W-1-3

Head Movement does not Necessarily Affect Scopal Relations: Arguments from Syntax and Semantics*

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1 Introduction

Null objects in Japanese are analyzed via Argument Ellipsis (or *pro*) (Oku 1998) or Head-stranding Ellipsis (Otani and Whitman 1991), the latter of which presumes syntactic Head Movement (**HM**). Sato and Hayashi (2018) and Sato and Maeda (2021) have recently argued that Japanese has syntactic HM with novel evidence of verb-echo answers in (1), in which HM changes scopal relations between the verbal complex and the other scope-bearing elements. Although *-dake* 'only' in Japanese obligatorily takes wide scope over negation, as illustrated in (1c), a verb-echo answer in (1b) lacks the *-dake* > NEG interpretation (*It is only bread that Taro didn't eat). They claim that (1b) has NEG > *-dake* reading instead, and the alleged scope-reversal effect observed in (1b) is due to syntactic verb-raising accompanying NEG.

(1) a. Taro-wa pan-dake tabe-ta-no?
Taro-TOP bread-only eat-PST-Q
'Did Taro eat only bread?'

b. Tabe-nakat-ta-yo.
eat-NEG-PST-PRT
Lit. 'Didn't eat.'(*-*dake* > NEG, NEG > -*dake*)

c. Taro-wa pan-dake tabe-nakat-ta.
Taro-TOP bread-only eat-NEG-PST
'It is only bread that Taro didn't eat.'
(-*dake* > NEG, *NEG > -*dake*)

Against this backdrop, we demonstrate that it is inconclusive that syntactic HM changes scopal relations from both syntactic and semantic perspectives. Syntactically, it is unclear whether NEG inside the complex head takes scope over the scope-bearing object after HM because the previous studies do not explicitly formulate how to implement traditional HM operations within the current Minimalist model (Chomsky 2021). Semantically, syntactic verbal HM must undergo obligatory reconstruction in the semantic component (Cresti 1995, Rullmann 1995) due to the presence of a higher type trace left behind by a verb; hence, the putative scope-reversal effects that Sato and Hayashi (2018) and Sato and Maeda (2021) discuss cannot be derived in the way that they argue.

2 Arguments from Syntax

Syntactic discussion on scope relations requires identification of c-command relations between scope-bearing elements. Therefore, in order to argue for the scope-reversal effect of HM, it is necessary to confirm that the movement can change c-command relations between those elements in the first place. To this end, suppose that syntactic HM is implemented via head-to-head adjunction as was widely assumed in the GB era. In that case, NEG in the complex head can c-command the scope-bearing object inside the TP, according to an oft-cited definition of c-command in (2) (Chomsky 1986:8, et seq.):

(2) X c-commands Y iff every category that dominates X also dominates Y and X does not dominate Y and Y does not dominate X. (cf. Funakoshi 2014:5)

For the sake of ease of exposition, let us observe (3) and see whether NEG inside the complex head c-commands the scope-bearing object inside the TP. If we employ the definition in (2), then the c-commanding domain of NEG is identified as TP because the category (not a segment) that dominates NEG is CP. Thus, every category that dominates NEG also dominates TP. Moreover, NEG does not dominate TP and vice versa. Strictly applying Chomsky's definition of c-command in (2), it seems that it is possible for a scope-bearing head inside a verbal complex to c-command a scope-bearing XP outside of it after syntactic HM.[1]

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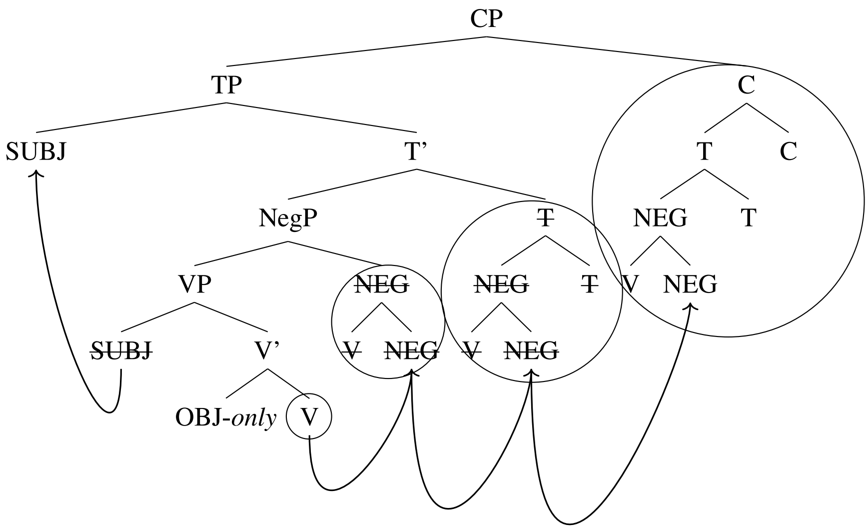
1. Cases where HM does not target another head (i.e., head-to-spec movement) are discussed in Section 3.2. Note that the tree diagram here is just for the sake of exposition. Syntactic objects created by Merge/MERGE could be described in set-theoretic notation, but we refrain from doing that here for ease of understanding.

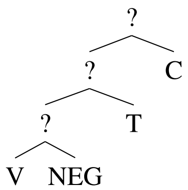
(3)



However, the definition in (2) relies heavily on the category-segment distinction of the GB era, which cannot be maintained as is in the current Minimalist model (cf. Chomsky 2021). Below, we demonstrate that once we depart from the category-segment distinction, the above story no longer holds.

C-commanding relations are considered to be derived from sister relations created via MERGE. If Set-MERGE is the only means of structure building in syntax, then the complex head in (3) should also be created via Set-MERGE. As long as Set-MERGE is applied, the sister relation comes for free, and so does the c-command relation. Therefore, the c-commanding domain of NEG should be V, which is the sister of NEG, as illustrated in (4).

(4)



One might say that syntactic HM can be implemented via Pair-Merge (Chomsky 2000) (or even Pair-MERGE) in the current Minimalist model. However, again, it is not obvious whether NEG c-commands the scope-bearing object out of the Pair-Merged verbal complex, $\langle\langle\langle V, NEG\rangle, T\rangle, C\rangle$; hence, the same problem arises here as well. In this connection, we briefly touch on Kobayashi and Tanabe's (2024) discussion on reanalyses of Pair-Merge/MERGE as Set-Merge/MERGE. Omune (2018) proposes that Pair-Merge of heads is reformulated by Set-Merge as in (5), as this relation holds set-theoretically. An unordered set created via Set-Merge/MERGE in (5) represents a head adjunction structure created by Pair-Merge/MERGE, where H_1 adjoins to H_2.

(5) $\{H_1, \{H_1, H_2\}\} = \langle H_1, H_2\rangle$

Applying this to the Japanese V-NEG-T complex created via syntactic HM, we obtain the following structure in (6). Once we check the c-commanding relations based on sisterhood, we see that the only element NEG c-commands is V. Therefore, NEG cannot c-command any elements outside of this complex head by any means.

(6) $\{\{V, \{V, NEG\}\}, \{\{V, \{V, NEG\}\}, T\}\}$

As discussed in this section, the definition of c-command must be carefully considered to determine the scope relations. However, most of the previous studies have not sufficiently discussed this issue to the best of our knowledge, and we believe that the conceptual discussion in this section confirms that HM does not necessarily affect the c-commanding domain or the scope relations. Next, we turn to empirical problems of syntactic verb-raising from the semantic perspectives.

3 Arguments from Semantics

Even if the above syntactic problems could be solved, the HM analyses of null objects cannot derive the intended interpretations from the available composition rules under the framework of Heim and Kratzer (1998) and von Fintel and Heim (2011). Crucial for our discussion is the observation made by Keine and Bhatt (2016) based on the fact of German long passive. They point out that if V_2 undergoes HM to a scope-bearing verb V_1 as in (7), V_1 obligatorily takes narrower scope than any element within VP_1 (e.g., XP). In what follows, we demonstrate that the same fact is predicted to hold if V undergoes HM to NEG as in (3) and that the verbal HM does not lead to the intended scope-reversal effect.

(7) $[_{VP_1}\ [_{VP_2}\ \text{XP}\ V_2\ ]\ V_1\ ] \Rightarrow [_{VP_1}\ [_{VP_2}\ \text{XP}\ t_2\ ]\ [_{V_1}\ V_2\ V_1\ ]\ ]$ $(^{*}V_1 > \text{XP} / {}^{\checkmark}\text{XP} > V_1)$

3.1 Higher Type Traces and Semantic Reconstruction

In addition to Functional Application (FA) and Predicate Modification (PM), the two rules below are utilized to interpret a moved element under the assumption in (8c):

(8) a. Traces and Pronouns Rule (Heim and Kratzer 1998:111, slightly modified)
If α is a pronoun or a trace, g is a variable assignment, and $i \in \text{dom}(g)$, then $[\![\, \alpha_i \,]\!]^g = g(i)$.

b. Predicate Abstraction Rule (PA) (Heim and Kratzer 1998:186, slightly modified)
Let α be a branching node with daughters β and γ, where β dominates only a numerical index i. Then, for any variable assignment g, $[\![\, \alpha \,]\!]^g = \lambda x \in \text{D}.\ [\![\, \gamma \,]\!]^{g^{[i \to x]}}$.

c. A moved element leaves behind a trace with a numerical index i and the same index is adjoined right below the moved element to c-command the trace. (cf. Heim and Kratzer 1998:186)

The following example illustrates how the moved DP *John* is interpreted via these rules.

(9) $[_{\text{XP}_{\langle s,\, t\rangle}}\ [_{\text{DP}_e}\ \text{John}\ ]\ [_{\text{YP}_{\langle e,\, st\rangle}}\ 1\ [_{\text{ZP}_{\langle s,\, t\rangle}}\ t_{1_e}\ \text{came}_{\langle e,\, st\rangle}\ ]]]$

a. $[\![\, \text{YP} \,]\!]^g$ by PA
$= \lambda x.[\![\, \text{ZP} \,]\!]^{g^{[1 \to x]}}$ by FA
$= \lambda x.[\![\, \text{came} \,]\!]^{g^{[1 \to x]}}([\![\, t_1 \,]\!]^{g^{[1 \to x]}})$ by (8a)
$= \lambda x.[\lambda x.\lambda w.\ x \text{ came in } w](g^{[1 \to x]}(1))$
$= \lambda x.[\lambda x.\lambda w.\ x \text{ came in } w](x)$
$= \lambda x.\lambda w.\ x \text{ came in } w$

b. $[\![\, \text{XP} \,]\!]^g$ by FA
$= [\![\, \text{YP} \,]\!]^g([\![\, \text{DP} \,]\!]^g)$
$= [\lambda x.\lambda w.\ x \text{ came in } w](\text{John})$
$= \lambda w.\ \text{John came in } w$

Note that the semantic type of a trace is limited to the one that makes the node immediately dominating it interpretable. In (9), if the trace is of type *e*, FA can be applied to the ZP node because its sister, *came*, takes as its first argument an element of type *e*.

In the case of quantifiers, they are interpreted in different positions in the semantic component depending on their semantic type. For instance, if a moved quantifier leaves behind a trace of type *e*, it takes scope in its landing site.[2] As a result, the moved quantifier *everyone* in (10) takes wider scope than negation:

(10) $[_{\text{TP}_{\langle s,\, t\rangle}}\ [_{\text{DP}_{\langle\langle e,\, st\rangle,\, st\rangle}}\ \text{everyone}\ ]\ [_{\text{T}''_{\langle e,\, st\rangle}}\ 1\ [_{\text{T}'_{\langle s,\, t\rangle}}\ \text{does}_{\langle st,\, st\rangle}\ [_{\text{NegP}_{\langle s,\, t\rangle}}\ \text{not}_{\langle st,\, st\rangle}\ [_{\text{VP}_{\langle s,\, t\rangle}}\ t_{1_e}\ \text{come}_{\langle e,\, st\rangle}\ ]]]]]$

a. $[\![\, \text{not} \,]\!]^g = \lambda p.\lambda w.\ \neg p(w)$ $\langle st, st\rangle$
$[\![\, \text{everyone} \,]\!]^g$
$= \lambda P.\lambda w.\forall x[x \text{ is a person in } w \to P(x)(w)]$ $\langle\langle e, st\rangle, st\rangle$
$[\![\, \text{does} \,]\!]^g = \lambda p.p$ $\langle st, st\rangle$

b. $[\![\, \text{NegP} \,]\!]^g$ by FA and (8a)
$= [\lambda p.\lambda w.\neg p(w)]([\lambda w.\ g(1) \text{ comes in } w])$
$= \lambda w.\neg[\lambda w.\ g(1) \text{ comes in } w\ ](w)$
$= \lambda w.\ g(1) \text{ does not come in } w$

c. $[\![\, \text{T}' \,]\!]^g$ by FA
$= [\![\, \text{does} \,]\!]^g([\![\, \text{NegP} \,]\!]^g)$
$= [\lambda p.p](\lambda w.\ g(1) \text{ does not come in } w)$
$= \lambda w.\ g(1) \text{ does not come in } w$

d. $[\![\, \text{T}'' \,]\!]^g$ by PA
$= \lambda x.[\![\, \text{T}' \,]\!]^{g^{[1 \to x]}}$ by FA and (8a)
$= \lambda x.\lambda w.\ g^{[1 \to x]}(1) \text{ does not come in } w$
$= \lambda x.\lambda w.\ x \text{ does not come in } w$

e. $[\![\, \text{TP} \,]\!]^g$ by FA
$= [\![\, \text{DP} \,]\!]^g([\![\, \text{T}'' \,]\!]^g)$
$= [\lambda P.\lambda w.\forall x[x \text{ is a person in } w \to P(x)(w)]]$
$([\lambda x.\lambda w.\ x \text{ does not come in } w])$
$= \lambda w.\forall x[x \text{ is a person in } w$
$\to [\lambda x.\lambda w.\ x \text{ does not come in } w](x)(w)]$
$= \lambda w.\forall x[x \text{ is a person in } w$
$\to x \text{ does not come in } w]$ $(\forall > \neg)$

On the other hand, if a moved quantifier leaves behind a higher type trace (i.e., a trace of the same semantic type as that of the quantifier itself) as in (11), semantic reconstruction applies (see Cresti (1995), Rullmann (1995) a.o.). Consequently, the moved quantifier, although it is located in the derived position, is interpreted in its base-generated position in the semantic component, and the $\neg > \forall$ interpretation is obtained:

2. In what follows, we ignore the semantic contribution of T for ease of presentation, but nothing hinges on this.

(11) $[_{\text{TP}_{\langle s,\,t\rangle}}\, [_{\text{DP}_{\langle\langle e,\,st\rangle,\,st\rangle}}\ \text{everyone}]\ [_{\text{T}''_{\langle\langle\langle e,\,st\rangle,\,st\rangle,\,st\rangle}}\ 1\ [_{\text{T}'_{\langle s,\,t\rangle}}\ \text{does}_{\langle st,\,st\rangle}\ [_{\text{NegP}_{\langle s,\,t\rangle}}\ \text{not}_{\langle st,\,st\rangle}\ [_{\text{VP}_{\langle s,\,t\rangle}}\ R_{1_{\langle\langle e,\,st\rangle,\,st\rangle}}\ \text{came}_{\langle e,\,st\rangle}]]]]]$

a. $[\![\text{VP}]\!]^g$ by FA and (8a)
$= g(1)([\lambda x.\lambda w.\ x \text{ comes in } w])$

b. $[\![\text{NegP}]\!]^g$ by FA
$= [\lambda p.\lambda w.\neg p(w)]([g(1)([\lambda x.\lambda w.\ x \text{ comes in } w])])$
$= \lambda w.\neg[g(1)([\lambda x.\lambda w.\ x \text{ comes in } w])](w)$

c. $[\![\text{T}']\!]^g$ by FA
$= [\lambda p.p](\lambda w.\neg[g(1)([\lambda x.\lambda w.\ x \text{ comes in } w])](w))$
$= \lambda w.\neg[g(1)([\lambda x.\ x \text{ comes in } w])](w)$

d. $[\![\text{T}'']\!]^g$ by PA
$= \lambda R.[\![\text{T}']\!]^{g^{[1\to R]}}$ by FA and (8a)
$= \lambda R.\lambda w.\neg[R([\lambda x.\ x \text{ comes in } w])](w)$

e. $[\![\text{TP}]\!]^g$ by FA
$= [\![\text{T}'']\!]^g([\![\text{DP}]\!]^g)$
$= [\lambda R.\lambda w.\neg[R([\lambda x.\ x \text{ comes in } w])](w)]$
$([\lambda P.\lambda w.\forall x[x \text{ is a person in } w \to P(x)(w)]])$
$= \lambda w.\neg[\lambda P.\lambda w.\forall x[x \text{ is a person in } w \to P(x)(w)]]$
$([\lambda x.\lambda w.\ x \text{ comes in } w])(w)$
$= \lambda w.\neg\forall x[x \text{ is a person in } w \to x \text{ comes in } w\,]$ $(\neg > \forall)$

Thus, movement is undone in the semantic component if the trace has a particular semantic type:

(12) If a moved element leaves behind a higher type trace (i.e., a trace of the same semantic type as that of the moved element), semantic reconstruction applies and it is interpreted in its base-generated position in the semantic component. (Fact 1)

3.2 Verbal Head Movement and the Obligatory Semantic Reconstruction

Matushansky (2006) points out that if a verb alone moves and the movement does not result in a head-to-head adjunction structure, no semantic effect arises. Considering the mechanism of semantic reconstruction, the reason is simple:

(13) $[_{\text{XP}_{\langle s,\,t\rangle}}\ \text{meet}_{\langle e,\,\langle e,\,st\rangle\rangle}\ [_{\text{YP}\langle\langle e,\,\langle e,\,st\rangle\rangle,\,\langle s,\,t\rangle\rangle}\ 1\ [_{\text{VP}_{2_{\langle s,\,t\rangle}}}\ [_{\text{DP}_{2_e}}\ \text{John}\,]\ [_{\text{VP}_{1_{\langle e,\,st\rangle}}}\ R_{1_{\langle e,\,\langle e,\,st\rangle\rangle}}\ [_{\text{DP}_{1_e}}\ \text{Mary}\ ]]]]]]$

a. $[\![\text{VP}_1]\!]^g$
$= [\![R_1]\!]^g([\![\text{DP}_1]\!]^g)$
$= g(1)(\text{Mary})$

b. $[\![\text{VP}_2]\!]^g$ by FA
$= [\![\text{VP}_1]\!]^g([\![\text{DP}_2]\!]^g)$
$= g(1)(\text{Mary})(\text{John})$

c. $[\![\text{YP}]\!]^g$ by PA
$= \lambda R.[\![\text{VP}_2]\!]^{g^{[1\to R]}}$ by FA and (8a)
$= \lambda R.g^{[1\to R]}(1)(\text{Mary})(\text{John})$
$= \lambda R.R(\text{Mary})(\text{John})$

d. $[\![\text{XP}]\!]^g$ by FA
$= [\![\text{YP}]\!]^g([\![\text{meet}]\!]^g)$
$= [\lambda R.R(\text{Mary})(\text{John})]$
$([\lambda x.\lambda y.\lambda w.\ y \text{ meets } x \text{ in } w])$
$= [\lambda x.\lambda y.\lambda w.\ y \text{ meets } x \text{ in } w](\text{Mary})(\text{John})$
$= \lambda w.$ John meets Mary in w

In the above structure, the moved verb is forced to leave behind a trace of the same semantic type as that of the verb itself (i.e., a trace of type $\langle e, \langle e, st\rangle\rangle$). Otherwise, the node immediately dominating the trace (VP_1) and the higher node (VP_2) cannot be interpreted. Hence, semantic reconstruction applies and the HM has no interpretive effect in this case:

(14) To avoid type mismatch, the semantic type of a trace left behind by a verb must be the same as that of the verb itself, and verbal HM is obligatorily subject to semantic reconstruction. (Fact 2)

Next, suppose that V-to-NEG movement happens and the structure in (15a) is obtained. As pointed out by Keine and Bhatt (2016), in a head-to-head adjunction structure, we have to abandon the assumption in (8c) and adjoin a numerical index to an unusual place that is not right below the moved verb to avoid vacuous binding as in (15b):

(15) a. $[_{\text{NegP}}\ [_{\text{NEG}}\ \text{NEG V}\ ]\ [_{\text{VP}_2}\ \text{DP}_2\ [_{\text{VP}_1}\ t_{\text{V}}\ \text{DP}_1\ ]]]$ b. $[_{\text{NegP}}\ [_{\text{NEG}}\ \text{NEG V}\ ]\ [_{\text{VP}_3}\ 1\ [_{\text{VP}_2}\ \text{DP}_2\ [_{\text{VP}_1}\ t_{\text{V}}\ \text{DP}_1]]]]$

In addition, if negation is a propositional operator of type $\langle st, st\rangle$ as widely assumed, the V-NEG complex cannot be interpreted by FA or PM due to type mismatch:

(16) a. $[_{\text{NEG}_{???}}\ \text{not}_{\langle st,\,st\rangle}\ \text{V}_{\text{intransitive}_{\langle e,\,st\rangle}}\ ]$ b. $[_{\text{NEG}_{???}}\ \text{not}_{\langle st,\,st\rangle}\ \text{V}_{\text{transitive}_{\langle e,\,\langle e,\,st\rangle\rangle}}\ ]$

Hence, we have to adopt another composition rule. Perhaps, the only rule available in the market is Function Composition (see Steedman (1985) and Keine and Bhatt (2016) a.o.), which allows us to combine two functions in a way that the resulting expression takes those arguments later that one of the original two functions requires:[3]

(17) Function Composition (FC)
If α is a branching node, $\{\ \beta, \gamma\ \}$ is the set of α's daughters, β is of type $\langle\sigma, \tau\rangle$ and γ is of type $\langle\tau, \upsilon\rangle$, then $[\![\alpha]\!]^g = \lambda x_\sigma.[\![\gamma]\!]^g([\![\beta]\!]^g(x))$. (based on Keine and Bhatt (2016)).

The examples below indicate how FC works in the head-to-head adjunction structures above.

3. Alternatively, we can assume the existence of non-propositional negation of type $\langle\langle e, st\rangle, \langle e, st\rangle\rangle$ or $\langle\langle e, \langle e, st\rangle\rangle, \langle e, \langle e, st\rangle\rangle\rangle$ but the choice does not affect the discussion here.

(18) a. $[_{\text{NEG}}$ not come $]$

b. $[\![\text{NEG}]\!]^g$ by FC
$= \lambda x.[\![\text{not}]\!]^g([\![\text{come}]\!]^g(x))$
$= \lambda x.[\lambda p.\lambda w.\neg p(w)]([\lambda x.\lambda w.\ x \text{ comes in } w](x))$
$= \lambda x.[\lambda p.\lambda w.\neg p(w)](\lambda w.\ x \text{ comes in } w])$
$= \lambda x.\lambda w.\neg[\lambda w.\ x \text{ comes in } w](w)$
$= \lambda x.\lambda w.\neg[x \text{ comes in } w]$
$= \lambda x.\lambda w.\ x \text{ does not come in } w$ $\langle e, st\rangle$

c. $[_{\text{NEG}}$ not meet $]$

d. $[\![\text{NEG}]\!]^g$ by FC
$= \lambda x.\lambda y.[\![\text{not}]\!]^g([\![\text{meet}]\!]^g(x)(y))$
$= \lambda x.\lambda y.[\lambda p.\lambda w.\neg p(w)]$
$([\lambda x.\lambda y.\lambda w.y \text{ meets } x \text{ in } w](x)(y))$
$= \lambda x.\lambda y.[\lambda p.\lambda w.\neg p(w)]([\lambda w.\ y \text{ meets } x \text{ in } w])$
$= \lambda x.\lambda y.\lambda w.\neg[\lambda w.\ y \text{ meets } x \text{ in } w](w)$
$= \lambda x.\lambda y.\lambda w.\neg[\ y \text{ meets } x \text{ in } w]$
$= \lambda x.\lambda y.\lambda w.\ y \text{ does not meet } x \text{ in } w$ $\langle e, \langle e, st\rangle\rangle$

Notice that the resulting complex heads have the semantic types identical to those of the moved verbs:

(19) The semantic type of a complex head involving a verb and negation corresponds to that of the verb itself. (Fact 3)

3.3 Putting Things Together

From Fact 1 to Fact 3, it follows that the V-NEG complex inevitably takes scope in the base-generated position of the verb. Suppose that in the hypothetical structure in (20), the verb *come* undergoes HM to NEG. The moved verb must leave behind a trace of the same semantic type of the verb itself, which in turn is identical to that of the V-NEG complex. Thus, semantic reconstruction obligatorily applies:

(20) $[_{\text{NegP}_{\langle s,t\rangle}}\ [_{\text{NEG}_{\langle e,st\rangle}}$ not come $]\ [_{\text{VP}_{2\langle\langle e,st\rangle,st\rangle}}\ 1\ [_{\text{VP}_{1\langle s,t\rangle}}\ [_{\text{DP}_{\langle\langle e,st\rangle,st\rangle}}$ everyone$]\ R_{1_{\langle e,st\rangle}}\ ]]]$

a. $[\![\text{VP}_2]\!]^g$ by PA
$=\lambda R.[\![\text{VP}_1]\!]^{g^{[1\to R]}}$ by FA
$=\lambda R.[\![\text{DP}]\!]^{g^{[1\to R]}}([\![R_1]\!]^{g^{[1\to R]}})$ by (8a)
$=\lambda R.[\lambda P_{\langle e,st\rangle}.\lambda w.\forall x[x \text{ is a person in } w$
$\to P(x)(w)]](g^{[1\to R]}(1))$
$=\lambda R.[\lambda P_{\langle e,st\rangle}.\lambda w.\forall x[x \text{ is a person in } w$
$\to P(x)(w)]](R)$
$=\lambda R.\lambda w.\forall x[x \text{ is a person in } w \to R(x)(w)]$

b. $[\![\text{NEG}]\!]^g$ by FC
$=\lambda x.[\![\text{not}]\!]^g([\![\text{come}]\!]^g(x))$
$=\lambda x.\lambda w.\ x \text{ does not come in } w$

c. $[\![\text{NegP}]\!]^g$ by FA
$=[\![\text{VP}_2]\!]^g([\![\text{NEG}]\!]^g)$
$=[\lambda R.\lambda w.\forall x[x \text{ is a person in } w \to R(x)(w)]]$
$([\lambda x.\lambda w.\ x \text{ does not come in } w\ ])$
$=\lambda w.\forall x[x \text{ is a person in } w$
$\to [\lambda x.\lambda w.\ x \text{ does not come in } w\ ](x)(w)\ ]$
$=\lambda w.\forall x[x \text{ is a person in } w$
$\to x \text{ does not come in } w\ ]$ $(= \forall > \neg)$

After the obligatory semantic reconstruction, the V-NEG complex is interpreted in the original position of the verb, where *not* is c-commanded by any other element within VP_1 or higher nodes. Consequently, the narrow(est) scope interpretation of negation (i.e. the $\forall > \neg$ interpretation) is obtained. Hence, the V-to-NEG HM does not expand but shrinks the scope of negation:

(21) The complex head involving a verb is interpreted in the base-generated position of the verb due to semantic reconstruction and the scope-bearing element(s) within the complex head take(s) the lowest scope. (Fact 4)

The same effect arises in a sentence involving -*dake* and negation. As shown below, if V undergoes HM to NEG, -*dake* takes wide scope over negation:[4]

(22) $[_{\text{NegP}}\ [_{\text{VP}}\ [_{\text{V}''}$ Taro $[_{\text{V}'}$ pan-dake $R_1\ ]\ ]\ 1\ ]\ [_{\text{NEG}}$ tabe NEG $]\ ]$

a. $[\![\text{-dake}]\!] = \lambda x.\lambda P_{\langle e,\langle e,st\rangle\rangle}.\lambda y.\lambda w{:}P(x)(y)(w).$
$\forall z[z \in \textsc{alt}(x) \wedge z \neq x \to \neg P(z)(y)(w)]$

b. $[\![\text{V}'']\!]^g$ by FA and (8a)
$=[\![\text{-dake}]\!]^g([\![\text{pan}]\!]^g)([\![R_1]\!]^g)([\![\text{Taro}]\!]^g)$
$=\lambda w{:}g(1)(\text{bread})(\text{Taro})(w).\forall z[z \in \textsc{alt}(\text{bread})$
$\wedge z \neq \text{bread} \to \neg g(1)(z)(\text{Taro})(w)]$

c. $[\![\text{VP}]\!]^g$ by PA
$=\lambda R.[\![\text{V}'']\!]^{g^{[1\to R]}}$ by FA and (8a)
$=\lambda R.\lambda w{:}R(\text{bread})(\text{Taro})(w).\forall z[z \in \textsc{alt}(\text{bread})$
$\wedge z \neq \text{bread} \to \neg R(z)(\text{Taro})(w)]$

d. $[\![\text{NEG}]\!]^g$ by FC
$=\lambda x.\lambda y.\lambda w.[\![\text{not}]\!]^g([\![\text{tabe}]\!]^g(x)(y))$
$=\lambda x.\lambda y.\lambda w.\ y \text{ does not eat } x \text{ in } w$

e. $[\![\text{NegP}]\!]^g$ by FA
$=[\![\text{VP}]\!]^g([\![\text{NEG}]\!]^g)$
$=\lambda w{:}[\lambda x.\lambda y.\lambda w.\ y \text{ does not eat } x \text{ in } w]$
$(\text{bread})(\text{Taro})(w).$
$\forall z[z \in \textsc{alt}(\text{bread}) \wedge z \neq \text{bread}$
$\to \neg[\lambda x.\lambda y.\lambda w.\ y \text{ does not eat } x \text{ in } w]$
$(z)(\text{Taro})(w)]$
$=\lambda w{:}$ Taro does not eat bread in w.
$\forall z[z \in \textsc{alt}(\text{bread}) \wedge z \neq \text{bread}$
$\to \neg[\ \text{Taro does not eat } z \text{ in } w\ ]\ ]$
$=\lambda w{:}$ Taro does not eat bread in w.
$\forall z[z \in \textsc{alt}(\text{bread}) \wedge z \neq \text{bread}$
$\to \text{Taro eats } z \text{ in } w\ ]$
(-*dake* > NEG)

4. The elements between a colon and a full-stop indicate presuppositions (Heim and Kratzer 1998), and $\textsc{alt}(x)$ denotes a set of contextually determined alternatives to x.

The same interpretation results from the structure in (3) that the HSE analysis assumes. After the iterative applications of FC, the V-NEG-T-C complex has the semantic type of $\langle e, \langle e, st \rangle \rangle$, which is the same as that of the verb *tabe* 'eat.' Hence, semantic reconstruction obligatorily applies, and the negation within the complex head is interpreted in the base-generated position of the verb, resulting in its narrowest scope reading. The end result is not the NEG $>$ *-dake* reading but the *-dake* $>$ NEG reading, contrary to what the HSE analysis contends.

4 Conclusion

In this paper, we have pointed out that syntactic movement of verbal heads does not necessarily change scope relations. First, we have seen in Section 2 that it is inconclusive at best whether the raised head c-commands the other scope-bearing XPs in the structure. Then, we have meticulously demonstrated in Section 3 that the intended scope-reversal effect cannot be derived from the existent composition rules under the framework of Heim and Kratzer (1998) and von Fintel and Heim (2011). Therefore, the argument for the HSE analysis is at most inconclusive unless the advocates of this analysis clarify how to derive the intended interpretation by a new composition rule or in some other way.

Let us conclude with two cautionary notes. First, we do not claim that every HM does not have any possibility to affect semantic interpretations. In fact, the verbal HM in question, if it exists at all in Japanese, does have an (unintended) interpretive effect (i.e., it shrinks the scope of negation). In addition, if a moved head is not forced to leave a higher type trace, it can be interpreted in its derived position. The potential candidates for such a head include negation and modals because their semantic type is of $\langle st, st \rangle$ and, unlike verbs, they do not have to leave behind a higher type trace.[5,6] Second, the discussion in this paper is applicable to any syntactic analysis based on scope facts. In the literature, it is often assumed that scope-reversal effects serve as evidence for overt or covert movement. However, such an analysis is in force only when it is convincingly shown that intended interpretations can be derived from proposed structures.

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5. See Lechner (2006) for the discussion of the HM of modals and its interpretive effects.
6. Kishimoto (2007, 2008) claims that syntactic NEG movement exists in Japanese, but see Fukushima (2022) for the counterarguments against this claim.