo-o sonkeisiteiru. (∃ » ∀, ∀ » ∃)
someone-NOM everyone-ACC admire
'Someone admires everyone.' (Watanabe 2000:12, 14)

(26a), uttered with the default neutral discourse setting, receives the skeletal prosodic structure shown in (27a). This structure results from mapping the TP/CP constituent and the *v*P constituent to two different MaPs, as per the cyclic mapping hypothesis in (9). The example in (26b), on the other hand, involves the focused subject *dareKA-ga* 'someone-NOM'. Given the focus-sensitive constraints in (24a, b), this means

[4] This structure corresponds to Tateishi and Selkirk's (1991:531) Type 3 Structure postulated without the DP hypothesis, where the subject NP and the VP are mapped as two independent MaPs: $[_S\ [_{NP}\ [_{NP}$ $Noun_1$-no] $Noun_2$-ga] $[_{VP}\ [_{NP}$ $Noun_3$-o] Verb]] → $(Noun_1\ Noun_2\text{-ga})_{MaP}$ $(Noun_3\text{-o}\ \ Verb)_{MaP}$.

that this example is associated with the derived prosodic representation shown in (27b), where all the major constituents of the sentence are contained within a single MaP.

(27) a. (**dareka-ga**)$_{MaP}$ (**daremo-o** sonkeisiteiru)$_{MaP}$ (default MaP phrasing)
b. (**dare**KA[FOC]-ga **daremo-o** sonkeisiteiru)$_{MaP}$ (focus on KA)

The Scope Principle is not applicable in (27a) because the two quantified expressions are not contained within the same MaP. We assume, following the spirit of May (1985), that in this case, the dependent interpretation is read off as a function of linear precedence so that the quantified subject contained in the first MaP takes scope over the quantified object contained in the second MaP, yielding the unambiguous ∃ » ∀ interpretation. The situation is radically different in (27b), however. Here, the two quantified expressions are now contained within the same MaP thanks to the application of the FOCUS-LEFT-EDGE constraint and the FOCUS-TO-END constraint. Accordingly, the Scope Principle allows the dependent interpretation within the two quantifiers contained in this single prosodic domain. It follows then that the example in (26b) is scopally ambiguous. This way, our system provides a principled explanation for why the inverse scope reading becomes possible when the subject XP receives focal rise-fall intonation.

Our analysis can be extended to two other cases of prosodically conditioned inverse scope interpretations discussed in section 1. Let us revisit the examples in (5), which show that the inverse surface scope is obtained if the focus intonation is superimposed on the second occurrence of the disjunctive marker *–ka*. The relevant examples are repeated here as (28).

(28) a. [John ka Mary]-ga daremo-o sonkeisiteiru. (or » every, *every » or) (=5)
John or Mary-NOM everyone-ACC admire
'John or Mary admires everyone.'
b. [John ka Mary-**KA**]-ga daremo-o sonkeisiteiru. (or » every, every » or)
John or Mary-or-NOM everyone-ACC admire
'John or Mary admires everyone.' (Watanabe 2000:14)

(28a) is phrased as in (29a). In (29a), the disjunctive subject *John ka Mary-ga* 'either John or Mary-NOM' is contained in a different MaP from the universally quantified object *daremo-o* 'everyone-ACC'. This representation, thus, gives rise to the surface scope reading (or » every) alone, a reading computed on the basis of the left-to-right order between the two constituents. On the other hand, the example in (28b), with the additional focus particle, is phrased as in (29b). This example can yield the inverse scope reading because the disjunctive subject and the universally quantified object stand within the same MaP thanks to focus-driven restructuring.

(29) a. (**John ka Mary-ga**)$_{MaP}$ (**daremo-o** sonkeisiteiru)$_{MaP}$ (default MaP phrasing)

b. (**John ka Mary-KA[FOC]-ga daremo-o** sonkeisiteiru)$_{MaP}$ (focus on KA)

The reader should be able to verify easily that the same analysis applies, *mutatis mutandis*, to the example of inverse scope with the quantified subject with focus, illustrated in (3c).

Let us make sure for concreteness' sake that our analysis can also account for the observation that short scrambling has the function of yielding the derived new scope (see section 4 for our analysis of the relationship between long-distance scrambling and scope reconstruction). This point was illustrated, for example, in (1b), repeated here as (30).

(30) Daremo-o$_i$ dareka-ga t_i sonkeisiteiru. (∃ » ∀, ∀ » ∃) (cf. (1b))
everyone-ACC someone-NOM admire
'Someone admires everyone.'

We assume, following Miyagawa (2001, 2003), that this OSV order has two possible syntactic derivations. One derivation, depicted in (31a), involves the EPP-driven movement of the direct object *daremo-o* 'everyone-ACC' to [Spec, TP], with the subject *dareka-ga* 'someone-NOM' staying in [Spec, *v*P]. The other derivation, depicted in (31b), involves the EPP-driven movement of the subject from [Spec, *v*P] to [Spec, TP], accompanied with A′-movement of the direct object to [Spec, CP].

(31) a. [$_{TP}$ daremo-o$_i$ [$_{vP}$ dareka-ga t_i sonkeisiteiru]]
(**daremo-o**)$_{MaP}$ (**dareka-ga** sonkeisiteiru)$_{MaP}$
b. [$_{CP}$ daremo-o$_j$ [$_{TP}$ dareka-ga$_i$ [$_{vP}$ t_i t_j sonkeisiteiru]]
(**daremo-o** **dareka-ga**)$_{MaP}$ (sonkeisiteiru)$_{MaP}$

The prosodic representation shown in (31b) can yield the ∀ » ∃ reading, as desired.

3.3. *New Predictions: Scope Domain Widening through Focus Restructuring in Japanese*

Our proposed analysis of the inverse scope in Japanese allows us to make a number of new predictions regarding scope interaction with SOV sentences as in (6a) with the focused subject and so-called particle-stranding ellipsis constructions. We show in this section that these predictions are indeed borne out.

First, recall that the example in (6a), repeated here as (32), only allows the ∀» Neg reading. This is because the example is associated with the prosodic representation in (33), where the universally quantified subject is in a higher MaP than the one that contains the negation.

(32) Zen'in-ga sono tesuto-o uke-nakat-ta. (*Neg »∀, ∀» Neg) (=6a)
all-NOM that test-ACC take-NEG-PAST
'All did not take that test.'

(33) MaP phrasing for (32) (unambiguous: ∀ » Neg)

[$_{TP}$ **zen'in**-ga$_i$ [$_{vP}$ t_i sono tesuto-o uke-**nakat**-ta]]

(**zen'in**-ga)$_{MaP}$ (sono tesuto-o uke-**nakat**-ta)$_{MaP}$

Suppose that focal rise-fall intonation is superimposed on the subject *zen'in-ga* 'all-NOM' in (33). Under our present set of assumptions, this focus should, then, widen the default MaP domain to reach the end of the utterance to include the negation, as shown in (34). Then, our analysis predicts that the variant of the example in (32) with the focal subject should allow the Neg »∀ interpretation. Our native speaker judgments noted in (35) confirm that this prediction is indeed borne out.

(34) revised MaP phrasing for (33) with the subject in focus

[$_{TP}$ **zen'in**-ga$_i$ [$_{vP}$ t_i sono tesuto-o uke-**nakat**-ta]]

(**zen'in-GA [FOC]** sono tesuto-o uke-**nakat**-ta)$_{MaP}$

(35) Zen'in-GA sono tesuto-o uke-nakat-ta-yo.

all-NOM that test-ACC take-NEG-PAST-PRT

'All did not take that test.'

✓ total negation: ∀ » Neg (No one took that test.)

✓ partial negation: Neg » ∀ (It is not the case that everyone took the test)

In (34), both the subject quantifier and negation are contained within the same MaP. Our Scope Principle then correctly ensures that the two quantifiers can scopally interact with one another.

A similar observation as the one we just made above for the nominative case particle *–ga* with respect to its scope-prosody correspondence was independently made by Kato (1988) and Nakanishi (2003) for the topic marker *–wa*. This topic particle has thematic and contrastive uses, as shown in (36a) and (36b), respectively.

(36) a. Thematic *wa*: "Speaking of…, talking about…"

John-wa gakusei desu.

John-TOP student is

'Speaking of John, he is a student.'

b. Contrastive *wa*: "X… but …, as for X…"

Ame-wa hutte imasu ga, yuki-wa hutte imas-en.

rain-TOP falling is but snow-TOP falling is-NEG

'It is raining, but it is not snowing.'

(cf. Kuno 1973:38, as cited in Nakanishi 2003:2)

As first pointed out by Kato (1988: 32) and further substantiated by Nakanishi (2003), sentences such as (37) and (38) with the topic marker *–wa* exhibit two different scope properties depending on their semantic interpretations. For example, the sentence in (37) has the total negation reading (i.e., ∀ » Neg) when the particle is used thematically but the partial negation reading (i.e., Neg » ∀) when it is used contrastively. A similar characterization holds true for the example in (38).

(37) Zen'in-wa ko-nakat-ta.
all-TOP come-NEG-PAST
→ total negation: ∀ » Neg (No one came.) when WA = thematic
→ partial negation: Neg » ∀ (Not all of them came.) when WA = contrastive

(Kato 1988:32)

(38) Minna-wa ne-nakat-ta.
everyone-TOP sleep-NEG-PAST
'Everyone didn't sleep.'
→ total negation: ∀ » Neg (No one slept.)
→ partial negation: Neg » ∀ (It is not the case that everyone slept,
i.e. There is someone who didn't sleep.)

(Nakanishi 2003:7)

Nakanishi (2003:7) designed an experiment to establish the descriptive observation that '… the two functions of *wa* are realized in different intonational patterns: in sentences with the thematic *wa*, P1 is almost as high as or can be lower than P2, whereas, in contrastive cases, P1 is always higher than P2.' These two contours are shown in (39a, b). In her experiment, Nakanishi herself read aloud the sentence shown in (38) using the two prosodic contours indicated in (39a, b) and tape-recorded it.[5] Actual F_0 contours are shown in Figure 1.

(39) a. Thematic *wa*

P1 *wa* P2

b. Contrastive *wa*

P1 *wa* P2

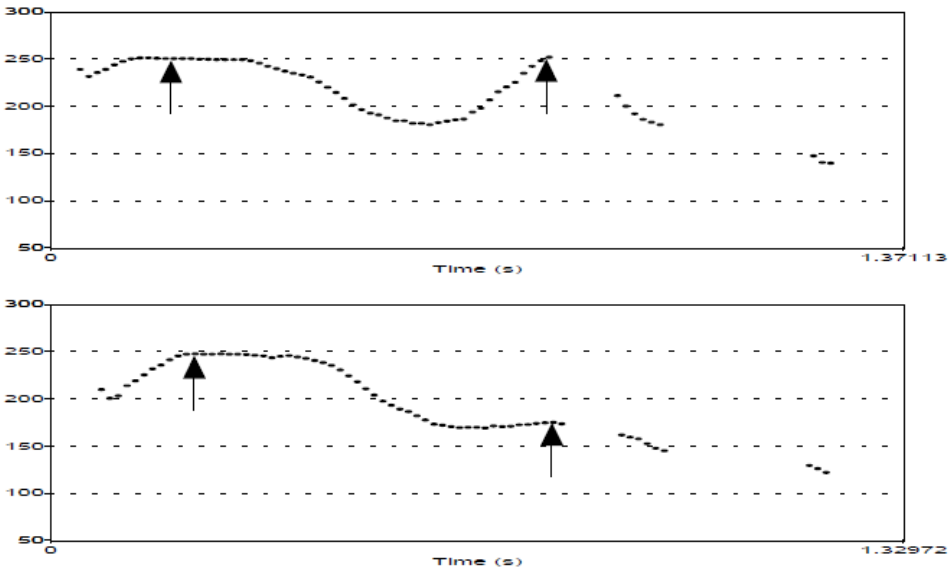
(Nakanishi 2003:7)

[5] F_0 is an acoustic correlate of the psycho-acoustic percept of pitch of the voice. P1 is the value of F_0 peak immediately before *wa* whereas P2 is the value of F_0 peak immediately after *wa*.

Figure 1: F_0 Contours of Thematic *wa* and Contrastive *wa*

Above: Thematic *wa* [P1: 251.13Hz, P2:251.79Hz]

Below: Contrastive *wa* [P1: 247.47 Hz, P2:174.52Hz]



Minna	wa	ne-**na**kat-ta
everyone	TOP	sleep-NEG-PAST
P1		**P2**

(Reproduced from Nakanishi 2003:8)

She then asked four Japanese subjects (2 males and 2 females) to listen to her recorded speech and to tell whether they can detect any correspondence between the scope possibilities and the intonational contours. Nakanishi reports that they unanimously agreed on the clear prosody-scope correspondence noted in (40a, b) for the topic marker –*wa*: the prosodic pattern of thematic *wa* shown in (39a) yields the total negation reading whereas the prosodic pattern of contrastive *wa* shown in (39b) yields the partial negation reading.

(40) a. Prosodic pattern of thematic *wa* --- ∀ » Neg reading [6]

b. Prosodic pattern of contrastive *wa* --- Neg » ∀ reading (Nakanishi 2003:8)

The correspondence discovered by Nakanishi (2003) is exactly what our analysis predicts. Let us illustrate our point using the example in (38). When the subject is interpreted thematically, the subject is contained in a MaP different from the one that contains the verbal complex. It follows then that the example only allows the ∀ » Neg reading in the same way that the example in (6a) only permits this reading. When the subject is interpreted contrastively, on the other hand, the

[6] See Nakanishi (2003:8–14) for her ingenious account of the prosody-scope correspondence shown in (40) using Büring's (1997) Alternative Semantics Approach, which we won't review for reasons of space.

default prosodic phrasing is subject to focus-driven readjustments, because a contrastively focused XP is a topic that is focused (i.e., [+Top, +Foc]). In other words, the right boundary of the MaP is stretched by the FOCUS-TO-END rule in (24b) till the end of the example in (38) so that this single extended MaP ends up containing both the universally quantified subject and negation. Consequently, the contrastive interpretation of *–wa* can yield the Neg » ∀ reading.[7]

Second, our analysis makes an interesting prediction with respect to scope properties in the so-called particle stranding ellipsis. It has been established in previous works on this constriction (Sato 2008, Sato and Ginsburg 2006, Shibata 2014, Sato and Maeda, to appear) that particles which can support this ellipsis pattern must bear focus. We predict then that particle-stranding ellipsis should trigger focus-driven MaP restructuring to create a scopal ambiguity that otherwise would be unavailable. This prediction also seems to be borne out. Consider examples in (41).

(41) a. Zen'in-ga tesuto-o uke-ta-no?
all-NOM test-ACC take-PAST-Q
'Did all take the test?'

b. Zen'in-ga tesuto-o uke-nakat-ta-yo. (*Neg »∀, ∀ » Neg) (cf. (6a))
all-NOM test-ACC take-NEG-PAST-PRT
'All did not take the test.'

c. GA tesuto-o uke-nakat-ta-yo. (Neg »∀, ∀ » Neg) (PSE)
NOM test-ACC take-NEG-PAST-PRT
'intended: All did not take the test.'

The example in (41b) is a full-fledged response to the *yes-no* question in (41a). This example only allows the total negation interpretation (i.e., ∀ » Neg) because the universally quantified subject is contained in a different MaP from the one that contains the negation, as depicted in (42).

(42) MaP phrasing for (41b) (unambiguous: ∀ » Neg)
[$_{TP}$ **zen'in**-ga$_i$ [$_{vP}$ t_i sono tesuto-o uke-**nakat**-ta-yo]]
(**zen'in**-ga)$_{MaP}$ (sono tesuto-o uke-**nakat**-ta-yo)$_{MaP}$

[7] One caveat is in order. Note that, given the prosodic contour of the contrastive use of *–wa*, our analysis should be able to yield the total negation (∀ » Neg reading) interpretation as well as the partial negation (Neg » ∀) reading in (38). This is because the negation and the subject will be contained in the same MaP due to the application of focus restructuring, so that the subject could take scope over the negation, just like the example in (6a) with the subject under focal stress.

We suspect that the lack of the ∀ » Neg reading is independently accounted for by the contrastive meaning of the topic marker *–wa* itself. In other words, this use of the particle necessarily evokes an XP that stands in contrast with the universal quantificational force of *zen*'in 'everyone', giving rise to partial negation. Thus, we maintain that the prosodic representation for (38) does contain the negation and the quantified subject in the same MaP, but only the partial negation reading is forced by the semantics of the contrastive topic *–wa*.

The example in (41c) is a shorter response to the same *yes-no* question which uses the particle-standing ellipsis. By hypothesis, the stranded nominative particle *–ga* bears emphatic focal pitch accent, which triggers the focus-driven MaP restructuring, yielding the derived prosodic representation shown in (43).

(43) MaP phrasing for (41c) (ambiguous: Neg »∀, ∀ » Neg)

[$_{TP}$	**GA**$_i$**[FOC]**	[$_{vP}$ t_i	sono	tesuto-o	uke-**nakat**-ta-yo]]
(	**zen'in**-ga		sono	tesuto-o	uke-**nakat**-ta-yo)$_{MaP}$

Here, the subject *zen'in-ga* 'all-*nom*' is contained in the same MaP that contains negation thanks to the restructuring. It follows that (41c) allows the inverse scope interpretation which is absent in (41b).

4. Cyclic Scope Interpretation by CP Phase: A View from Long-Distance Scrambling

In this section, we address one issue that arises under our analysis from the perspective of long-distance scrambling. Since long-distance scrambling brings two quantifiers in the same MaP, our analysis seems to predict that such an operation should be able to yield a new scopal effect. Tada (1993) shows, however, that this movement creates no scope shift, an instance of the so-called radical reconstruction. We propose that the lack of scope effects in the context of long-distance scrambling falls into place if we assume that CPs are mapped to Intonational Phrases (IntPs) which delimit scope-interaction potentials of quantifiers once and for all. This analysis explains the relevant scope reconstruction pattern without any ad hoc stipulations, unlike in Reinhart's (1976, 1978)/May's (1985) Scope Principle, a purely representational constraint on syntactic structure.

Let us start by pointing out an issue with our present analysis raised by long-distance scrambling, using (44a, b) as an illustrative example.

(44) a. Dareka-ga [$_{CP}$ John-ga daremo-o aisiteiru]-to omotteiru.
someone-NOM John-NOM everyone-ACC love-COMP think
'Someone thinks that John loves everyone.' (∃ » ∀, * ∀ » ∃)

b. Daremo$_i$-o dareka-ga [$_{CP}$ John-ga t_i aisiteiru]-to omotteiru.
everyone-ACC someone-NOM John-NOM love-COMP think
'lit. Everyone, someone thinks that John loves.' (∃ » ∀, * ∀ » ∃)

(Tada 1993:35)

(44a) only allows the surface scope interpretation where the matrix subject *dareka-ga* 'someone-NOM' takes scope over the embedded direct object *daremo-o* 'everyone-ACC'. Tada (1993:35) observes that this ∃ » ∀ reading remains unaffected by long-distance scrambling of the erstwhile embedded direct object to the sentence-initial position crossing the matrix subject. Tada's

observation seems problematic for our analysis. Let us assume that long-distance scrambling moves the embedded direct object to the adjoined position of the matrix TP, as in (45a). Under this assumption, the syntactic structure underlying (44b) will yield the prosodic structure in (45b).

(45) Partial prosodic representation for (44b) after long-distance scrambling

a. [$_{TP}$[Daremo-o$_i$] [$_{TP}$ dareka-ga … [$_{CP}$ John-ga t_i …]]]

b. (**Daremo-o** **dareka-ga**)$_{MaP}$ … (John-ga)$_{MaP}$

In (45b), the two quantified expressions end up in the same MaP as a result of the long-distance scrambling applied to *daremo-o* 'everyone-ACC'. By hypothesis, then, this prosodic configuration should give rise to scope interaction between the two quantifiers, incorrectly yielding the ∀ » ∃ interpretation, contrary to facts.

Examples (46a, b) raise a similar problem for our current analysis. The example in (46a) is minimally different from the example in (45a) in that the two quantifiers are within the same clause in the base in the former, but not in the latter. The example in (46a) allows both surface and inverse scope interpretations when focal fall-rise intonation is imposed on the embedded subject *dareka-ga* 'someone-NOM'. The example in (46b) now shows that this scope ambiguity is maintained even after the embedded direct object *daremo-o* 'everyone-ACC' undergoes long-distance scrambling over the embedded subject to the sentence-initial position.

(46) a. John-ga [$_{CP}$ dareka-ga daremo-o aisiteiru]-to omotteiru.
John-NOM someone-NOM everyone-ACC love-COMP think
'John thinks that someone loves everyone.' (∃ » ∀, ∀ » ∃, with focus on *dareka*)

b. Daremo$_i$-o John-ga [$_{CP}$ dareka-ga t_i aisiteiru]-to omotteiru.
everyone-ACC John-NOM someone-NOM love-COMP think
'lit. Everyone, John thinks that someone loves.' (∃ » ∀, ∀ » ∃, with focus on *dareka*)

Once again, the lack of any scope alternation effect caused by the long-distance scrambling seems to raise an empirical challenge for our present analysis. The scrambled structure in (47a) underlying the example in (46b) should yield the prosodic structure shown in (47b).

(47) Partial prosodic representation for (46b) after long-distance scrambling

a. [$_{TP}$[Daremo-o$_i$] [$_{TP}$ John-ga … [$_{CP}$ dareka-ga t_i …]]]

b. (**Daremo-o** John-ga)$_{MaP}$ … (**dareka-ga**)$_{MaP}$

Here, *daremo-o* 'everyone-ACC' is contained in a higher MaP than *dareka-ga* 'someone-NOM', contained within another lower MaP. As a result, then, we would predict that (46b) should only allow the ∀ » ∃ reading, contrary to facts.

One should note as a matter of observation that long-distance scrambling involved in the derivation of (44b) and (46b) cross the embedded clause and that no decision made regarding scope interaction within the embedded clause can be subsequently modified. Thus, in (44a), the scope-interaction potential of *daremo-o* 'everyone-ACC' is delimited by the embedded CP, so that no further syntactic movement of this quantified expression across the CP boundary may affect scope properties of this expression. Similarly, in (44a), the relative scope between the two quantifiers within the embedded CP is fixed within the CP (depending on whether the embedded subject is associated with focal rise-fall intonation or not; see section 1). Once the scope is fixed, subsequent scrambling of the embedded object cannot modify this scope any longer.

We capitalize on this absolute scope-freezing effect of CP boundary and propose here that the scope-interaction potential of any quantified expression is delimited by intonational boundary once and for all and can never be modified subsequently, as stated in (48): see Fox and Pesetsky (2005) for a similar monotonicity-based thesis that information about linear order obtained within a given Spell-Out domain can never be deleted or contradicted in the course of a syntactic derivation.

(48) Intonational phrasing delimits scope-interaction potentials of quantifiers cyclically.

Our proposed cyclic determination of scope-interaction potentials is built on Selkirk's (2009, 2011) Match Theory, defined in (49i–iii). The matching constraint in (49iii), plays a pivotal role in our formulation of (48), since it explicitly argues for transparent correspondence between clauses/CPs and IntPs, with precursors found in such works as Ladd (1986) and Nespor and Vogel (1986).

(49) A Match theory of the syntax-prosodic structure interface (Selkirk 2009:40)

(i) Match Clause
A clause in syntactic constituent structure must be matched by a constituent of a corresponding prosodic type in phonological presentation, call it ι.

(ii) Match Phrase
A phrase in syntactic constituent structure must be matched by a constituent of a corresponding prosodic type in phonological representation, call it φ.

(iii) Match Word
A word in syntactic constituent structure must be matched by a constituent of a corresponding prosodic type in phonological representation, call it ω.

Our proposed system straightforwardly explains the obligatory scope reconstruction possibility illustrated earlier in (44b) and (46b). The relevant steps of the syntactic/prosodic computations for (44b) and (46b) are depicted in (50ai–iii) and (50bi–ii), respectively.

(50) a. Schematic Structure of (44a, b) before and after long-distance scrambling

i. [$_{CP2}$ QP_2]

→ Scope interaction possibility delimited by CP_2

ii. [$_{CP1}$ QP_1 [$_{CP2}$ QP_2]]

→ No scope interaction + scope hierarchically determined (i.e., QP_1» QP_2, * QP_2 » QP_1) + scope interaction delimited by CP_1

iii. [$_{CP1}$ QP_2 QP_1 [$_{CP2}$ ~~QP_2~~]]

→ **QP_1» QP_2, * QP_2 » QP_1**

b. Schematic Structure of (46a, b) before and after long-distance scrambling

i. [$_{CP2}$ QP_1 QP_2]

→ Scope interaction possibility delimited by CP_2 (QP_1» QP_2, QP_2 » QP_1) + scope interaction possibility delimited by CP_1

ii. [$_{CP1}$ QP_2 [$_{CP2}$ QP_1 ~~QP_2~~]]

→ **QP_1» QP_2, QP_2 » QP_1**

In (50ai), QP_2 is introduced in the syntactic derivation, leading up to the completion of the embedded CP_2 phase. As per our derivational condition in (48), the scope-interaction potential of QP_2 is delimited by this CP phase, so that it cannot scopally interact with any other quantificational expression. Thus, even when QP_1 is introduced in the syntactic derivation, building up the higher CP_1 phase, as shown in (50aii), our CP-based delimitation hypothesis blocks any scope interaction between QP_1 and QP_2, with the result that their relative scope can only be determined as a function of structural hierarchy/left-to-right order between the two quantifiers, yielding the QP_1» QP_2 reading but prohibiting the derived QP_2 » QP_1. It follows then that no subsequent scrambling of QP_2 over the QP_1 within the CP_1 phase, as depicted in (50aiii), may alter their relative scope.

A similar story holds true for the derivation shown in (50b) for the example in (46b). In (50bi), the two quantifiers – QP_1 and QP_2 – are introduced within the same CP_1 phase. The two quantifiers, thus, can choose to scopally interact (with the caveat, of course, that the subject quantifier is accompanied with focal rise-fall intonation). Our condition in (48) now dictates that whichever scope possibility is chosen within the CP_1 phase may never be altered once the syntactic derivation moves from this phase to the higher CP_2 phase. Consequently, long-distance scrambling of QP_2 over QP_1 across the CP clause boundary can add any new scope information, thereby yielding the obligatory scope reconstruction effect observed in (46b).

5. An Architectural Issue: Localism vs. Globalism at the Syntax-Phonology Interface

In this paper, we have developed a derivational system of the syntax-prosody interface, following Ishihara's (2007) theory, according to which two designated Spell-Out domains – *v*Ps and CPs – are mapped to MaPs and IntPs in the prosodic representation, respectively. We have argued that MaPs define domains of scope interaction between quantifiers whereas IntPs delimit scope-interaction

potentials of quantifiers. The results of our analysis reached in sections 3 and 4 indicate that a) MaPs created in a phase-based fashion may be subject to local readjustment due to focus (recall the FOCUS-LEFT-EDGE rule and the FOCUS-TO-END rule in (24a, b)) to account for the prosodically conditioned availability of inverse scope readings in canonical SOV sentences in Japanese (section 3) and that b) IntP boundaries serve as absolute delimiters for scope-interacting potentials to account for the obligatory scope reconstruction property exhibited by long-distance scrambling.

The two results just noted above raise the important architectural question whether strictly local computations in phase-based syntactic derivations are compatible with the existence of semi-global computations in the post-syntactic phonological component (Chomsky 2004; Boeckx and Grohmann 2007; Sato 2012). Our reported results provide strong empirical vindication of the view that C_{HL} requires both derivational and representation systems to some limited extent for the proper trafficking at the syntax-prosody interface. We simply note here that this conclusion is further reinforced by Sato and Dobashi's (2016) theory of the *that*-trace effect, which we briefly summarize below.

Sato and Dobashi (2016) propose that the *that*-trace violation in English has its roots in the prosodic constant, stated in (51), which prohibits the creation of a prosodic phrase solely based on a function word such as the complementizer *that*.

(51) Function words cannot form a prosodic phrase on their own.[8] (Sato and Dobashi 2016:333)

Among various arguments for this prosodic analysis is the observation made by Drury (1999) and Kandybowicz (2006) that the *that*-trace violation is mitigated by contrastive focus stress on the subordinate verb. This observation is illustrated by the contrast between (52a) and (52b).

(52) a. * Who$_i$ do you think that t_i wrote Barriers?
b. √/ (?) Who$_i$ do you think that t_i WROTE *Barriers* (as opposed to, say, *edited it*)?
((52b) from Kandybowicz 2006:222)

Sato and Dobashi propose that the alleviation effect in question is explained as a natural consequence of post-syntactic semi-global adjustments triggered by focus-restructuring rule on the default prosodic structure created by phase-theoretic syntactic computations. More specifically, they assume Dobashi's (2003) phase-theoretic algorithm of the syntax-prosody mapping, which, with details aside, essentially yield the prosodic phrasing, shown in (53), for neutral English SVO sentences (Nespor and Vogel 1986; cf. Selkirk's (1978, 1984, 1986, 1996) Prosodic Hierarchy in (7)).

(53) $(\text{C Subj})_\varphi$ $(\text{T v V})_\varphi$ $(\text{Obj})_\varphi$

[8] Sato and Dobashi suggest that the condition, in turn, can be derived from the interaction of the Lexical Category Condition (Truckenbrodt 1999) with Prosodic Vacuity (Kandywbociz 2015), within the Match Theory (Selkirk 2011).

As for the actual implementation of focus-sensitive readjustment rules, they assume the leftward focus restructuring rule as shown in (54).

(54) Leftward Focus Restructuring Rule: English
If some word in a sentence bears focus, place a φ-phrase boundary at its right edge, and join the word to the φ-phrase on its left. (Kenesei and Vogel 1995:28)

The rule in (54) is independently supported by data pertaining to the interaction of the rhythmic stress rule and φ-phrase boundary. It is commonly held that the application of the Rhythmic Rule – a rule that avoids the clash of two otherwise adjacent primary word stresses –is governed by a prosodic phrase φ-boundary (see Selkirk 1978 and Nespor and Vogel 1986, for example). With this background in mind, consider English examples in (55).

(55) a. It's hard to outcláss Délaware's football team.
b. It's hard to óutclass DÉLAWARE'S football team. (Kenesei and Vogel 1995:19, 22)

The Rhythmic Stress Rule does not apply between the verb and the possessor of the direct object in (55a) because the two constituents are contained in two different φ-phrases, as witnessed in its default prosodic structure in (56a) (see also (53)). However, when contrastive focus is placed on the possessor of the direct object, the Rhythmic Stress Rule may apply, as shown in (55b). This pattern is correctly captured by the leftward Focus Restructuring Rule in (54). This rule has the effect of removing the left boundary of the original φ-phrase that contained a focused constituent so that it may be restructured into another φ-phrase to its left. This modification, then, gives rise to the revised prosodic structure shown in (56b), where *outclass* and *DELAWARE* are within the same φ-phrase, a precondition for the Rhythmic Stress Rule to apply.

(56) a. (It's hard)$_{\varphi}$ (to outcláss)$_{\varphi}$ (Délaware's)$_{\varphi}$ (football team)$_{\varphi}$.
b. (It's hard)$_{\varphi}$ (to óutclass DÉLAWARE'S)$_{\varphi}$ (football team)$_{\varphi}$.
(adopted from Kensei and Vogel 1995:31, with a slight modification)

Returning now to the alleviation effect of contrastive focus on the *that*-trace effect, the examples in (52a, b) are now assigned the prosodic representations shown in (57a) and (57b), respectively, as the combined effect of the phase-theoretic mapping in (53) and the Leftward Focus Restructuring Rule in (54).

(57) a. * Who$_i$ do you think $\boxed{\text{(that } t_i\text{)}}$ (wrote)$_{\varphi}$ (*Barriers*)$_{\varphi}$?
b. Who$_i$ do you think $\boxed{\text{(that } t_i \text{ WROTE)}_{\varphi}}$ (*Barriers*)$_{\varphi}$?
((57b) from Sato and Dobashi 2016:340)

In (57a), the archetypical *that*-trace effect is obtained because the complementizer *that* forms a φ-phrase on its own, in violation of the prosodic condition in (51). In (57b), on the other hand, the same *that* forms a φ-phrase with the embedded verb *wrote* thanks to the application of the Leftward Focus Restructuring Rule, thereby evading the violation of the relevant condition.

In sum, Sato and Dobashi's (2006) study on the *that*-trace effect, together with our current study reported here, brings one important lesson to the forefront of minimalist investigations of the syntax-phonology interface, a point also reiterated by Kratzer and Selkirk (2007) in their study of the proper formulation of the Nuclear Stress Rule. Cyclic Spell-Out yields only a skeletal prosodic representation for the purposes of prosodic phrasing; cumulative results of Cyclic Spell-Out then may be subject to further (probably language-specific) domain-specific adjustments to give rise to the complete phonological form before it is externalized for use at the Articulatory-Perceptual System. This consideration, therefore, strongly argues for a model of human language which incorporates both derivational computational procedures and semi-global syntax-external adjustments on their outputs.

5. Conclusions

In this paper, we have argued that the effects of focus intonation on inverse scope interpretation in SOV sentences in Japanese, first observed by Kitagawa (1994) and later discussed by Watanabe (2000), receive a principled explanation under our phase-based theory of syntax-prosody mapping. We have also shown that our analysis correctly accounts for otherwise unrelated scope phenomena concerning partial negation, the interpretations of the topic marker *wa* and particle stranding ellipsis. To the extent that our analysis that combines insights from both recent phase-based theories of the syntax-prosody mapping (Ishihara 2007; Kratzer and Selkirk 20070 and independently motivated principles of focus-restructuring (Nagahara 1994; Kenesei and Vogel 1995) is on the right track, our study strongly suggests that local computations interact with semi-global interface computations to a limited extent, meaning that C_{HL} requires both derivational and representational systems. Our study, therefore, necessitates seriously reconsideration of the time-honored view of the syntax-external phonological component as a merely "ornamental" component of C_{HL}: rather, it may well be that the phonological component can make use of its autonomous operations independent of syntax to sanction a range of new interpretive outcomes albeit only within a narrow range of options made available by universal principles of syntax with independently motivated principles of prosody.

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