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著者名(英)	YUKIKO UEDA
journal or publication title	Scientific approaches to language
volume	3
page range	221-239
year	2004-03-30
URL	http://id.nii.ac.jp/1092/00000105/

FQ Subjects and Scope in Minimalist Syntax

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Ueda (2000, 2002, 2003a, 2003b) propose a new scope calculation system named a *phase*-based approach. The new system treats scope calculation as a feature-matching operation in C_{HL}. We call this matching operation *F_{quant}-matching*. On the basis of our new approach to scope calculation, this paper explores scope interpretation in sentences with floating quantifiers (henceforth FQs), focusing on the case in which FQs appear in the subject position. We call subjects of this type *FQ subjects*. We observe interesting scope phenomena concerning FQs, which are problematic data for previous analyses. It is demonstrated that the mysterious scope facts in FQ subject constructions with and without scrambling are reducible to our *phase*-based approach.

Introduction

Ueda (2000, 2002, 2003a, 2003b) propose a new scope calculation system named a *phase*-based approach. The new system treats scope calculation as a feature-matching operation between more than one

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This paper is a revised version of my Ph.D dissertation submitted, in partial fulfillment of the requirements for the degree of Doctor of Philosophy to Graduate School of Language Sciences at Kanda University of International Studies.

I am grateful to Sandiway Fong, Kazuma Fujimaki, Nobuko Hasegawa, Kazuko Inoue, Taketo Ito, Hideki Maki, Roger Martin, Shigeru Miyagawa, Tomohiro Miyake, Edson T. Miyamoto, Masatake Muraki, Masao Ochi, Naoko Okura, Masaki Sano, Hiroaki Tada, Koichi Takezawa, Keiko Watanuki, Masashi Yamada, and all the audiences at *the Kotoba to Bunka Seminar* at Ritsumeikan University on July 17, 2003 for their invaluable comments and extensive discussion. My special thanks go to Masaki Sano for his insightful suggestions about the topic of this paper. The research reported here was supported in part by Japan Society for the Promotion of Science and by International Foundation for the Promotion of Language and Culture. All remaining errors are my own.

interpretable feature related to quantification (henceforth F_{quant}). We call this matching operation in C_{HL} *F_{quant}-matching*. It is shown that the working space of F_{quant}-matching is restricted by a syntactic unit *phases* and the system is subject to the Phase Impenetrability Condition (henceforth the PIC) proposed in Chomsky (2001), i.e., *Derivation by Phase*. Given the matching operation for scope calculation in C_{HL}, scope interpretation can be derivationally determined with only existent basic implements for sentence building, that is, *match* and *the PIC*. This is an attempt to propose an alternative scope system without relying on any movement, namely, Quantifier Raising (henceforth QR), Quantifier Lowering (henceforth QL), and A-movement for Case-checking.

In this paper, we will argue for the adequacy of our new scope system in terms of scope interpretations of FQs. It will be shown that mysterious scope facts concerning FQs are naturally accounted for without assuming any other special implement.

This paper is organized as follows. Section 1 will be a briefly introduction to the mechanism we assume, namely, the *phase*-based approach, proposed by Ueda (2000, 2002, 2003a, 2003b). In Section 2, three problematic data concerning FQs will be pointed out. We will demonstrate how the *phase*-based approach accounts for the complex scope phenomena with FQs in Section 3. Section 4 is a conclusion.

1. Ueda (2000, 2002, 2003a, 2003b): The *Phase*-Based Approach

1.1 Proposals

Ueda (2000, 2002, 2003a, 2003b) explore the correlation between NP-licensing positions and scope interpretation in Chomsky's (2000, 2001) framework. Under a series of QR analyses, it is widely assumed that English has QR at LF. Through the invisible operation at LF, (1a) permits an ambiguous scope reading between the subject QP and the object QP. Ueda (2000, 2002, 2003a, 2003b) propose an alternative view in which NP-licensing positions play a crucial role in scope interaction between two QPs. To see the point, consider the

following examples in terms of their NP-licensing heads[1]:

(1) a. ***Someone*** loves ***everyone***. (every > some, some > every)
b. ***Who*** does ***everyone*** love?
(^{OK} list answer: John loves Mary, Tom Susan, Roger Sara...)
c. ***Who*** loves ***everyone***?
(* list answer: John loves Mary, Tom Susan, Roger Sara...)

In (1a), the subject, *someone*, is licensed by T, whereas the object, *everyone*, is licensed by *v*. In (1b), the object *wh*-phrase, *who*, is licensed by C, the subject, *everyone* by T. On the other hand, in (1c), the subject *wh*-phrase, *who*, is licensed by C, whereas the object, *everyone*, by *v*. On the basis of the observation above, our first approximation to scope interaction is given in (2).

(2) Ambiguous readings and pair-list answer readings are impossible when two QPs in question are licensed by different heads which project an independent *phase*.[2]

There arises a question. What mechanisms correlate NP licensing positions in C_{HL} with scope interpretation restricted by a syntactic unit *phases*? As a possible answer to the question, we propose a new scope calculation system, in which scope calculation is treated as a Feature-matching operation in C_{HL} between features related to quantification, F_{quant}. We call this operation F_{quant}-*matching*. As far as *match* is one of the legitimate operations in C_{HL} (Chomsky (2000, 2001)), it follows that its application is restricted by a syntactic unit *phases* and is subject to the PIC. We call the new scope system *a* phase-*based approach*.

1.2 The mechanism and the assumptions

Before demonstrating our new scope mechanism, we summarize our assumptions. First, we crucially use Chomsky's (2001) *Derivation by Phase* version of PIC:

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[1] We use the term *license* in the following way: an NP is licensed if all the uninterpretable features of the NP are marked for deletion. Ueda (2000, 2002, 2003a, 2003b) call NPs of this type *deactivated NPs*. We will introduce this technical term in 1.2 in this paper.
[2] Following Chomsky (2000, 2001), we assume that *v*P and CP are *phases*.

(3) The Phase Impenetrability Condition

The domain of H is not accessible to operation at ZP, but only H and its edge.

$[_{ZP}\ Z \ldots [_{HP}\ [H\ YP]]]$

(where ZP and HP are strong phases) (Chomsky 2001)

The PIC is a syntactic condition, which restricts the size of 'working space' of syntactic operations and the timing of Spell-Out. (3) means that *YP*, which is a complement of a phase HP, cannot be accessible to operations at the next higher phase *ZP*, because the complement *YP* is spelled-out after the head *Z*, projecting the next phase *ZP*, merges with *HP*. (4) is a schematic structure of the visible domain at ZP-phase level.

(4) The boxed portions indicate the visible domain at ZP-phase

$[\boxed{_{ZP}\qquad Z \ldots [_{HP}\ \_\_\_}]\ [\boxed{H}\ YP]]]$

↑ ↑ edge head

strong phase strong phase

Second, we introduce a new notion *deactivated NPs*, given in (5), and tentatively assume (6) with respect to the timing of the application of the matching operation.[3]

(5) ***Deactivated NPs*** are NPs all of whose uninterpretable features are marked for deletion.

(6) The F_{quant}-matching operation applies to ***deactivated NPs***.

Furthermore, we assume that there is no object shift at least in English and Japanese through this paper. Specifically, object NPs are licensed by *v* and become deactivated NPs in situ.

Given the assumptions above, return to the subject. (1) is repeated as (7) and the schematic structures corresponding to (1a)-(1c) are given in (8). (8a), (8b), and (8c) are the structures immediately after the two QPs in each sentence become deactvated NPs in the derivation. The boxed portions are the visible domains of the higher QP.

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[3] We will revise (6) in Section 3.

(7) = (1)

a. ***Someone*** loves ***everyone***. (every > some, some > every)

b. ***Who*** does ***everyone*** love?

(^{OK} list answer: John loves Mary, Tom Susan, Roger Sara...)

c. ***Who*** loves ***everyone***?

(* list answer: John loves Mary, Tom Susan, Roger Sara...)

(8) a. [$_{TP}$ T [$_{vP}$ ***someone*** v [$_{VP}$ loves ***everyone***]]].

F_{quant} F_{quant} $\rightarrow {}^{OK}F_{quant}$-matching

b [$_{CP}$ C [$_{TP}$ ***everyone***$_i$ T [$_{vP}$ ***who***$_j$ [$_{vP}$ t_i v [$_{VP}$ loves t_j]]]]?

F_{quant} F_{quant} $\rightarrow {}^{OK}F_{quant}$-matching

c. [$_{CP}$ C [$_{TP}$ ***who*** T [$_{vP}$ t_i v [$_{VP}$ loves ***everyone***]]]?

F_{quant} $F_{quant} \rightarrow {}^{*}F_{quant}$-matching

Unlike (8a) and (8b), in (8c), the object QP, *everyone*, which is licensed by *v*, is invisible to the subject QP, *who*, at [Spec, TP], because the VP is spelled out when C merges with TP. Recall that not until C merges with TP, are all the uninterpretable features of *wh*-phrases marked for deletion (See (5) and (6)). Therefore, in (7c)(= (1c) and (8c)), the subject QP, *who*, cannot enter *F_{quant} matching* with the object QP, *everyone*, resulting in no pair list answer. The unique answer to (7c) is the wide scope reading of the subject *wh*-phrase, *who*, in canonical order. On the contrary, (7a) and (7b) permit F_{quant}-matching. In (8a), the object QP, *everyone*, is licensed by *v*, whereas the subject QP, *someone*, by T. When T merges with *v*P, the subject QP becomes a deactivated NP by uninterpretable Case-feature marking and can enter the F_{quant}-matching operation with the object QP at [Spec, *v*P]. Thus, (7a) has an ambiguous reading, namely, an inverse scope reading through F_{quant}-matching in C_{HL} and a wide scope reading of the subject QP, *someone*, in canonical word order at LF. In (7b), not until C merges with TP, does the object *wh*-phrase, *who*, become a deactivated NP at the higher spec of *v*P. In addition, the complement of *v*P, namely, VP, is spelled out. However, the subject QP, *everyone*, has already undergone the movement to [Spec, TP] because the EPP-feature of T must be satisfied before C merges with TP. At this point of the derivation given in (8b), the two QPs,

namely, subject QP, *everyone*, and the object QP, *who*, become deactivated NPs and stay in the same CP-phase domain. Thus, F_{quant}-matching is possible between them, resulting in the pair-list answer.

Jun Abe (personal communication) suggests an alternative view in which the F_{quant}-matching operation applies to relevant QPs after spell-out at every strong phase. However, we are against this idea. Using Polarity Items, we claim that QPs should enter the matching operation as soon as more than one target QP becomes deativated NPs without waiting for the time of spell-out. The crucial examples are given in (9).

(9) a. Some student or other hasn't answered many of the questions on the exam. (some > *many*, **many* > some: as a PPI reading)
b. Two students or other hasn't answered many of the questions on the exam. (*two* > *many*, many > *two*)

The contrast in (9) indicates that the subject QPs should not be a probe of F_{quant}-matching at [Spec, TP], but at [Spec, *v*P] before the EPP satisfaction. As shown in (10), F_{quant}-matching is possible both in (10a) and (10b), where the complement of *v*P-phase is still visible to the both subject positions, [Spec, TP] and [Spec, vP], without being spelled-out, because T is not a strong phase.

(10) a. F_{quant}-matching after the EPP-satisfaction

$[_{TP}\ \textbf{\textit{some}}_i \quad T\ [\ NEG\ [_{vP}\ \ t_i \quad v\ [_{VP}\ V \quad \textbf{\textit{many}}\ ]]]]$.

F_{quant} F_{quant}

b. F_{quant}-matching before the EPP-satisfaction

$[_{TP} \quad T\ [\ NEG\ [_{vP}\ \textbf{\textit{some}} \quad v\ [_{VP}\ V \quad \textbf{\textit{many}}\ ]]]]$.

F_{quant} F_{quant}

Next, take PPI-licensing in Negative sentences into consideration. If we assume that the F_{quant}-matching operation were executed at [Spec, TP] after the EPP satisfaction as in (10a), then the PPI subject, *some student*, cannot avoid the application of the matching operation at [Spec, TP], because the PPI subject can be appropriately licensed at [Spec, TP] outside of NEG and the object, *many of the questions*, is still in the same domain without being spelled-out. This wrongly

predicts that (9a) has an inverse scope reading, namely, a wide scope of *many*. On the other hand, given the application before EPP satisfaction as in (10b), F_{quant}-matching is impossible only in (9a), resulting in no inverse scope reading, because the PPI subject at [Spec, *v*P] is not appropriately licensed under the NEG. However, in (9b), where the subject QP does not require such a licensing condition, thus, the subject QP can enter the matching operation at [Spec, *v*P] and has an inverse scope reading. Therefore, we conclude (11) with respect to the timing of the application of the F_{quant}-matching operation.

(11) As far as the PIC permits, the F_{quant}-matching operation applies to target QPs as soon as both of them become deactivated NPs, but before their EPP-satisfaction.

On the basis of the assumptions, in the subsequent section, we will demonstrate that various scope facts are reducible to the *phase*-based scope system cross-linguistically.

1.3 English, Japanese, and Greek/Catalan

It has been discussed that NP-licensing positions and scope interpretation are closely related and the F_{quant}-matching operation is restricted by a syntactic unit *phases*.

Exactly the same correlation between the syntactic positions and the availability of inverse scope can be observed in Greek/Catalan and Japanese. In (12)-(13), (a)-sentences disallow ambiguous readings, whereas (b)-sentences allow them. It is reported that subjects of (a)-sentences in those languages are in CP-layer, higher than TP and show A'-status, whereas subjects in (b)-sentences are *v*P-internally licensed and show A-status (Alexiadou and Anagnostopoulou:1998, Fukui:1984, 1986, Ueda:2000, 2002, 2003a, 2003b).[4] In both languages, F_{quant}-matching is disallowed between two QPs in different *phase* domains.

[4] See Ueda (2002, 2003a, 2003b) for detailed discussion of subject positions. With respect to the mechanism of the EPP-satisfaction of T, see also Ueda (2002) for Japanese and Alexiadou and Anagnostopoulou (1998) for Greek and Catalan.

(12) Greek: pre/post-verbal subject constructions

a. SVO: some > every, *every > some → * F_{quant}-matching

Kapios fititis stihiothetise ***kathe arthro.***

some student filed every article

'There is some student, who filed every article.'

[CP C [TP stihiothetise [vP ***some student*** [VP ***every article***]]]].

F_{quant} F_{quant}

b. VSO: some > every, every > some → $^{OK}F_{quant}$-matching

Stihiothetise **kapios fititis** ***kathe arthro.***

filed some student every article

'There is some student, who filed every article.'

'Every article was filed by a different student.'

[TP Stihiothetise [vP ***some student*** [VP ***every artucle***]]].

F_{quant} F_{quant}

(Alexiadou and Anagnostopoulou:1998)

(13) Japanese: *ga-kara* alternating constructions

a. *ga*-subject: some > every, *every > some → *F_{quant}-matching

Dareka-ga dono tegami-mo okut-te-oi-te-kudasai.

someone-**GA** every letter send-TE-put-TE-imperative

'I hope that there is someone who sends every letter.'

[CP [TP [vP ***someone-GA*** [VP ***every letters*** V] v] T] C].

F_{quant} F_{quant}

b. *kara*-subject: some > every, every > some → $^{OK}F_{quant}$-matching

Dareka-kara dono tegami-mo okut-te-oi-te-kudasai.

someone-from every letter send-TE-put-TE-imperative

'I hope that there is someone who sends every letter.'

'I hope that each letter is sent by someone.'

[TP [vP ***someone-kara*** [VP ***every letter*** V] v] T].

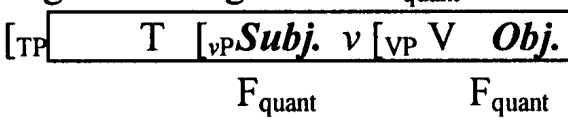
F_{quant} F_{quant}

(Ueda: 2002, 2003a, 2003b)

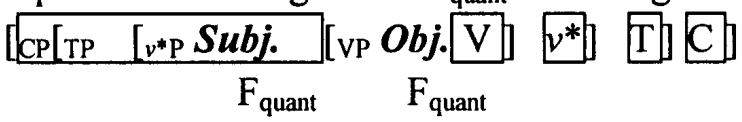
Finally, one of the most typical scopal contrasts between English and Japanese given in (14), which has been discussed as a parametric language variation of QR, is accounted for in the following way.

(14) a. English: some > every, every > some $\rightarrow$ $^{OK}F_{quant}$-matching
Someone loves everyone.
b. Japanese: some > every, *every > some $\rightarrow$ $^{*}F_{quant}$-matching
Dareka-ga daremo-o aisitei-ru.

(15) a. English: ambiguous: $^{OK}F_{quant}$-matching



b. Japanese: unambiguous: $^{*}F_{quant}$-matching



(15a) and (15b) are schematic structures of (14a) and (14b) respectively. English subject QP becomes a deactivated NP when its uninterpretable Case-feature is marked for deletion by T. Thus, English subject QP can be a probe for F_{quant}-matching at the completion of TP. Therefore, in English, the object QP is visible to the subject QP in [Spec, *v*P], because TP is not a strong phase and the complement of *v*P, namely, VP, is not spelled-out yet. As the result, F_{quant}-matching is possible between the subject QP and the object QP in English, resulting in an inverse scope reading at LF. Thus, (14a) is two-way-ambiguous at LF. One is the wide scope reading of the existential quantifier *someone* in the canonical order. The other is the inverse scope reading via F_{quant}-matching On the other hand, C, rather than T involves in *ga*-marking in Japanese (See Ueda 2002, 2003a, 2003b). That is, Japanese *ga*-marked subjects can be a deactivated NP at the completion of CP. When C merges with TP, the complement of the lower strong phase *v*P, namely, VP, is spelled-out and the object QP is invisible to the subject QP. Thus, F_{quant}-matching is impossible. Therefore, Japanese shows the fixed scope in canonical order.

2. The Facts: Problematic Data with FQs

This section explores three mysterious scope facts in sentences with so-called Floating Quantifiers (henceforth FQs). The first mystery is the case of an FQ subject without scrambling. As shown in the

previous section, Japanese is one of the rigid-scope languages in the canonical word order, especially in *ga*-marked subjects. However, once quantifiers are placed outside of Case-markers as in (16b), they behave differently in scope taking as shown in (17). Unlike (17a), (17b) has an ambiguous reading.

(16) a. Q-NP: [3-nin no gakusei]-ga
3-CL Gen student-Nom
'three students'

b. FQ: [gakusei]$_i$-ga 3-nin$_i$[5]
student-Nom 3-CL
'three students'

(17) a. Q-NP subject: unambiguous (3 > every, *every > 3)
[*3-nin no sensei*]-ga dono gakusei mo sidoositeiru.
3-CL Gen teacher-Nom every teacher supervise
'There are three teachers, who supervise every student.'
*'As for the student, each of them is supervised by three teachers.'

b. FQ-subject: ambiguous (3 > every, every > 3)
[*Sensei*]$_i$-ga *3-nin*$_i$ dono gakusei mo sidoositeiru.
teachers-Nom 3-CL every book supervise
'There are three teachers, who supervise every student.'
'As for the students, each of them is supervised by three teachers.'

There is quite a clear contrast between (17a) and (17b). This fact results in overruling the status of Japanese as a rigid scope language. The contrast in (17) should be accounted for without assuming any additional implements such as Quantifier Raising and Quantifier Lowering including reconstruction.

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[5] Quantifiers of this type have been called *Floating Quantifiers*, which are morphologically realized as the sequence *NP-Case-Q*. The term *Floating Quantifier* comes from analyses which syntactically move the quantifier. Sportiche (1988) proposes an alternative analysis in which not the quantifier but the NP moves out and hence the quantifier is 'strand' rather than 'floated'. Ishii (1998) calls quantifiers of this type *NP-quantifiers*. Dowty and Brodie (1984) propose that floating quantifiers are not NP quantifiers, but quantificational adverbials modifying VP-predicates. Ishii (1998) calls quantifiers of this type VP-quantifiers. Moreover, Ishii (1998) claims that the two types of quantifiers, namely, NP-quantifiers and VP-quantifiers, coexist in Japanese. For the sake of convenient, we call quantifiers with the sequence NP-Case-Q *floating quantifiers* (henceforth FQs) through this paper, whether they are derived by a quantifier movement or not.

The second mystery concerning FQs is the case of an FQ object with scrambling. (18) is the most typical example originally noted by Hasegawa (1993).

(18) a. Q-NP$_i$ Q-NP t_i: ambiguous (3 > every, every > 3)
[*3-nin no gakusei*] -o$_i$ dono sensei mo t_i sidoositeiru.
3-CL Gen student-Acc every teacher supervise
'There are three students, who are supervised by every teacher.'
'As for the teachers, each of them supervises three students.'

b. FQ$_i$ Q-NP t_i: unambiguous (*FQ3 > every, every > FQ3)
[[*Gakusei*]-*o*$_i$ *3-nin*]$_i$ dono sensei mo t_i sidoositeiru.[6]
student-Acc 3-Cl every teacher supervise
*'There are three students, who are supervised by every teacher.'
'As for the teachers, each of them supervises three students.'

Hasegawa (1993) proposes an insightful view, in which FQs have an adverbial status and function as an A'-quantifier, and claims (19).

(19) FQs must go back to their theta-position when they are interpreted.

Hasegawa's (19) succeeds in accounting for the contrast given in (18).[7] Hasegawa's (19), however, wrongly predict that the case exemplified by (20b), in which an FQ appears in the subject position would be ambiguous. In (20b), even if the FQ subject, *sensei-ga 3-nin* 'student-Nom 3-CL' goes back to its theta-position, following (19), the subject c-commands the trace of the scrambled object, resulting in an ambiguous scope reading. This is the third mystery.

[6] Note that there is a clear contrast between (17b) and (18b).

[7] Hasegawa (1993) assumes Hoji's (1985) generalization on Japanese scopal relation between quantified NPs given in (i).

(i) If a quantifier Q1 takes scope over another quantifier Q2, Q2 must c-command Q2 or a trace of Q2 at S-structure.

(20) a. Q-NP$_i$ Q-NP t_i: ambiguous (every > 3, 3 > every)
Dono gakusei mo$_i$ 3-nin no sensei-ga t_i sidoositeiru.
every student 3-CL Gen teacher-Nom supervise
'As for the students, each of them is supervised by three teachers.'
'There are three teachers, who supervise every student.'

b. Q-NP$_i$ FQ t_i: unambiguous (every > 3, *3 > every)
Dono gakusei mo$_i$ sensei-ga 3-nin t_i sidoositeiru.
every student teacher-Nom 3-CL supervise
'As for the students, each of them is supervised by three teachers.'
*'There are three teachers, who supervise every student.'

In Section 4, it is shown that our *phase*-base approach succeeds in giving a unified account to the complex scope facts concerning FQs.

3. Scope Taking of FQs: The *Phase*-Based Approach

In section 2, it was pointed out that FQ subjects behave differently from other QPs. What we can conclude from the data described in the previous section is that FQs can never take scope over a preceding QP, regardless of their surface syntactic positions, but FQ subject with the canonical order can, namely, subject-object order without any scrambling.

First, let us begin with the case of an FQ object with scrambling, which is repeated here as (21) . (21) is the most typical example noted by Hasegawa (1993). With respect to (21), our *phase*-based approach accounts for the contrast without assuming any reconstruction (cf. Hasegawa's (19) in Section 2).

(21) a. Q-NP$_i$ Q-NP t_i: ambiguous (3 > every, every > 3)
[*3-nin no gakusei*] -o$_i$ dono sensei mo t_i sidoositeiru.
3-CL Gen student-Acc every teacher supervise
'There are three students, who are supervised by every teacher.'
'As for the teachers, each of them supervises three students.'

b. FQ_i Q-NP t_i: unambiguous (*FQ3 > every, every > FQ3)
[[*Gakusei*]-o_i *3-nin*]$_i$ dono sensei mo t_i sidoositeiru.[8]
student-Acc 3-Cl every teacher supervise
*'There are three students, who are supervised by every teacher.'
'As for the teachers, each of them supervises three students.'

In order to treat the scope taking in FQs, we propose a small revision of the timing of the application of the F_{quant}-matching operation, discussed in Section 1.2. (22) is our tentative assumption proposed in Section1.2. We propose (23) as an alternative, which is a more general condition than before.

(22) The F_{quant}-matching operation applies to ***deactivated NPs***.
(23) The F_{quant}-matching operation applies between more than one F_{quant}, with the proviso that its application must be postponed until the host NP is deactivated when the F_{qaunt} is c-commanded by a Case-marker.

(23) indicates that F_{quant} of FQs takes its scope in situ and can enter F_{quant}-matching without waiting for the host NP licensing, because F_{quant} of FQs is outside of the host NPs as shown in (24). The isolation from the host NP is also supported by the position of Case-markers.

(24) a. Q-NP: [3-nin no gakusei]-ga
F_{quant} Gen student-Nom
'three students'
b. FQ: [gakusei]$_i$-ga 3-nin$_i$
student-Nom F_{quant}
'three students'

Furthermore, with respect to scrambling, we assume the followings:

(25) a. Scrambling is feature-driven.
b. Features related to scrambling ($F_{scrambling}$) are possessed by NPs.
c. Head C involves in the licensing of $F_{scrambling}$.

[8] Note that there is a clear contrast between (17b) and (18b).

Given (23) and (25), consider how our system accounts for the fact. (26a) and (26b) are the schematic structures corresponding to (21a) and (21b), respectively.

(26) a. Q-NP$_i$ Q-NP t_i: ambiguous (3 > every, every > 3)
[*3-nin no gakusei*] -o$_i$ dono sensei mo t_i sidoositeiru.
[$_{CP}$ ***every***$_i$ [$_{TP}$ [$_{vP}$ ***3nin-no gakusei***$_i$ [$_{vP}$ t_i] [$_{VP}$ t_j V] v] T] C]
F_{quant} F_{quant}

b. FQ$_i$ Q-NP t_i: unambiguous (*FQ3 > every, every > FQ3)
[[*Gakusei*]-*o*$_i$ *3-nin*]$_i$ dono sensei mo t_i sidoositeiru.
[$_{CP}$ [$_{TP}$ [$_{vP}$ ***every***] [$_{VP}$ *gakusei-o* ***3nin*** V] v] T] C]
F_{quant} F_{quant}

In (26a), not until C merges with TP, do both F_{quant}s enter F_{quant}-matching. At this point, they stays in the same phase domain. That is why (26a) has an ambiguous reading. Contrary to (26a), F_{quant} of the object FQ takes its scope VP internal position. However, the subject Q-NP, *dono-sensei mo* 'every teacher', must wait for the application of the matching operation until it becomes a deactivated NP, namely, until C merges with TP. C merges with TP, when the complement of the lower phase is spelled-out and F_{quant} of the object FQ becomes invisible to the subject Q-NP. In (26b), the subject QP and the object FQ are in different phases. Thus, F_{quant}-matching does not apply to them, resulting in an unambiguous reading; namely, the QP subject takes scope over the FQ object regardless of whether or not the object is scrambled over the subject.

Next consider (19), repeated here as (27), where the scrambled object is a QP, but the subject is an FQ.

(27) a. Q-NP$_i$ Q-NP t_i: ambiguous (every > 3, 3 > every)
Dono gakusei mo$_i$ 3-nin no sensei-ga t_i sidoositeiru.
every student 3-CL Gen teacher-Nom supervise
'As for the students, each of them is supervised by three teachers.'
'There are three teachers, who supervise every student.'

b. Q-NP$_i$ FQ t_i: unambiguous (every > 3, *3 > every)
Dono gakusei mo$_i$ sensei-ga 3-nin t_i sidoositeiru.
every student teacher-Nom 3-CL supervise
'As for the students, each of them is supervised by three teachers.'
*'There are three teachers, who supervise every student.'

As we mentioned in Section 2, previous analyses wrongly predict that the case exemplified by (27b) is *ambiguous*, contrary to fact.

Our *phase*-based approach appropriately predicts the unambiguous reading, namely, a scrambled QP object alone can take scope over the FQ subject. (28) is the schematic structure of (27).

(28) a. Q-NP$_i$ Q-NP t_i: ambiguous (every > 3, 3 > every)
Dono gakusei mo$_i$ 3-nin no sensei-ga t_i sidoositeiru.
[CP [TP [vP ***every***$_i$ [vP ***3-nin no seisei***] [VP t_j V] v]] T] C]
F_{quant} F_{quant}

b. Q-NP$_i$ FQ t_i: unambiguous (every > 3, *3 > every)
Dono gakusei mo$_i$ sensei-ga 3-nin t_i sidoositeiru.
[CP [TP [vP ***every***$_i$ [vP *sensei-ga*] [VP ***3nin*** [VP t_j V] v] T] C]][9]
F_{quant} F_{quant}

In (28a), the scrambled object QP and the subject QP become deactivated NPs when C merges with TP. At this point, both QPs are in the same phase. Thus, the operation of F_{quant}-matching applies to them. Therefore, (28a) becomes ambiguous. On the other hand, F_{quant} of the FQ subject in (28b) takes its scope in VP adjoined position. The scrambled object becomes a deactivated NP when C, which involves in licensing scrambled elements, merges with TP at the outer Spec of vP. At the same time, the complement of the lower *phase*, namely, VP, is spelled out. Thus, F_{quant} of the FQ is not visible to the scrambled object. F_{quant}-matching is impossible between them. Therefore, (28b) permits only the wide scope reading of the scrambled QP in the surface word order.

[9] Following Dowty and Brodie (1984), we tentatively assume floated quantifiers adjoin to the VP in this paper. As noted in fn.6 in this paper, many analyses of FQ structures have been proposed. Unfortunately, we do not have enough time to discuss which analysis is the most plausible in this paper. We leave this issue open for future studies.

The final mystery is the case of FQ subjects without scrambling, which is repeated here as (29).

(29) a. Q-NP subject: unambiguous (3 > every, *every > 3)
[*3-nin no sensei*]-ga dono gakusei mo sidoositeiru.
3-CL Gen teacher-Nom every teacher supervise
'There are three teachers, who supervise every student.'
*'As for the student, each of them is supervised by three teachers.'

b. FQ-subject: ambiguous (3 > every, every > 3)
[*Sensei*]$_i$-ga *3-nin*$_i$ dono gakusei mo sidoositeiru.
teachers-Nom 3-CL every book supervise
'There are three teachers, who supervise every student.'
'As for the students, each of them is supervised by three teachers.'

The contrast between (29a) and (29b) can be naturally accounted for under our *phase*-based approach. (30) is the schematic structure of (29).

(30) a. Q-NP subject: unambiguous (3 > every, *every > 3)
[*3-nin no sensei*]-ga dono gakusei mo sidoositeiru.
[CP [TP [vP ***3-nin no sensei***] [VP ***every*** V] v] T] C]
F_{quant} F_{quant}

b. FQ-subject: ambiguous (3 > every, every > 3)
[*Sensei*]$_i$-ga *3-nin*$_i$ dono gakusei mo sidoositeiru.
[CP [TP [vP *sensei-ga* [VP ***3-nin*** [VP ***every*** V]] v] T] C]
F_{quant} F_{quant}

With respect to the case of (29a)(=(30a)), the subject QP and the object QP are in different phases when both of them are deactivated. Thus they cannot enter an F_{quant}-matching relation, resulting in an unambiguous scope reading, namely, a wide scope reading of the QP subject alone is permissible. As for (29b), F_{quant} of FQs takes its scope in situ without waiting for the host NP licensing. The object QP becomes a deactivated NP when *v* merges with VP. At this point of the derivation, both F_{quant}s can enter the F_{quant}-matching relation. Therefore, (29b) (=(30b)) is interpreted ambiguously.

To sum up, the mysterious scope taking in the cases of FQs with

and without scrambling are naturally predictable using our *phase*-based system for scope calculation without assuming any movement including reconstruction.

4. Conclusion

In this paper, we demonstrated how the *phase*-based approach accounts for the more complex scope phenomena in Japanese. It was shown that the mysterious scope facts concerning FQs, especially in the subject position, with and without scrambling are reducible to our *phase*-based approach.

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