A Revised C-T Amalgamation Theory and Its Application to the Derivation of *Wh*-questions

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Abstract: In this paper, I propose the derivation of subject-questions and object-questions by revising the C-T amalgamation theory proposed by Sakamoto (2014). In Sakamoto's (2014) framework, the phase head C and the nonphase head T are amalgamated for efficient valuation of Agree feature (AF) and Edge feature (EF). Although this theory succeeds in prohibiting vacuous movement of *wh*-subjects to Spec-C, which was once regulated by the Vacuous Movement Hypothesis, it cannot produce a proper word order of object-questions. I therefore claim that the C-T amalgam can split into C and T as needed in the derivation, and that subject-questions are best analyzed under the amalgamated C-T head while object-questions should be analyzed under the separated C/T heads.

Keywords: *Wh*-questions, Vacuous Movement Hypothesis, clausal systems

1. Introduction

There seem to be some differences between the derivation of object-questions like (1) and that of subject-questions like (2). The former includes *Do*-support like *did* in (1) and Subject Auxiliary Inversion (SAI), but the latter does not [1].

(1) Who did Mary see?   (Object-question)
(2) Who saw John?   (Subject-question)

In this paper, I will propose how they are different and what derives the differences focusing on the structure of C and T.

This paper is organized as follows. Section 2 introduces the Vacuous Movement Hypothesis (henceforth, VMH), which is supposed to capture the differences between subject- and object-questions, and then points out its theoretical problems. In Section 3, I summarize a series of previous studies which reconsider the VMH and its effect: Agbayani (2000, 2006), Ishii (2004), and Sakamoto (2014). Section 4 attempts to revise Sakamoto's (2014) theory and explain the derivation of subject-questions and object-questions. Lastly, Section 5 provides a brief conclusion.

2. The Vacuous Movement Hypothesis and *Wh*-questions

2.1 The Vacuous Movement Hypothesis

In the generative literature, it has been argued that a *wh*-phrase in object-questions originates from the internal argument position of the verb and then moves to Spec-C, along with T-to-C head movement of Tense. This yields the word order pattern like (1), where the *wh*-phrase precedes the auxiliary in C and the subject in Spec-T. As stated in the previous section, however, subject-questions lack *Do*-support and SAI. This implies a possibility that *wh*-subjects do not move to Spec-C but stay in their subject-positions, Spec-T. The Vacuous Movement Hypothesis proposed by Chomsky (1986) accommodates this possibility and states that movement which has no effect on PF output (i.e. no outcomes related to word order) is not operated at S-structure and delayed until LF.

(3) *The Vacuous Movement Hypothesis* (Chomsky, 1986)
     Vacuous movement is not obligatory at S-structure.

This implies that unlike *wh*-objects, *wh*-subjects stay in Spec-T at S-structure. While the *wh*-object *who* in (4) moves to Spec-C, the *wh*-subject *who* in (5) is analyzed as occupying Spec-T under the VMH, since we would not obtain any word order change when the subject undergoes *wh*-movement to Spec-C.

(4) [$_{CP}$ Who$_i$ did [$_{TP}$ Mary [$_{vP}$ see t_i]]]?
(5) [$_{TP}$ Who [$_{vP}$ saw John]]?

       This analysis is supported by the observation that *wh*-island effect is removed in embedded subject-questions. According to Chomsky (1986), the extraction of the *wh*-object *what* from the embedded *wh*-clause in (6) is possible since the embedded *wh*-subject *who* stays Spec-T and therefore *what* can move to the main clause via embedded Spec-C, which is not occupied by *who* [2].

(6) What$_i$ do you wonder [who saw t_i]?   (adapted from Chomsky, 1986)

Notice that the VMH does not prohibit movement of *wh*-subjects at LF. The ungrammaticality of (7) shows LF-movement of the *wh*-subject *who*: LF-movement of *who* to embedded Spec-C eliminates the intermediate trace of *how* and therefore t_i cannot be properly governed by any antecedents.

(7) *How$_i$ do you wonder [$_{CP}$ who$_j$ [$_{TP}$ t_j fixed the car t_i]]?   (cf. Chomsky, 1986)

In this way, *wh*-movement of *wh*-subjects to Spec-C is suspended at S-structure, according to the VMH.

2.2 Problems within the Modern Minimalist Framework

Although the VMH properly regulates vacuous movement of *wh*-subjects to Spec-C at S-structure, it is conceptually problematic since it compares the derivation with an overt movement and that with an equivalent covert movement. In the framework of minimalist program, derivations are constrained by economy conditions in such a way that more economical derivation is preferred. According to Collins (1997), evaluation of economy conditions is implemented at each stage of derivation, not at whole derivation. The VMH is not preferable in that it compares the derivation at S-structure and that at LF.
       Moreover, although the VMH postulates *wh*-movement at LF, the modern minimalist framework has no LF-movement, as pointed out in Sakamoto (2014). As operations relating to movement are reduced to Merge applied only at narrow syntax, no elements can undergo movement at LF. The VMH, thus, should be reconsidered within the framework of modern minimalist.

3. Previous Studies

In this section, I introduce previous studies which attempt to revise or redefine the VMH: Agbayani (2000, 2006), Ishii (2004), and Sakamoto (2014). They share the same idea that *wh*-subjects can fulfill the requirements for *wh*-questions in the position of Spec-T, so that they do not move to Spec-C. However, they are different in terms of what requirements *wh*-subjects satisfy.

3.1 Agbayani (2000, 2006)

Agbayani (2000, 2006) redefines the VMH in terms of feature movement. He postulates that overt movement consists of Move F and Pied-Pipe, and that moved F and category (i.e. a lexical item or a phrase) should be PF adjacent (or no intervening item between them) [3]. The relevant definitions are given as follows.

(8) a. *Move F*
       The feature F (to be checked) of category α is extracted out of α and moves to the domain of a functional head H; F enters into a checking relation with an uninterpretable feature of H.
   b. *Pied-Pipe*
       Category α is pied-piped to Spec, H.

(9) X and Y are PF adjacent if no phonological features intervene between X and Y.   (Agbayani, 2006)

In the case of *wh*-questions, thus, Move F raises *wh*-feature of a *wh*-phrase to Spec-C. Economy conditions require only Move F, but if anything intervenes between the moved *wh*-feature and the category (the *wh*-phrase), the latter must be raised to another Spec-C by Pied-Pipe to obtain PF adjacency between them. Therefore, in the object-question (10), after the *wh*-feature of the object *who* moves to Spec-C, *who* itself is also raised by Pied-Pipe; otherwise, the subject *Mary* and the verb *saw* intervene between the *wh*-feature and *who*, which prevents PF adjacency. Contrarily, the *wh*-subject *who* in the subject-question in (11) stays in Spec-T, not moves to Spec-C, since *who* and its *wh*-feature are already adjacent without applying Pied-Pipe.

(10) [$_{CP}$ Who$_i$ [$_{C'}$ [F$_{who}$] [$_{C'}$ C [$_{IP}$ Mary see t_i]]]]?
(11) [$_{CP}$ [F$_{who}$] [$_{C'}$ C [$_{IP}$ Who saw John]]]?

Thus he redefines the VMH as follows.

(12) The Vacuous Movement Hypothesis (Agbayani, 2006)
     Move F applies; Pied-Pipe is blocked.

His proposal properly predicts the grammaticality of sentences including sluicing. When the *wh*-object introduces the embedded interrogative clause as in (13), TP is deleted. However, when it is introduced by the *wh*-subject, deletion of TP leads to ungrammaticality, as shown in (14a). Considering his theory, this is because only the *wh*-feature of *who* is stranded after deletion and PF adjacency cannot be held between the *wh*-feature and *who*, as in (14b). For PF adjacency, Pied-Pipe should raise *who* to Spec-C, like (14c-d).

(13) a. I heard Pat insulted someone. Tell me who [Pat insulted t].
     b. I heard Pat insulted someone. Tell me [$_{CP}$ who$_i$ [$_{C'}$ [F$_{who}$] [$_{C'}$ C [$_{IP}$ Pat insulted t_i]]]].
(14) a. I heard someone left early. *Tell me [who left early].
     b. I heard someone left early. *Tell me [$_{CP}$ [F$_{who}$] [$_{C'}$ C [$_{IP}$ who left early]]].
     c. I heard someone left early. Tell me who [left early].
     d. I heard someone left early. Tell me [$_{CP}$ who$_i$ [$_{C'}$ [F$_{who}$] [$_{C'}$ C [$_{IP}$ t_i left early]]]].

(adapted from Agbayani, 2006)

In this way, Agbayani (2000, 2006) considers that *wh*-subjects stay in Spec-T since they can meet the condition of PF adjacency between feature and its category without moving to Spec-C.

3.2 Ishii (2004)

Ishii (2004) also reconsiders the VMH within the framework of modern minimalist. In his theory, the EPP-feature of C is erased by the merger of *wh*-phrases in the minimal domain (MD) of C, which is the notion proposed by Chomsky (1995). The definition of MD is as follows [4].

(15) a. The minimal domain Min(δ(H)) of H is the small subset K of δ(H) such that for any $\gamma \in \delta$(H), some $\beta \in$ K reflexively dominates γ.
     b. The domain δ(H) of H is the set of categories included in Max(H), the smallest maximal projection including H, that are distinct from and do not contain H.   (Chomsky, 1995)

Under the probe-goal theory, movement consists of Agree, selection of a phrase for Merge, and Merge of the phrase. With these theoretical apparatus, in the object-question like (16), the EPP-feature of C enters into a matching relation with the *wh*-feature of the *wh*-phrase *who*, and then it internally merges *who* within the MD of C, Spec-C. On the other hand, in the subject-question like (17), the EPP-feature of C does not need Merge of the *wh*-subject *who* after Agree is applied since it is already in the MD of C: "only Agree takes place" in subject-questions (p. 191). As a result, the *wh*-subject does not move to Spec-C, but stay in Spec-T.

(16) [$_{CP}$ Who$_i$ [$_{CP}$ C [$_{TP}$ Mary [$_{TP}$ T [$_{vP}$ see t_i]]]]]?
(17) [$_{CP}$ C [$_{TP}$ Who [$_{TP}$ T [$_{vP}$ saw John]]]]?

Based on this idea, he analyzes *that*-trace effects. Embedded *wh*-objects like *who* in (18) move to embedded Spec-C to be in the MD of C. This enables them to move to the main clause since Spec-C

is the edge of the phase head C and therefore accessible to *v* in the main clause according to the Phase Impenetrability Condition (PIC), where operations outside a phase can be applied only to the phase head and its edge. Therefore *wh*-objects can be extracted from embedded clauses regardless of existence of the complementizer *that*. On the other hand, embedded *wh*-subjects, which stay in Spec-T for the reason stated above, are not accessible to *v* in the main clause since Spec-T is in Transfer domain of embedded C. This blocks extraction of *wh*-subjects from *that*-complements for violation of the PIC, as shown in (19a-b). Note that without *that*, embedded clauses are TP, a nonphase, which enables *wh*-subjects to move above without crossing any phase boundary, as in (19c).

(18) a. Who$_i$ do you think (that) John saw t_i?
    b. … [$_{CP}$ who$_i$ [$_{CP}$ that [$_{TP}$ John [$_{TP}$ T [$_{vP}$ saw t_i]]]]]
(19) a. Who$_i$ do you think (*that) t_i saw Bill?
    b. *… [$_{CP}$ that [$_{TP}$ who [$_{TP}$ T [$_{vP}$ saw Bill]]]]
    c. … [$_{TP}$ who [$_{TP}$ T [$_{vP}$ saw Bill]]]   (adapted from Ishii, 2004)

        To sum up, in the theory of Ishii (2004), *wh*-subjects stay in Spec-T since they can be in the MD of C and therefore erase the EPP-feature of C without moving to Spec-C, unlike the case of *wh*-objects in object-questions.

3.3 Sakamoto (2014)

Unlike the other previous studies introduced so far, Sakamoto (2014) claims that we do not have to assume a distinct rule like the VMH to regulate the vacuous movement of *wh*-subjects to Spec-C, and that the VMH effect is derived by other more general principles in a minimalist framework. For this purpose, he suggests a computational system involving amalgamation of phase heads such as C and *v* with nonphase heads such as T and V, respectively, as shown in (20). This amalgamation enables efficient valuation of features. In the first place, Lexical Items (LIs) have Agree Feature (AF) and Edge Feature (EF). It has been generally argued that AF, which originates from a phase head, is valued via Agree/Value after it is inherited to a nonphase head, and that EF is valued at every LIs based on Merge. This means that valuation of AF is implemented only at nonphase heads and EF is valued at every LI, which Sakamoto (2014) argues is not efficient way of valuation. However, his amalgamation theory enables both AF and EF to be valued on the same one amalgamated head. With two heads amalgamated, the amalgam employs double EFs; one is intrinsic to phase heads and the other is inherent to nonphase heads. Such double EFs let the amalgam create double Specifier positions: Spec-C and Spec-T in the case of the C-T amalgam. The merger of Spec-T and Spec-C values EF and EF(C) and labels TP and CP, respectively. In this paper, I call his proposal "C-T amalgamation theory" for convenience [5].

(20)

                                                              (Sakamoto, 2014)
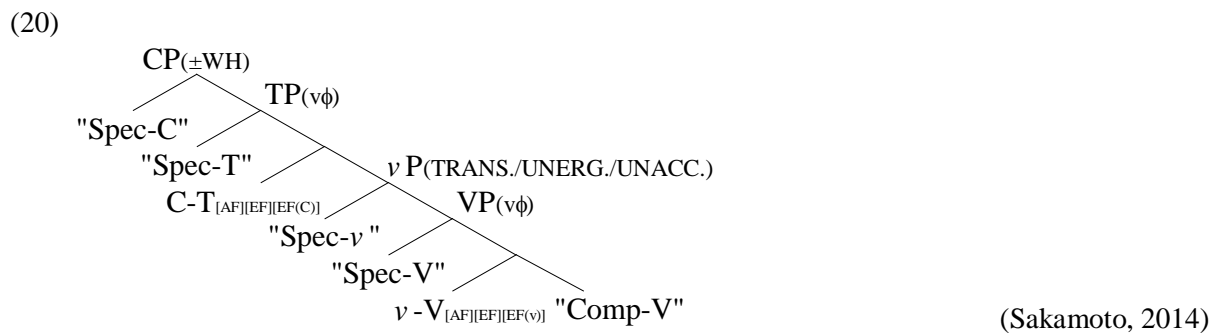
In the C-T amalgamation theory, object-questions are derived in a way shown in (21). When the subject *Mary* is merged as Spec-T, its ϕ-feature values EF as [vϕ]. Then the *wh*-object *who* is merged as Spec-C, which assigns [+WH] to EF(C). On the other hand, in the case of subject-questions like (22), the merger of the *wh*-subject *who* as Spec-T solely values EF as [vϕ] and EF(C) as [+WH] since *who* has both ϕ-feature and *wh*-feature.

(21) [$_{CP(+WH)}$ Who$_i$ [$_{TP(vϕ)}$ Mary C-T$_{[uϕ][EF][EF(C)]}$ [$_{vP}$ saw t_i]]]?
(22) [$_{TP(+WH, vϕ)}$ Who C-T$_{[uϕ][EF][EF(C)]}$ [$_{vP}$ saw John]]?

Given that *wh*-movement is implemented for checking *wh*-features, the derivation of object-questions needs the position of Spec-C for EF(C) to be valued as [+WH] while it is not required in subject-questions. This means that Sakamoto's (2014) C-T amalgamation theory saves computational effort for *wh*-movement of *wh*-subjects, dispensing with the VMH.

In addition to reducing the VMH to computational efficiency condition, this theory derives Superiority effects. If C and T are separated, in (23a) the merger of the subject *who* as Spec-T cannot value EF(C) since it belongs to the C head, where it is valued only by Merge as Spec-C. This keeps the possibility that EF(C) gets valued by the merger of the object *what* as Spec-C, which is inconsistent with the result of (24a). However, under Sakamoto's (2014) C-T amalgamation theory, the merger of *wh*-subjects values all the features on the C-T head including EF and EF(C). This makes Spec-C redundant and blocks further *wh*-movement of *what* to Spec-C like (24b).

(23) a. Who saw what?
　　 b. [$_{\text{TP}(+\text{WH}, v\phi)}$ Who C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ saw what]]?
(24) a. *What did who see?
　　 b. *[$_{\text{CP}}$ What$_i$ [$_{\text{TP}(+\text{WH}, v\phi)}$ who C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ saw t_i]]]?　　　　(adapted form Sakamoto, 2014)

The theory also explains the grammaticality of sentences relating to semantic selection of verbs. Considering this phenomenon within the framework of the VMH, the requirement of semantic selection of *wonder* in (25) is satisfied by LF-movement of the embedded *wh*-subject *who* since *wh*-subjects are assumed to move to Spec-C at LF. However, this assumption leads us to predict that the *wh*-object *what* in (26) can also satisfy the requirement of *wonder* by moving to Spec-C only at LF, which is not the case. The C-T amalgamation theory solves this problematic issue. Given that the requirement of semantic selection is satisfied by labeling complements properly, in (25) the merger of the embedded *wh*-subject *who* as Spec-T assigns [+WH] to EF(C) and labels TP, the largest SO, as interrogative. Also in (27), the merger of the *wh*-object *what* value EF(C) as [+WH], which satisfies the requirement of *wonder*. On the other hand, (26) is ungrammatical since the merger of the embedded subject *John* as Spec-T values EF(C) as [−WH] and therefore the complement clause is interpreted as declarative.

(25) a. I wonder [who saw what].
　　 b. I wonder [$_{\text{TP}(+\text{WH}, v\phi)}$ who C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ saw what]].
(26) a. *Who wondered [John saw what]?
　　 b. *Who wondered [$_{\text{TP}(-\text{WH}, v\phi)}$ John C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ saw what]]?
(27) a. Who wondered [what John saw]?
　　 b. Who wondered [$_{\text{CP}(+\text{WH})}$ what$_i$ [$_{\text{TP}(v\phi)}$ John C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ saw t_i]]]?
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(adapted from Sakamoto, 2014)

In the remaining part of this paper, I make my proposal along with the C-T amalgamation theory with slight revision since his theory is efficient in that it does not postulate a distinct hypothesis, the VMH, to regulate vacuous movement of *wh*-subjects. Also, the absence of the VMH allows "Spec-v-to-Spec-T" movement of subjects under the Predicate-internal Subject Hypothesis, which is also vacuous movement [6].

4. Proposal

4.1 Split C/T Analysis

Although Sakamoto's (2014) C-T amalgamation theory works well especially for subject-questions as shown in (28), it cannot produce a proper word order of object-questions if we consider that auxiliaries such as *will* occupy the amalgamated C-T head [7]. In (29), the auxiliary *will* is realized as the C-T head, which follows the moved *wh*-object *who* in Spec-C and the subject *Mary* in Spec-T. This yields the ungrammatical sentence *Who Mary will visit?*

(28) a. [$_{\text{TP}(+\text{WH}, v\phi)}$ Who C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ visit John]]?
　　 b. Who will visit John?
(29) a. [$_{\text{CP}(+\text{WH})}$ Who$_i$ [$_{\text{TP}(v\phi)}$ Mary C-T$_{[u\phi][EF][EF(C)]}$ [$_{v\text{P}}$ visit t_i]]]?
　　 b. *Who Mary will visit?

In order to solve this problem, therefore, I suggest that the amalgamated C-T head splits into C and T as needed in the derivation, and that this split occurs if the merger of Spec-T cannot value all the features on the C-T head [8]. To put it more specifically, C and T are first introduced into the derivation as an amalgamated head, but it splits and another C head is created above TP when the merger of Spec-T cannot assign proper values to all the features including AF, EF, and EF(C).

This derivation is similar to Criterial Head Movement in Split CP system, proposed by Maeda (2014). Within the framework of Split CP hypothesis, the C head is divided into some heads such as the Force head and the Top(ic) head, as cited in (30). Although they are introduced into the derivation as an amalgamated C head, it splits to satisfy the requirement of features. For example, in (31), which contains the complementizer (and therefore Force phrase) *that* and the topic phrase *beans*, first *beans* is merged as Spec-C and satisfies the requirement of the topic feature on C. However, the force feature remains unsatisfied, which triggers split of C and another C head with the force feature is created.
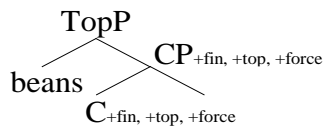
(30) The left periphery in English
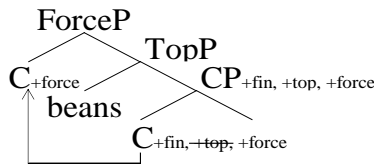
[$_{ForceP}$ Force [$_{TopP}$ Top [$_{FocP}$ Foc [$_{FinP}$ Fin]]]]   (Maeda, 2014)

(31) a. I think that beans, John ate.

   b.

       TopP
       /   CP$_{+fin, +top, +force}$
   beans /\
        C$_{+fin, +top, +force}$

   c.

      ForceP
     / TopP
  C$_{+force}$ /\ CP$_{+fin, +top, +force}$
   beans
        C$_{+fin, \cancel{+top,} +force}$

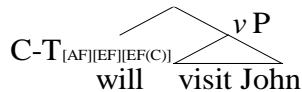   (adapted from Maeda, 2014)

Criterial Head Movement and my proposal about the derivation of C and T share the same idea that amalgamated heads can split in order to satisfy the requirement of features.

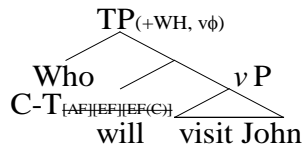## 4.2 The Derivation of Wh-questions and Its Consequences

As stated in the previous section, the amalgamated C-T head splits for feature requirement. I further claim that subject-questions are best analyzed under the amalgamated C-T head, while object-questions should be analyzed under the separated C/T heads. As for the subject-question *Who will visit John?* in (32), first the C-T amalgam is introduced into the derivation, and then the *wh*-subject *who* is merged as Spec-T. This merger enables both EF and EF(C) to be valued as [vϕ] and [+WH] respectively, and therefore the C-T head remains amalgamated.

(32) a. Who will visit John?

   b.

            /\ vP
  C-T$_{[AF][EF][EF(C)]}$ /\
        will visit John

   c.

       TP$_{(+WH, vϕ)}$
     /\
  Who vP
 C-T$_{\cancel{[AF][EF][EF(C)]}}$ /\
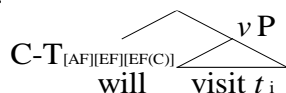   will visit John

On the other hand, in the object-question *Who will Mary visit?* in (33), the amalgamated C-T head is introduced and then the subject *Mary* is merged as Spec-T. However, this cannot value all the features on the C-T head since the merger of *Mary* assigns [vϕ] to EF but EF(C) remains unvalued or gets wrongly valued as [−WH]. The C-T amalgam, thus, splits into C and T, and another C head with EF(C) is created above Spec-T. Then the *wh*-object *who* is merged as Spec-C and values EF(C) as
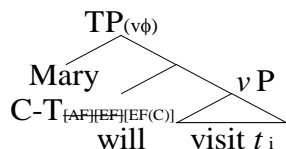
[+WH]. This analysis produces a proper word order of object-questions with auxiliaries since C, which is the position of (moved) auxiliaries, precedes the subject position, Spec-T.
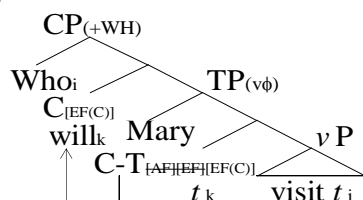
(33) a. Who will Mary visit?

    b.

                             vP

    C-T$_{[AF][EF][EF(C)]}$
         will   visit t_i

    c.

         TP$_{(v\phi)}$

      Mary vP
    C-T$_{[AF][EF][EF(C)]}$
        will   visit t_i

    d.

       CP$_{(+WH)}$

    Who$_i$ TP$_{(v\phi)}$
     C$_{[EF(C)]}$
      will$_k$ Mary vP
         C-T$_{[AF][EF][EF(C)]}$
            t_k visit t_i

This analysis properly predicts the lack of SAI in subject-questions since auxiliaries cannot undergo T-to-C movement if C and T are amalgamated into one head. On the other hand, in object-questions, C and T are separated, which enables auxiliaries to move from T to C and precede subjects[9].

    My proposal suggests an efficient derivation of examples including sluicing. Suppose that a phase head carries a feature responsible for deletion of its complement like E-feature advocated by Merchant (2001). The complement of the C-T is deleted when the C-T remains amalgamated, while if it splits into C and T, the complement of C is deleted. In (34), the embedded subject-question is headed by the amalgamated C-T head, so that its complement vP is deleted, resulting in the grammatical sluicing sentence. If the embedded object-question in (35) is analyzed under the split C/T heads, then the complements of the C head is deleted, again yielding the grammatical sluicing sentence. If the C-T head remains amalgamated in (35), the E-feature on the C-T deletes vP, which yields an ungrammatical sentence *Tell me who Pat.

(34) I heard someone left early. Tell me [$_{TP}$ who C-T [$_{vP}$ left early]].
(35) I heard Pat insulted someone. Tell me [$_{CP}$ who$_i$ C [$_{TP}$ Pat T [$_{vP}$ insulted t_i]]].
              (*Tell me [$_{CP}$ who$_i$ [$_{TP}$ Pat C-T [$_{vP}$ insulted t_i]]].)   (c.f. Agbayani, 2006)

    That-trace effects are also predicted by the analysis along with my proposal. In the subject-question like (36), the merger of who as Spec-T in the embedded clause values all the features on the C-T head, and therefore the amalgam does not split. Then there are no positions for the complementizer that, which blocks the embedded wh-subject from being extracted out of the embedded clause with that. On the other hand, the object-question like (37), which contains the separated C/T heads in the derivation, that can be positioned in C[10]. If this sentence is analyzed under the C-T amalgam, that cannot be realized anywhere. Then possible existence of that in object-questions cannot be explained.

(36) a. Who$_i$ do you think (*that) t_i will visit Mary?   (taken from Mizuguchi, 2008)
    b. Who$_i$ do you think (*that) [$_{TP}$ t_i will [$_{vP}$ visit Mary]]?
(37) a. Who$_i$ do you think (that) John will visit t_i?   (taken from Mizuguchi, 2008)
    b. Who$_i$ do you think [$_{CP}$ t_i (that) [$_{TP}$ John will [$_{vP}$ visit t_i]]]?
          (*[$_{CP}$ t_i [$_{TP}$ John will/that [$_{vP}$ visit t_i]]]?)

5. Conclusion

In this paper, I have discussed the differences between the derivation of subject-questions and that of object-questions. Wh-subjects in subject-questions do not overtly move to Spec-C, but behave as if they

move to Spec-C unlike the case of *wh*-objects. Although the VMH is supposed to capture this effect, the C-T amalgamation theory of Sakamoto (2014) properly derives it without postulating the hypothesis. Within the theory, the amalgamated C-T head enables *wh*-subjects to stay in Spec-T and to assign [+WH] to EF(C). In this paper, I have revised this theory in such a way that the C-T head can split into C and T to satisfy all the features on the head. This leads to the conclusion that subject-questions are best analyzed under the amalgamated C-T head while object-questions should be analyzed under the separated C/T heads. This analysis properly derives the differences between subject-questions and object-questions.

Acknowledgements

Notes

[1] Although *wh*-questions include that with the reason adverbial *why*, I only discuss the derivation of subject-questions and object-questions in this paper for my purpose.

[2] While Chomsky (1986) considers this sentence grammatical, Agbayani (2006) argues by surveying a number of speakers that this is as degraded as the case of *wh*-islands formed by *wh*-objects. I am not concerned with the grammaticality of this sentence.

[3] Agbayani's (2004) formal definition of intervention is as follows: if X precedes both Y and Z, and Z precedes Y, then Z intervenes between X and Y.

[4] The discussion here adopts the notion of domination proposed by Chomsky (1986):
(i) α dominates β if every segment of α dominates β.

[5] In his amalgamation theory, *v* and V are also amalgamated. However, this paper does not deal with the behavior of the *v*-V amalgam since my purpose is to reveal the derivation of clausal systems.

[6] Vacuous scrambling in Japanese is also one of the vacuous movement which should be excluded. With the VMH abolished, Sakamoto (2014) regulates this movement in terms of Linearization preservation proposed by Fox and Pesetsky (2003). For further arguments, see Sakamoto (2014).

[7] Note that Sakamoto (2014) considers infinite particle *to* and complementizer *that* as phonetic realization of the labels of clauses. However, it is difficult to deal with auxiliaries as a mere phonetic realization, and this leads to the necessity of postulating the split C/T heads.

[8] As for yes-no questions, I consider following Sakamoto (2014) that the derivation includes the operator $Op_{y/n}$, which assigns [+WH] to EF(C). Also, I argue that this kind of questions are analyzed under the separated C/T heads since the merger of subjects as "Spec-T" cannot value EF(C) as [+WH]. This paper does not deal with the derivation of (main/embedded) declarative clause.

[9] According to Radford (2004), SAI (or C-to-T movement of auxiliaries) is triggered by Tense feature [TNS] on C. Within the framework of split CP hypothesis, it is the Foc head that has [TNS] and thus auxiliaries move to Foc.

[10] According to Rizzi (1997), Force and Fin in embedded clauses are realized as overt *that* and null *that* respectively, and in a simple case they are amalgamated as one head, which can be realized as either overt *that* or null *that*. This accounts for the optionality of *that* in object-questions.

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