Strategies for Transfer*

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Abstract

This paper addresses a derivation of *wh*-interrogatives in English and identifies where a *wh*-phrase appears in a relevant clause. Incorporating the C/T bundling hypothesis, whereby C^0 and T^0 are introduced in syntax as a single head and can be scattered/copied in a derivation (Giorgi and Pianesi (1997), Gallego (2014), Erlewine (2020), and Hsu (2021)), into the current phase theory (Chomsky (2000, 2001, 2008)), I propose two types of Transfer: One is to transfer the complement of a phase head and the other is to transfer the whole phase (Obata (2010), Groat (2015)). As a consequence of this proposal, I argue that the landing site of a *wh*-phrase in a matrix interrogative is [Spec, (C/T)P], whereas that of a *wh*-phrase in an embedded interrogative is [Spec, VP] of a matrix clause, similar to exceptional-Case marking (ECM) constructions (Postal (1974)).

Keywords: *wh*-interrogatives, C/T bundling hypothesis, phase theory, Transfer, *do*-support, ECM constructions

1.   Introduction

It is well-known that a *wh*-phrase in an English interrogative moves overtly to the clause-initial position. In (1a), for example, *what* begins in the object position and is required to move to the sentence-initial position, accompanied by *do*-support. In (1b), *who* has moved from the subject position to the sentence-initial
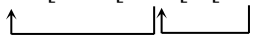
position, without *do*-support in this case.

(1) a. What did John see?
   b. Who saw the dog?

A general consensus has developed that the landing site of *wh*-extraction from the object position is [Spec, CP].[1]

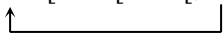(2)   [CP what_i [C' did [TP John see t_i]]]

In contrast, a good deal of discussion and debate is ongoing about the landing site of a *wh*-phrase in the subject position. Of at least four proposed analyses, the most standard is that just as the *wh*-phrase in the object position has moved to [Spec, CP], so the *wh*-phrase in the subject position has moved from [Spec, *v*P] through [Spec, TP] (Koopman (1983), Pesetsky and Torrego (2001)).

(3)   [CP who_i [C' C^0 [TP t_i' [T' [*v*P t_i saw the dog]]]]]

The second analysis is that the *wh*-subject has moved to stay in [Spec, TP], which is taken to be the canonical subject position (George (1980), Chomsky (1986a)).

(4)   [CP C^0 [TP who [T' T^0 [*v*P t_i saw the dog]]]]

Third is that the *wh*-subject has moved directly to [Spec, CP] from [Spec, *v*P] without stopping at [Spec TP] (Messick (2020)).

(5)   [CP who_i [C' C^0 [TP T^0 [*v*P t_i saw the dog]]]]

Fourth is that the *wh*-subject has moved to a certain position that is located between CP and TP, permitting the phrase to have A/A′-properties (Bošković (to appear)).

(6)　　　$[_{CP}\ C^0\ [_{A/A'P}\ who_i\ [_{TP}\ T^0\ [_{vP}\ t_i\ saw\ the\ dog]]]]$

Evident from this discussion is that little consensus has been reached on the landing site of the *wh*-extraction of a subject.

Furthermore, a question remains as to why *do*-support applies only when a *wh*-phrase moves from the object position, as shown in the contrast between (1a) and (1b) above. A more complex situation arises when *wh*-movement applies in embedded interrogatives. *Do*-support does not apply even when a *wh*-phrase moves from the object position, as in (7a).[2]

(7) a. I wonder what John saw.
　　 b. I wonder who saw the dog.

The generalization is that *do*-support applies only when a *wh*-phrase moves from a matrix non-subject position.

In this paper, I provide new analysis of the landing site of *wh*-extraction in matrix and embedded interrogatives and, as a consequence of this proposal, answer the question of why *do*-support applies only in a certain syntactic environment.

This paper is organized as follows. In section 2, I sketch the general theoretical framework assumed throughout, focusing particularly on the system of Transfer within the current phase theory and propose strategies for Transfer. In section 3, I provide a principled account of the landing site of *wh*-movement in both matrix and embedded clauses. Section 4 concludes the paper.

2.　Proposal: Strategies for Transfer

In this section, I review a series of basic adopted assumptions and present my proposal of strategies for Transfer. First of all, following Giorgi and Pianesi (1997), Erlewine (2020), and Hsu (2021), among others, I assume that C^0 and T^0 are introduced in syntax as a single head, which I call $(C/T)^0$, with their features bundled, including φ-features and the Q-feature, as in (8).

(8)　　the C/T bundling hypothesis
　　　　$[_{(C/T)P} (C/T)^0_{[\varphi][Q]} [_{vP} \ldots]]$

I argue that these features can be either scattered/inherited, as in (9a), or copied, as in (9b), onto the separated head(s) in a derivation (see Chomsky (2008) and Gallego (2014), respectively).

(9)　a.　Scattering/Inheritance
　　　　　$[_{CP}\ C^0_{[Q]} [_{TP} T^0_{[\varphi]} [_{vP} \ldots]]]$
　　　b.　Copying
　　　　　$[_{(C/T)P} (C/T)^0_{[\varphi][Q]} [_{(C/T)P} (C/T)^0_{[\varphi][Q]} [_{vP} \ldots]]]$

All three options of (8), (9a), and (9b) come free, although constraints on derivations and interface conditions reduce their application to a unique one in a derivation.

　　　One of the restrictions is imposed by Chomsky's (2000, 2001) phase theory. He hypothesizes that C^0 constitutes a phase head and that Transfer applies at the completion of CP.[3] Transfer is supposed to send the complement of C^0 to conceptual-intentional (C-I) and sensorimotor (SM) interfaces for interpretation. As a result, the Phase-Impenetrability Condition (PIC) comes into force in syntax.

(10)　　the Phase-Impenetrability Condition (PIC):
　　　　In a phase α with head H, the domain of H is not accessible to operations outside α only H and its edge are accessible to such operations.　　　　　　　　　　　　　　　　　　　(Chomsky (2000: 108))

Specifically, when the phase CP is completed, the complement of C^0 is transferred to the interfaces. Since TP is thought of as the complement of C^0, TP is transferred to be inaccessible to further syntactic operations. By contrast, edge elements of CP—[Spec, CP] and C^0—are still accessible to such operations, thus providing an element with an escape hatch for crossing a phase boundary.

　　　In short, Transfer achieves the following two functions.

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> (11) a. Creating an inaccessible domain.
>
>   b. Creating an escape hatch.
>
>   (Cf. Legate (2003), Nyvad, Christensen and Vikner (2017))

For syntactic objects to be interpreted at the interfaces, a syntactic operation like Transfer is necessary for sending them to the interfaces, resulting in an inaccessible domain for further syntactic operations. For an element to move across a phasal domain, a mechanism like Transfer is necessary in syntax for creating such an escape hatch position, so as to prevent all syntactic objects from being transferred to be inaccessible.

On these grounds, let us see what is gained when the options of (8), (9a), and (9b) are each used in the phase theory. To begin with, let us direct our attention to (8). Since C^0 is introduced in syntax as a single head with T^0, it follows that the transfer domain should be the whole (C/T)P. No elements can be accessible to further operations.

> (12) $[_{(C/T)P} (C/T)^0{}_{[\varphi][Q]} [_{vP} \dots]]$ (=(8))

As mentioned above, this is just because Transfer applies to the complement of the phase head C^0, i.e., TP—TP is bundled with CP in this case—so that CP is also transferred when TP is transferred.[4] Hence, when (C/T)P is completed, the whole (C/T)P is transferred.

Next, let us turn to (9a), in which features of C^0 and T^0 are scattered/inherited.

> (13) $[_{CP}\ C^0{}_{[Q]} [_{TP} T^0{}_{[\varphi]} [_{vP} \dots]]$ (=(9a))

Most researchers have regarded this as a basic clausal structure. In this case, the transferred domain is TP, because, as a result of separation of C^0 and T^0, Transfer applies to the complement of C^0, i.e., TP. TP is, then, prevented from being accessed by further operations. In contrast, edge elements—[Spec, CP] and C^0—have yet to be transferred and are still accessible to such operations.

Lastly, let us examine (9b), into which features of C^0 and T^0 are copied. (For

expository purpose, I place the subscript "1" at the upper head and "2" at the lower head, respectively.)

(14)　　　$[_{(C/T)1P} (C/T)_1{}^0{}_{[\varphi][Q]} [_{(C/T)2P} (C/T)_2{}^0{}_{[\varphi][Q]} [_{vP} \ldots]]]$　　　　(=(9b))

Suppose that copying $(C/T)^0$ applies first to create $(C/T)_1P$ and $(C/T)_2P$, and then they are transferred simultaneously. Given this stipulation, when $(C/T)_1P$ and $(C/T)_2P$ are completed, $(C/T)_1P$ and $(C/T)_2P$ are both transferred as a whole and no elements inside them are accessible to further operations.

To summarize, incorporating the C/T bundling hypothesis, together with their feature of a scattering or copying operation, into a mechanism for Transfer, we have two types of transfer: One is to transfer the whole phase to them, as in (12) and (14) (Obata (2010), Groat (2015)) and the other is to transfer the complement of a phase head to the interfaces, as in (13) (Chomsky (2000, 2001)). Importantly, the latter type alone allows for derivation to proceed by creating an escape hatch at the phase edge.

In the following section, I argue that the present proposal, interacting with constraints on derivation and interface conditions, provides a precise mechanism for determining where a *wh*-phrase moves in matrix and embedded interrogatives. In addition, I also give sufficient account of why *do*-support applies only when *wh*-extraction applies from a matrix non-subject position.

3.　The Landing Site of *Wh*-Movement

In this section, I show that the landing site of subject and object *wh*-extraction in matrix interrogatives is [Spec, (C/T)P] (subsections 3.1. and 3.2.), while that of *wh*-extraction in embedded interrogatives is [Spec, VP] of a matrix clause (subsection 3.3.).

3.1.　The Landing Site of Matrix Subject *Wh*-Movement

Let us begin with the *wh*-movement of a matrix subject, as in (15). I claim that the option of (8), in which the $(C/T)^0$ head is not separated, is used, and the matrix *wh*-subject moves to [Spec, (C/T)P].

(15)   Who saw the dog?   (=(1b))

Here, as shown in the structure of (16), the subject *who* has moved from [Spec, vP] to [Spec, (C/T)P] to agree with φ-features and the Q-feature on (C/T)^0.

(16)   [$_{(C/T)P}$ who$_i$ (C/T)^0$_{[φ][Q]}$ [$_{vP}$ t_i saw the dog]]

At the completion of (C/T)P, Transfer applies to the whole (C/T)P, which is sent to the interfaces for interpretation. There is nothing wrong with this derivation. Neither separation nor copying of C^0 and T^0 happens. From a perspective of computational efficiency, this is preferable. No additional or unnecessary operations apply. Furthermore, all syntactic elements are sent to the interfaces for interpretation; this is also preferable from a viewpoint of Full Interpretation at the interfaces (Chomsky (1986b)). Therefore, matrix subject *wh*-movement is derived in the simplest way and its landing site is [Spec, (C/T)P].

3.2. The Landing Site of Matrix Non-Subject *Wh*-Movement

Next, let us consider the *wh*-movement of a matrix object to the sentence-initial position, as in (17).

(17)   What did John see?   (=(1a))

I maintain that this derivation involves copying the bundled (C/T)^0 head and creating a kind of shell structure of two (C/T)Ps. To derive a sentence like (17), for example, the bundled (C/T)^0 head in (18a) is copied and a (C/T)P-shell structure is created, as illustrated in (18b).

(18) a.   [$_{(C/T)P}$(C/T)^0$_{[φ][Q]}$ [$_{vP}$ John saw what]]
     b.   [$_{(C/T)P}$(C/T)$_1^{0}_{[φ][Q]}$ [$_{(C/T)P}$ (C/T)$_2^{0}_{[φ][Q]}$ [$_{vP}$ John saw what]]]

Then, *what*, originating in the object position, moves to [Spec, (C/T)$_1$P] to agree with the Q-feature of (C/T)$_1$^{0}, along with movement of the subject *John* from [Spec, vP] to [Spec, (C/T)$_2$P] to agree with φ-features of (C/T)$_2$^{0}.[5]

(19) $[_{(C/T)P}$ what$_j$ $[_{(C/T)'}$ $(C/T)_1{}^0{}_{[\varphi][Q]}$ $[_{(C/T)P}$ John$_i$ $[_{(CT)'}$ $(C/T)_2{}^0{}_{[\varphi][Q]}$ $[_{vP}$ t_i see $t_j]]]]$

When $(C/T)_1P$ is completed, the whole $(C/T)_1P$ and $(C/T)_2P$ are transferred. Since all elements are sent to the interfaces for interpretation, the derivation satisfies Full Interpretation, and it converges correctly.

If copying $(C/T)^0$ does not apply and only one $(C/T)^0$ is involved, as in the subject *wh*-movement, the derivation crashes. No landing site exists for the *wh*-movement from object position simply because the unique [Spec, (C/T)P] position has already been filled with the subject *John*.

(20) $[_{(C/T)P}$ John$_i$ $(C/T)^0{}_{[\varphi][Q]}$ $[_{vP}$ t_i saw what]]

For this reason, copying is necessary for the object *wh*-movement.

Noticeably, although copying must obligatorily apply in the object *wh*-movement, the copying of the bundled $(C/T)^0$ head itself is an optional operation. As discussed in the preceding subsection, copying does not apply when a *wh*-phrase is extracted from subject position. With respect to the status of such an optional operation, I argue that a certain effect must occur at the interfaces so that they can recognize that an optional operation has been applied; otherwise, its application is considered to be uneconomical and unnecessary. Given this, I assume that one of the interface effects copying brings about is externalizing the $(C/T)_1{}^0$ head. As mentioned in (19) above, the $(C/T)_1{}^0$ head has the Q-feature and φ-features. The Q-feature enters into an Agree relation with *what*. The value of φ-features is "teleported" by the value of the corresponding φ-features of $(C/T)_2{}^0$ (see footnote 5). To externalize the Q-feature and φ-features on the $(C/T)_1{}^0$ head, I claim that *do*-support applies.

(21) $[_{(C/T)P}$ what$_j$ $[_{(C/T)'}$ **did**$_{[\varphi][Q]}$ $[_{(C/T)P}$ John$_i$ $[_{(C/T)'}$ $(C/T)_2{}^0{}_{[\varphi][Q]}$ $[_{vP}$ t_i see $t_j]]]]$

Once the $(C/T)_1{}^0$ is set to be overly pronounced, as in (21), the interfaces discern that optional copying of $(C/T)^0$ has applied in this derivation. They correctly distinguish the syntactic structure of object *wh*-movement from that of subject *wh*-movement; as a result, "the copying of $(C/T)^0$ has an effect on outcome." In

this sense, *do*-support is a kind of last resort operation for the interfaces to identify what has happened in syntax to interpret the structure of *wh*-movement in an unambiguous fashion.

3.3. The Landing Site of Embedded *Wh*-Movement

Lastly, let us examine what syntactic differences lie between matrix and embedded interrogatives. I argue that derivation of the embedded interrogative must involve the feature scattering/inheritance of $(C/T)^0$, as schematized in (22), and the landing site of an embedded *wh*-phrase is [Spec, VP] of a matrix clause, as in (23).

(22) a. $[_{(C/T)P} (C/T)^0_{[\varphi][Q]} [_{vP} \ldots]]$ (=(8))

     b. $[_{CP} \ C^0_{[Q]} [_{TP} T^0_{[\varphi]} [_{vP} \ldots]]]$ (=(13))

(23) $[_{VP} \textit{wh-}\text{phrase}_i V [_{CP} \ t_i' [_{C'} C^0_{[Q]} [_{TP} T^0_{[\varphi]} [_{vP} \ldots t_i \ldots]]]]]]$

Let us see why separation of C^0 and T^0 must obligatorily apply to derive embedded interrogative sentences like (24).

(24) a.   I wonder what John saw.

     b.   I wonder who saw the dog.   (=(7))

If feature scattering/inheritance does not apply and $(C/T)^0$ is kept as a single head, we cannot derive the sentence of (24a) because only one [Spec, (C/T)P] position is available, and the position has already been occupied by *John*, as in (25). No landing site exists for *what* in the embedded *wh*-object movement, so that the derivation crashes.

(25) $[_{(C/T)P} \text{John}_i (C/T)^0_{[\varphi][Q]} [_{vP} t_i \text{ saw what}]]$

This is why the single $(C/T)^0$ is unusable in (24a). The option is also precluded in (24b). The relevant derivational stage is as follows.

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(26) $[_{(C/T)P}\text{who}_i \; (C/T)^0_{[\varphi][Q]} \; [_{vP} \; t_i \; \text{saw the dog}]]$

This stage is much the same as that of (16) above. Different from (16), however, derivation of (24b) crashes because (26) constitutes an embedded clause and it has to merge with an element in a matrix clause. If nothing happens, the (C/T)P in (26) is transferred as a whole and is inaccessible to further operations at the completion of (C/T)P. Then, it cannot merge with the matrix verb *wonder*. This is why the $(C/T)^0$ is unusable in (24b). Therefore, the option involving the $(C/T)^0$ as a single head cannot derive an embedded interrogative.

As another option, we might have a derivation the same as that for the matrix *wh*-object interrogative, where the $(C/T)^0$ head is copied to create an additional specifier position. However, this option is also precluded to derive (24) for the following reason. Like derivation involving the single $(C/T)^0$ head just examined above, once the (C/T)P is copied and completed, the whole (C/T)P is transferred and inaccessible to further operations. Merging the (C/T)P with the matrix verb is impossible. Therefore, this option is not allowed to derive sentences like (24).

The only option we have, then, is to separate C^0 and T^0. Suppose that the derivation proceeds and reaches the following step.

(27) $[_{(CT)P} \; (C/T)^0_{[Q]} \; [_{vP} \; ... \; wh\text{-phrase} \; ...]]$

As a next step, feature scattering/inheritance occurs.

(28) $[_{CP} \; C^0_{[Q]} \; [_{TP} \; T^0_{[\varphi]} \; [_{vP} \; ... \; wh\text{-phrase} \; ...]]$

After separation of C^0 and T^0, the *wh*-phrase moves to [Spec, CP] from either object or subject position to check the Q-feature on C^0.

(29) $[_{CP} \; wh\text{-phrase}_i \; [_{C'} \; C^0_{[Q]} \; [_{TP} \; T^0_{[\varphi]} \; [_{vP} \; ... \; t_i...]]$

Although TP is transferred to be inaccessible at the completion of CP, the edge elements of CP—[Spec, CP] and C^0—are still accessible to matrix elements. Thus, the embedded clause can merge with the matrix verb (V).

(30)   [$_{VP}$ V [$_{CP}$ *wh*-phrase$_i$ [$_{C'}$ C$^0_{[Q]}$ [$_{TP}$ T$^0_{[\varphi]}$ [$_{vP}$ ... t_i...]]]]]]

Since this scattering is an optional operation, it must have a certain interface effect, and, therefore, I claim that the *wh*-phrase has to move further to a matrix clause, whose derivation is reminiscent of raising the embedded subject to the matrix object position in ECM constructions (Postal (1974)).

(31)   [$_{VP}$ *wh*-phrase$_i$ V [$_{CP}$ t_i' [$_{C'}$ C$^0_{[Q]}$ [$_{TP}$ T$^0_{[\varphi]}$ [$_{vP}$ ... t_i...]]]]]]

Raising the *wh*-phrase enables the interfaces to interpret the structure in which the heads of C^0 and T^0 are separated. The argument is the following. Recall that the phase has two roles. The role relevant to the present discussion is to create an escape hatch, which comes as a consequence of separating (C/T)^0 into C^0 and T^0. If the escape hatch is unnecessary, it is preferable not to create such an additional position in the first place from the perspective of simplicity. If it is necessary, however, an element using the "escape" hatch has to "escape" from the position. By doing so, the interfaces can recognize what has happened in the derivation under consideration. If edge positions of an embedded clause end up empty and have no interpretive contribution, the interfaces can guess that the separation of C^0 and T^0 has applied to create an escape hatch. That is, when *wh*-movement applies in an embedded interrogative, the *wh*-element has to move to a matrix clause through an escape hatch. Given this argument, sentences in (24) above should have the following structures:

(32) a. I wonder$_j$ [$_{VP}$ what$_i$ t_j [$_{CP}$ t_i [$_{TP}$ John saw t_i]]].
      b. I wonder$_j$ [$_{VP}$ who$_i$ t_j [$_{CP}$ t_i [$_{TP}$ t_i saw the dog]]].

Here, the *wh*-phrase has moved to [Spec, VP] of the matrix clause, whose verb *wonder* has moved to v^0 and, as a result, precedes the *wh*-phrase.

This argument is supported by a verb-particle construction. Adapting the insight of Johnson (1991), I assume that a verb (V) and a particle (Prt) are introduced in syntax as a single verbal head, as in (33).

(33) $[_{vP} v^0 [_{VP} (V\text{-}Prt)^0 DP]]$

As derivation proceeds, one of the following two options occurs: First, V and Prt move to v^0, as in (34a). Second, V alone moves to v^0, and Prt remains in its underlying position, as in (34b).

(34) a. $[_{vP} v^0 [_{VP} (V\text{-}Prt)^0 DP]] \rightarrow [_{vP}\ v^0{+}(V\text{-}Prt)_i^0\ [_{VP}\ DP_j [_{v'}\ \ \ t_i\ \ \ \ \ t_j...]]$

   b. $[_{vP} v^0 [_{VP} (V\text{-}Prt)^0 DP]] \rightarrow [_{vP}\ v^0{+}(V)_i^0\ \ \ \ \ [_{VP}\ DP_j [_{v'} (t_i\text{-}Prt)^0\ \ t_j...]]$

Since the direct object (DP) is assumed to move to [Spec, VP],[6] two linear order options emerge. If we take the option of (34a), the *V-Prt-DP* order appears. If we take the option of (34b), the *V-DP-Prt* order appears. These two linear orders are actually attested in the following sentences.

(35) a.   Betsy figured out [the problem] carefully.
   b.   Betsy figured [the problem] out carefully.

(Johnson (1991: 594–595))

In (35a), the verb *figured* and the particle *out* precede the direct object *the problem* whereas in (35b), the verb alone precedes the direct object, followed by the particle.

   If the *wh*-phrase in an embedded interrogative moves to a matrix clause, as the present analysis argues, its landing site should be [Spec, VP], as shown in (36).

(36) $[_{VP} wh\text{-}phrase_i V [_{CP}t_i' [_{C'} C^0_{[Q]} [_{TP} T^0_{[\varphi]} [_{vP} ... t_i...]]]]]$

This movement allows for the V^0 to enter into a selectional relation with the *wh*-phrase in terms of the Q-feature before it moves to the v^0 position (see Lasnik and Saito (1992)).

   Then, if we take the option of (34b) for derivation of a verb-particle construction with an interrogative as its argument, the linear order of *V*-wh-*phrase-Prt* should occur. This prediction is borne out by the following examples:

(37) a. Red is assembling those clues and trying to figure [what] out Fitch was trying to warn him about.[7]

    b. I'm still trying to figure [what] out works over here.[8]

    c. The Court of Appeals has been asked to interpret state labor law to figure [who] out is prohibited from tip sharing among Starbucks employees.[9]

    d. Engineers on the $1 million project were trying to figure [what] out to do next.[10]

In (37a), *what* has moved from the complement position of *about* in the embedded clause to a position between the matrix verb *figure* and the particle *out*. The position is taken to be [Spec, VP], so the landing site of the embedded object *wh*-extraction is [Spec, VP] of the matrix clause. In (37b), *who* has moved from the embedded subject position over *out*, clearly illustrating that the landing of the embedded subject *wh*-extraction is also [Spec, VP]. Examples (37c) and (37d) show that [Spec, VP] of the matrix clause can be occupied by the *wh*-subject of a passive sentence and the *wh*-phrase extracted from an infinitival clause, respectively.

Note, incidentally, that all of my informants judged the sentences in (37) to be ungrammatical. Although Andrew Radford (personal communication) agreed with their judgments and said that they were ungrammatical, he gave me some relevant data, showing that the landing site of the embedded *wh*-movement seems to be in a matrix clause, which are shown in (38).

(38) a. ?? The police couldn't figure [who] out she had collaborated with.

    b. ?? She refused to say [who] to the police she had spent the night with.

    c. ? He asked [who] in a sarcastic tone she had spent the night with.

                        (Andrew Radford (personal communication))

(38a) indicates that *who* has moved from the complement position of *with* in the embedded clause to a position between *figure* and *out*, and it is not completely ungrammatical. Relevant to this type of example, (38b) shows that *who* has raised across the main clause indirect object *to the police*. In (38c), *in a sarcastic tone* modifies the main clause verb phrase headed by *asked*, so *who* must seemingly

have raised into the main clause. On the basis of these data, I assume that the sentences in (37) are grammatical, in principle, though they are precluded by some factor irrelevant to syntax.

Of course, if we take the option of (34a), the linear order of *V-Prt*-wh-*phrase* occurs, as in (39).

(39) a. Helping scientists figure out [what proteins] look like can facilitate research into the inner workings of cells and, …[11]

   b. The key here is to figure out [what] works in multiple dimensions and what doesn't.[12]

   c. Ute families are large and it can be complicated to figure out [who] is related and how.[13]

   d. She will be the first to figure out [what] to do for her future.[14]

From these examples, the landing site of the embedded *wh*-movement is [Spec, VP] of the matrix clause.[15]

To summarize the discussion thus far, I have proposed two types of Transfer. For their interaction with the C/T bundling hypothesis and a scattering/copying operation, I have provided a principled account of the landing site of *wh*-movement. A matrix *wh*-subject/object moves to [Spec, (C/T)P], while an embedded *wh*-subject/object moves to [Spec, VP] of a main clause by crossing over the embedded clause.

I conclude this section by making explicit the superiority of the present analysis over previous analyses. As mentioned in section 1, the landing site of *wh*-subject extraction has been debated. Some researchers hold that the subject moves to [Spec, CP] because it occurs with *the hell*. This element is considered to appear with [Spec, CP] (Pesetsky (1987)). As examples in (40) show, only the *wh*-element at the sentence's beginning can occur with *the hell*. Since the landing site of the *wh*-object in (40a) has been supposed to be [Spec, CP], its occurrence with *the hell* is fine. Similarly, the *wh*-subject appearing in the sentence-initial position in (40b) can occur with *the hell*, so that the *wh*-subject must be in [Spec, CP]. This is the basic argument made for the *wh*-subject occupying [Spec, CP].

(40) a. What the hell did you buy?

    b. Who the hell bought a car?

    c. *Who bought what the hell?

         (Messick (2020: 3), Cf. Pesetsky (1987), Bošković (to appear))

These data are compatible with the present analysis because it argues that the landing site of the *wh*-subject is [Spec, (C/T)P], which also includes the element C^0.

    Other researchers hold that the landing site of the *wh*-subject is [Spec, TP] because another *wh*-phrase can cross it, as shown in (41).

(41) a. What kinds of gifts$_i$ are there rules about [who can give t_i to whom]?

    b. *What kinds of gifts$_i$ are there rules about [who you can condemn for giving t_i to whom]?   (Chung and McCloskey (1983: 708–709))

The contrast in grammaticality between (41a) and (41b) shows that *what kinds of gifts* can be extracted from the embedded interrogative by crossing the *wh*-phrase acting as a subject, as in (41a), but not as an object, as in (41b). Sentence (41a) can be possible because the *wh*-subject has moved to occupy [Spec, TP], and [Spec, CP] is available for an additional *wh*-object, as in (42).

(42)   [$_{CP}$ what kinds of gifts$_j$ [$_{C'}$ C^0 [$_{TP}$ who$_i$ can [$_{vP}$ t_i give t_j to whom]]]]

Data in (41) are also compatible with the present analysis. When we try to extract a *wh*-phrase from a *wh*-island, both scattering and copying apply to $(C/T)^0$. Specifically, the example of (41a) is derived as follows.

(43) a. [$_{(C/T)P}$ $(C/T)^0_{[\varphi][Q]}$ [$_{vP}$ *wh*-subject ... *wh*-object]]

    b. [$_{CP}$ $C^0_{[Q]}$ [$_{TP}$ $T^0_{[\varphi][Q]}$ [$_{vP}$ *wh*-subject ... *wh*-object]]]

    c. [$_{CP}$ *wh*-object$_j$ [$_{C'}$ $C^0_{[Q]}$ [$_{TP}$ *wh*-subject$_i$ [$_{T'}$ $T^0_{[\varphi][Q]}$ [$_{vP}$ t_i ...t_j]]]]]

First of all, the separation of C^0 and T^0, in addition to the (partial) copying of the Q-feature, occurs from (43a) to (43b), providing us with two landing sites for a

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wh-element: [Spec, TP] and [Spec, CP]. The former is occupied by the *wh*-subject and this enters into an agreement relation with φ-features and the Q-feature on T^0, while the latter can be occupied by the *wh*-object, and this enters into an agreement relation with the Q-feature on C^0. Hence, the *wh*-object moves further from the escape hatch to the sentence-initial position. Note, incidentally, that acceptability of this sentence differs depending on speakers. This may come from the status of C^0, which undergoes both separation and (partial) copying. Some speakers may regard this kind of C^0 as "defective," so that it does not have the power to apply Transfer. Then, an element can be accessible to further operations. Hence, extraction is possible. Other speakers may take the C^0 to be a phase head because it involves copying, even though it is partial in that only the Q-feature is copied. Then, as an effect of copying, the whole phase is transferred to be inaccessible to further operation. Hence, extraction is not possible.

In contrast, (41b) is completely ungrammatical because no positions exist to which *what kinds of gifts* can move. The *wh*-phrase *who* has moved from the object position of the verb *condemn* to [Spec, CP], which is a position created by the separation and copying of C^0 and T^0. It is the only landing site for non-subject *wh*-movement available in the embedded clause and there is no escape hatch position to which *what kinds of gifts* moves, so that (41b) is ungrammatical.[16]

Therefore, the present analysis can account for all data that previous analyses have dealt with in terms of the landing site of the *wh*-subject.

As for the landing site of embedded *wh*-movement, previous analyses failed to account for the data in (37) and (38). All have maintained uniformly that a *wh*-phrase moves to [Spec, CP] in the embedded interrogative sentence. In this sense, the present analysis is superior because it makes a correct prediction about the data.[17]

4.　Concluding Remarks

In this paper, I proposed two types of Transfer: One is to send the complement of a phase head to the interfaces for interpretation. The other is to send the whole phase to the interfaces. Although these two types come free, only one can be chosen for application in an actual derivation depending on how the bundled

C/T head is used in the derivation. If the C/T head is used as a single head or copied into two separate C^0 and T^0 heads, the whole-phase-transfer strategy is taken. I have demonstrated that it accounts for derivation of *wh*-phrase extraction in a matrix interrogative. If the C/T head is scattered/inherited, the phase-complement-transfer strategy is taken. I have shown that this accounts for the derivation of *wh*-phrase extraction in an embedded interrogative. Then, I asserted that the analysis can (i) provide a principled account of where the landing site of *wh*-movement is, (ii) answer the question of why *do*-support applies when a *wh*-phrase undergoes movement from a matrix non-subject position, and (iii) present new data to indicate that a *wh*-phrase in an embedded interrogative moves to [Spec, VP] of a matrix clause.

Notes

1)   Abstracting from details irrelevant here, this paper focuses on a CP phase and ignores a phase status of *v*P.

2)   This paper discusses standard English and does not consider a variety of English that allow for *do*-support in an embedded interrogative. See Henry (1995) and McCloskey (2006) for relevant discussion.

3)   I assume that a phase is completed when all the uninterpretable features on the

phase head are valued.

4)   In this paper, I tentatively assume that the head-complement relation is determined by selection. Then, TP is taken as a complement of C^0 because TP is selected by C^0.

5)   Since $(C/T)_1{}^0$ and $(C/T)_2{}^0$ were originally one and the same head, I assume that the result of agreement, such as deletion of uninterpretable features and valuation of an unvalued feature, is shared between them. This might be done by an operation like "teleportation." I hope to explore this possibility in future research. Furthermore, I leave open for now the question of what prevents *John* from moving to [Spec, $(C/T)_1$] and *what* from moving to [Spec, $(C/T)_2$] as another derivational possibility other than (18b).

6)   I leave open the question of why DP moves to [Spec, VP]. This may occur for a Case reason, as standardly assumed in the Government and Binding era (Chomsky (1981)), or for a labeling reason, as proposed by Chomsky (2013, 2015).

7)   https://www.ibtimes.com.au/blacklist-season-2-spoilers-new-revelations-about-super-bowl-episode-fulcrum-storyline-be-explored

8)   https://www.theguardian.com/football/2016/oct/22/swansea-city-watford-premier-league-match-report

9)   https://www.nbcnewyork.com/news/local/starbucks-tip-sharing-policy-cash-jars-split-lawsuit-baristas-supervisors-managers/2099136/

10)   https://www.deseret.com/2002/5/18/19655649/ship-scuttles-itself-a-little-early

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11)   https://www.wired.com/story/without-code-for-deepminds-protein-ai-this-lab-wrote-its-own/

12)   https://semiengineering.com/new-power-performance-options-at-the-edge/

13)   https://www.nationalgeographic.com/culture/article/covid19-and-indigenous-communities

14)   https://www.tennisworldusa.org/tennis/news/Editors_Thoughts/100331/naomi-osaka-has-to-reset-everything-or-is-tennis-no-longer-a-priority/

15)   One might wonder how the present analysis accounts for an example like a *wh*-interrogative occurring in a subject.

  (i) a. [How many numbers people who have had no previous experience will
           have to do] is not sure.   (Ross (1973: 148))
       b. ? Was [why he has come] obvious?   (ibid.: 145)

Example (ia) shows that the *wh*-interrogative can appear in the subject position. Example (ib) indicates that it occupies [Spec, TP] because it immediately follows the inverted auxiliary in C^0. The present analysis argues that the *wh*-phrase must move to occupy a position in a higher clause. However, there are no positions available at this time. I hope to explore it further in future work.

16)   See also George (1980), Chomsky (1986), Agbayani (2000, 2006), and Branigan (2020) for relevant discussion about subject-object asymmetry with respect to *wh*-extraction from a *wh*-island.

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17)   I leave it to future research to determine the status of the so-called complementizer *that*. If the present analysis is correct, *that* could appear in C^0. This should be possible only when $(C/T)^0$ is separated into C^0 and T^0. However, when separation of C^0 and T^0 applies, the C^0, an edge element of a phase, must move further to a higher position to escape from the position, as a *wh*-phrase in an embedded interrogative must. I know of no strong evidence for this argument, and the present analysis does not account for the appearance in a sentence such as (i).

(i)   a.   I think that John is smart.

b.   That John is smart is obvious.

c.   It is obvious that John is smart.

It might be that *that* is not a complementizer but another category. See Kayne (2010, 2021) and Radford (2018) for relevant discussion.

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