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Resolving the Multiple-*Wh* Puzzle without Movement: Box Theory and Interface Dissociation*

Haewon Jeon (Silla University)

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Jeon, Haewon
Visiting Professor, Department of English Education
Silla University
140 Baegyang-daero 700beon-gil(Rd.), Sasang-Gu
Busan, Korea
Tel: +82-51-999-5224
Email: hwJeon@kmou.ac.kr

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ABSTRACT

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Within Chomsky's (2024) Miracle Creed framework, which replaces successive-cyclic movement with *in-situ* access by higher phase heads, this paper derives two classical puzzles of multiple *wh*-questions—Superiority amelioration (the third-*wh* effect) and Baker's (1970) scope ambiguity—from a divergent read-off system at the interfaces. Under the Box theory, the Sensory-Motor (SM) and Conceptual-Intentional (CI) interfaces evaluate a single syntactic object under asymmetric locality conditions: SM externalization is strictly local and subject to phase opacity, whereas CI interpretation accesses structures across clausal boundaries to establish feature valuation and assign long-distance scope. Coupling this differential read-off with the Clausal Typing Hypothesis and the choice of which C_Q head accesses the redundant *wh*-phrase, we derive the full multiple-*wh* paradigm—naturally capturing Baker's scope ambiguity, the rescue of intra-clausal Superiority violations, and the interpretive rigidity of rescued configurations. This divergent SM/CI read-off over a stationary boxed *wh*-phrase provides a unified, principled account for the complex syntactic and semantic behaviors of multiple interrogatives without invoking covert movement or LF absorption.

KEYWORDS

multiple *wh*-questions, superiority amelioration, the third-*wh* effect, scope ambiguity, Miracle Creed, divergent read-off, Box system, externalization

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1. Introduction

A syntactic architecture is tested most sharply where its own commitments leave a question undecided. Chomsky's (2024) Miracle Creed framework, having replaced successive-cyclic movement with access at the extended phase edge, makes a strong claim about how a single derivation is read by the two interfaces—yet it is precisely at the edge, where more than one *wh*-phrase may sit, that the framework has not settled which element a higher head accesses. Multiple *wh*-questions bring this indeterminacy to the surface.

(1) a. Who wonders what who bought?
b. *Bill wonders what who bought.
c. Who wonders who bought what?
d. Bill wonders who bought what.

They form a minimal 2×2 paradigm, crossing the type of the matrix clause against the order of the two *wh*-phrases in the embedded clause. The lower row, with the canonical *who bought what* order, is well-formed whether the matrix is interrogative (1c) or declarative (1d). The upper row displaces the object *what* across the embedded subject *who*, and here grammaticality turns entirely on the matrix: (1a), with an interrogative matrix, is rescued, while (1b), with a declarative matrix, is sharply excluded. The puzzle that organizes this paper can be put in one sentence: why should an ordering violation internal to the embedded clause be sensitive to the type of a higher clause? Any answer must also capture the interpretive asymmetry that runs alongside the grammaticality one—that (1c) is ambiguous as to the scope of *what*.

By analyzing the syntactic-semantic interface properties of multiple *wh*-questions, this study explores the empirical consequences of this architectural shift. Specifically, our analysis centers on a cluster of classical puzzles known as Superiority amelioration and the third-*wh* effect. This paradigm revolves around the phenomenon in which a structural Superiority violation within an embedded clause is grammatically rescued by the interrogative status of the higher matrix clause. The central thesis advanced in this paper is that this amelioration effect is not derived from covert movement, featural opacity, or specialized LF Absorption mechanisms (Higginbotham and May 1981), as proposed in previous literature. Rather, it emerges quite naturally from the principle of "Interface Dissociation" inherent in the Miracle Creed framework. According to our analysis based on Chomsky's (2024) Box Theory, the Sensory-Motor (SM) and Conceptual-Intentional (CI) interfaces evaluate the single boxed syntactic object formed within a clause under entirely distinct locality conditions. While the SM interface is strictly bound by island constraints and phase opacity—unable to cross an intervening phase boundary—the CI interface can transparently penetrate these boundaries to establish long-distance dependencies. By coupling this differential read-off mechanism with the Clausal Typing Hypothesis (Cheng 1991) and the free interaction of Merge and Minimal Search, this study successfully derives the full range of interpretive ambiguities and grammatical variations exhibited by multiple *wh*-questions. The two interfaces will be seen to read this box under opposite locality: CI interpretation may cross an intervening interrogative clause, but externalization may not—a *wh*-phrase cannot be externalized out of an embedded interrogative into the matrix.

Investigating the cognitive foundations of language, the Strong Minimalist Thesis (SMT) posits that human I-language intrinsically satisfies this Miracle Creed. Following the logical consequences of the SMT to their limit, Chomsky's (2024) Miracle Creed framework undertakes a fundamental reorganization of syntactic computation and its mapping to the SM and CI interfaces. Perhaps the most significant architectural shift introduced by this new framework is the complete elimination of successive-cyclic movement, a mechanism long considered essential in generative grammar for deriving long-distance dependencies. For decades, seemingly unbounded

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operations like *wh*-movement were analyzed as step-wise displacement, with elements moving sequentially through intermediate phase edges (Spec-CP) to satisfy locality constraints such as the Subjacency Condition. The Miracle Creed framework, however, completely dispenses with the derivational redundancy of these intermediate landing sites. Instead, it adopts an Access model: a syntactic object undergoes Internal Merge (IM) at most once, and the resulting structure is subsequently accessed and read off *in situ* by a higher phase head. This extreme simplification of the narrow syntax effectively shifts the explanatory burden for such phenomena away from the syntactic derivation itself and onto the read-off mechanisms at the interfaces. The architecture does not, however, decide the case that matters most for multiple interrogatives. Consider a transitive *v**P in which the object *wh* has been internally merged and the external-argument *wh* subsequently externally merged:

(2) [C_Q .... [*who what* [*v**P buy *what*]] (Who bought what?)

In other words, C_Q is presented with two distinct candidates—*who* and *what*—for access and consultation. In a simple, single-clause question like *Who bought what?*, this dual candidacy poses no real issue, as the target is straightforwardly resolved by standard Superiority. What settles it is which candidate C_Q accesses. Accessing the higher subject *who* yields the well-formed *Who bought what?*; accessing the lower object *what* instead would externalize it over *who*, deriving the ill-formed **What did who buy?*. In a single clause, then, Superiority follows for free: with the subject *who* and the boxed object *what* side by side at the extended phase edge, the probe accesses the structurally higher of the two, and no separate ordering statement need be added. However, in multiple *wh*-questions such as (1a) and (1c), where both *who* and *what* at the extended phase edge of the embedded clause stand as fully available targets for C_Q to consult, and a single higher head is no longer the whole story. Navigating this structural indeterminacy becomes a critical juncture in the derivation of multiple *wh*-questions, driving much of their syntactic and semantic complexity. Both elements sit at the edge of the extended phase. Which does C_Q access?

The paper proceeds as follows. Section 2.1 sets out the Miracle Creed architecture, and Section 2.2 introduces the wh-puzzle, reviewing the classical analyses of the paradigm while indicating why their mechanisms—covert movement, featural opacity, LF Absorption—do not transfer to a system without successive-cyclic movement. Section 3 develops the proposal: Section 3.1 sets out its assumptions and the Interface Dissociation, Section 3.2 derives the paradigm in (1)—Baker's (1970) ambiguity, the rescue and interpretive rigidity of the third-wh configuration, and the exclusion of the ill-formed cases—from which head accesses the redundant wh-phrase left after clausal typing, and Section 3.3 extends the account to in-situ focus. Section 4 concludes.

2. Background

2.1 The Miracle Creed Framework

The most fundamental axiom of the Miracle Creed framework is Principle T[1], which dictates that all relation-forming and structure-building operations in the syntax must be directly related to thought. By mandating that every application of Merge make a direct contribution to semantic interpretation at the CI interface, this principle

1 According to Principle T, every syntactic relation and structure-building operation (SBO) must be fundamentally tied to cognitive function, ensuring that all generated semantic properties are properly interpreted at the Conceptual-Intentional (CI) interface (Chomsky 2024, p. 22).

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upholds the strongest version of SMT. Under the strict governance of Principle T, Merge—the sole syntactic operation—applies in two distinct ways, syntactically instantiating the traditional duality of semantics.

First is the Propositional Domain (PD)[2]. Built entirely by External Merge (EM), this domain forms the syntactic foundation where basic argument structures and theta-roles are assigned. Second is the Clausal Domain (CD). Formed by Internal Merge (IM), this domain handles discourse and information-structural properties, such as interrogative force, topic, and focus. In this system, IM is not merely a meaningless procedure that displaces elements. Rather, IM targets a theta-marked element within the PD and draws it into the CD, thereby imposing strict segregation. The moment an element moves into the CD via IM, it ceases to have any further syntactic interaction with the EM-generated structures that constitute the PD. This domain segregation operates as a core mechanism that maximizes derivational economy and ensures read-off efficiency at the interfaces. The theoretical device that physically enforces and executes this syntactic segregation is the concept of the Box. When a syntactic object undergoes a single instance of IM from its theta-position to a local phase edge, it is metaphorically placed into a box. This phenomenon of boxing carries profound structural consequences for the derivation.

The most crucial of these is that a boxed element is completely shielded and exempted from any further structure-building operations within the narrow syntax, which prevents the element from conflicting with subsequent theta-role assignments and fundamentally blocks it from undergoing any further IM—meaning successive-cyclic movement is entirely eliminated. Consequently, this functions as a powerful constraint, permitting IM to apply at most once per syntactic object. The most decisive point of departure, however, is that boxing is neither Transfer to the interfaces nor deletion from the workspace. The boxed element is not removed as the derivation proceeds; it just sits there on the plane of the CD.

(3) [C_Q .... [you *what* [v^*P buy *what*]] (What did you buy?)

A minimal case shows what this amounts to. In (3), the earlier analysis raised *what* from its object position to Spec-CP via Spec-v*P; in the present system *what* moves only once, to the edge of v*P, where it is boxed and goes no further. This derivation does not involve successive-cyclic movement but simply C_Q consults the box in place, and the instruction it passes to the SM interface—pronounce the *wh*-element at the clause-initial C—is what SM realizes as *What did you buy?* The revealing cases are those in which the box is pronounced not in its own clause but higher up.

(4) a. Who does she believe Tom met?
b. [$C_{[+Q]}$ ... *believe* [$C_{[-Q]}$Tom who [v^*P meet who]]]
c. *She believes who Tom met

Consider an example from Chomsky's lectures (2023), the object *who* originates in the embedded clause *Tom met who* and is boxed at the local v*P edge, yet it surfaces at the top of the sentence, across the clause boundary introduced by *believe*. Two properties of the system are already visible. First, $C_{[+Q]}$ accesses the box at a phase-edge position; and second, the externalization instruction it issues is to pronounce that boxed element at the highest

2 Conceptualizing I-language fundamentally as a cognitive engine for thought generation, Chomsky (2024) outlines a structural division that captures the familiar duality of semantics. In this architecture, language distinguishes between two primary categories of thought: a propositional layer dedicated to basic theta-theoretic relations, and a clausal layer that computes discourse-oriented properties such as illocutionary force, topic, and focus (Chomsky 2024, pp. 4-5).

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C. What licenses the long-distance externalization here is that the intervening clause contributes no competing $C_{[+Q]}$. It is long established that clause-embedding predicates select the semantic type of their complements: *wonder* is a rogative predicate, taking an interrogative [+Q] complement, whereas *believe* is anti-rogative, admitting only a declarative [−Q] complement (Grimshaw 1979). Since *believe* selects a declarative, neither it nor the clause it embeds introduces a [+Q] head, and the derivation of *Who does she believe Tom met?* contains exactly one C_Q—the matrix one—which consults the box and externalizes *who* at the top. The counterfactual makes the point sharp: were there a $C_{[+Q]}$ in the complement of *believe*, as in the structure [C_{Q2} she believe [C_{Q1} Tom met who]], the boxed *who* would fall under the instruction of the lower C_{Q1} and be spelled out locally, yielding the ill-formed in (4c) rather than the attested matrix question. The reach of a box to a higher head is therefore not a matter of the box travelling upward, but of which interrogative head is present to consult it.

Chomsky takes the Phase Impenetrability Condition (PIC) to be a propositional property—a condition on External Merge within the PD—so that it does not govern the CD. What this exemption secures, however, is a specific and limited privilege: the visibility of the box. Because the box lies outside the reach of the PIC, its content remains available to be read by a higher phase head no matter how many phase boundaries intervene. Visibility in this sense is an interpretive notion—it says that the box can be consulted—and it must be kept distinct from the question of whether every operation a phase head might perform on the box is equally unbounded.

(5) a. Which pictures of each other do the men like
b. **W** [1 C INFL [3 the-men [2 **W** like **W**]]]
c. Which pictures of each other do the men hope Bill likes
d. **W** [1 C INFL [3 the men [**W** hope Bill [2 **W** like **W**]]]]
e. Which pictures of each other did Mary think the men hope Bill likes
f. **W** [C INFL [Mary thought [1 C INFL [3 the men [**W** hope Bill [2 **W** like **W**]]]]]] (Chomsky 2024, p. 13)

Chomsky (2024, p. 13) sets out the derivation of *Which pictures of each other did Mary think the men hope Bill likes* in stages—(5a-f)—and the fact that it must be given in stages is itself what makes the dissociation visible. Throughout, the fronted wh-phrase is written as a single box, **W**, which recurs at each phase rather than moving through it; the same box is simply consulted again as the structure grows. At the lowest phase, [2], where **W** originates as the object of *likes*, the theta-relation between the verb and *pictures* is fixed once and for all. As the derivation extends upward, the reciprocal *each other* is resolved at the intermediate phase within the configuration [3] in which *the men* c-commands it; no reconstruction and no lowering of the fronted phrase are called for, because the box is read where it sits. Only at the matrix does externalization apply, instructing the SM interface to pronounce the box at the left edge of the clause. In (5f), a phase head consults the single box **W** at each level rather than moving it: the matrix C_Q accesses **W** and issues the instruction to externalize it at the matrix left edge, while a lower head consults the very same box at phase [3]—where its reciprocal *each other* is resolved under *the men*—and at [2], where its theta-relation to *likes* is fixed. One and the same box is thus consulted and read, at three distinct locations, and the interpretive dependencies reach across the clause boundaries that externalization does not. Concretely, the three read-offs are distributed across the phases: the theta-relation is fixed and interpreted on **W** at the lowest phase [2], where it originates as the object of *likes*; the antecedent for the reciprocal *each other* is resolved on W at the intermediate phase [3], under *the men*; and SM externalization is realized on *W* at the highest phase, at the matrix left edge. Externalization, anaphora, and thematic interpretation are thus settled at three distinct points of one and the same derivation—exactly the profile that a single box, consulted by successive heads but read differently by each interface, leads us to expect.

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In this architecture, then, a syntactic object is interpreted not by movement through copies but by consultation and access[3]: a phase head (C or v^*) searches its domain, locates the box, and reads it. Crucially, the two interfaces do not read it under the same conditions—a contrast we will state as the distinction between a box's access-visibility and its externalization-accessibility. For the CI interface, which fixes scope and anaphoric dependencies, consultation draws directly on the box's unbounded visibility: a higher C can assign scope to, or resolve binding into, a box several phases below it with no intervening step. The SM interface is not free in this way. Externalization is not a reading of the box but a placement of it—an instruction to pronounce its content at a designated position—and such placement is a spell-out operation, effected cyclically and hence subject to phase opacity and to the island constraints that govern externalization. A boxed object is therefore universally visible but only locally externalizable: it can be interpreted from a distance while being pronounced only within a bounded domain.

The dissociation drawn here—one and the same object read by SM and CI under different conditions—is not a device peculiar to the analysis that follows; it restates, in the present framework, a generalization that has been argued for independently on other data. The divergence of externalization from CI interpretation has been formalized as Non-Simultaneous Transfer: the complement of a phase head may be sent to one interface without being sent, at the same point, to the other, so that a phase can be a PF-phase without being an LF-phase, or conversely (Felser 2004, Marušič 2005, 2009, Citko 2014). Sauerland and Elbourne (2002) extend the phase in just this direction, taking the edge of a phase to be distinct for LF and for PF, so that a phrase present at only the LF-edge is accessible to LF alone, and one at only the PF-edge to PF alone, in a later phase. On such a system the two interfaces do not, in general, read the same structure at the same domain.

The mechanism differs—cyclic Transfer to two interfaces versus consultation of a box—yet the content is the same: pronunciation and interpretation are read off at different loci and under different locality. What we call Interface Dissociation, and the contrast just drawn between a box's access-visibility and its externalization-accessibility, is this independently motivated result recast for a system without successive-cyclic movement, not an assumption invented for the case at hand. Were SM and CI constrained to read a single object strictly at one and the same domain and in the same manner, the attested divergences of quantifier scope, reconstruction, and clausal ellipsis would be underivable; that they are derivable, and on independent grounds, is what licenses the divergent read-off the analysis below assumes.

This asymmetry between access-visibility and externalization-accessibility is the concrete form that Interface Dissociation takes in the present system, and it is the pivot on which the analysis in §3 turns: because CI read-off is transparent to phase boundaries while SM externalization is not, one and the same box can feed a long-distance interpretive dependency and a strictly local exponence, so that scope and binding may reach across a boundary that pronunciation cannot. The syntactic trajectory of the subject stands in stark contrast to this. Externally merged at the outer specifier of v^*P, where it receives its theta-role, the subject subsequently undergoes IM to Spec-TP. Therefore, the subject is not boxed; instead, it resides at what Chomsky (2023) calls the extended phase edge. Because the subject sits at the extended phase edge without being enclosed in a box, the way a higher phase head accesses it proceeds via a two-step procedure : First, the interrogative complementizer ($C_{[+Q]}$) accesses the subject at its initial, externally merged lower position (the v^*P-external position) to read its [+Q] interrogative feature. The subject's lower occurrence is a position that carries no phonological feature. Next, $C_{[+Q]}$ accesses the subject again at its higher Spec-TP position—where its phonological substance actually resides—to execute the SM

3 As Chomsky notes in his Keio and EMU lectures (2023), "At each phase, the phase head consults the boxed element for interpretation."

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externalization operation for physical pronunciation. This structural asymmetry—where the object is singularly boxed while the subject remains unboxed at the extended edge awaiting two-step access—serves as the geometric pivot that naturally derives compliance with Superiority in multiple *wh*-questions.

2.2 The *Wh*-Puzzle: Superiority and the Third-*Wh* Effect

The empirical core of this study is the four-way paradigm introduced in (1), repeated here as (6), a cluster of embedded multiple-*wh* configurations that has anchored theories of interrogative syntax since Chomsky (1973).

(6) a. Who wonders what who bought?
b. *Bill wonders what who bought.
c. Who wonders who bought what?
d. Bill wonders who bought what.

The puzzle is compact but stubborn. The four strings share the same question-embedding predicate, *wonders*, and the same two embedded arguments; they differ only along two dimensions: whether the matrix subject is itself a *wh*-phrase *who* or a referential DP *Bill*, and which of the two embedded *wh*-phrases—the subject *who* or the object *what*—surfaces in the embedded clause-initial position. These two dimensions interact to produce a single, sharp asymmetry: of the four strings, only (6b) is ill-formed. An adequate theory must therefore explain why the embedded string *what who bought* is fatal in (6b) yet licit in (6a), while leaving untouched the unremarkable well-formedness of (6c) and (6d). A word is in order on what this paradigm does *not* include. The deviance of (6b) is an effect of the embedded word order—of which *wh*-phrase surfaces clause-initially—and not of extraction across a clause boundary. It should therefore be kept apart from the superficially similar case in (7):

(7) *What did you wonder who bought ___?

Here *what* is not merely ordered within its clause but pronounced in the matrix, having been externalized out of an embedded interrogative—a *wh*-island configuration. Its ill-formedness has a different source from that of (6b): it is a matter of how far a *wh*-phrase may be externalized, not of which *wh*-phrase types the embedded clause. We return to (7) once the relevant locality is in place (§3.2.2); throughout Section 2, it serves only to delimit the paradigm, whose deviance is uniformly clause-internal.

The deviance of (6b) is the embedded reflex of the Superiority Condition (Chomsky 1973), which requires that when two positions are eligible for a single movement operation, the structurally higher one be targeted. In the embedded clause of (6b), the interrogative complementizer must attract a *wh*-phrase to its specifier, and two candidates compete: the subject *who* and the object *what*. Because the subject asymmetrically c-commands the object, Superiority selects *who*; fronting *what* across the higher *who* yields exactly the deviance found in the root question *What did who buy?* Recast within the Minimalist Program as a subcase of the Minimal Link Condition (Chomsky 1995), the same result follows from Attract Closest: the probing complementizer must engage the nearest goal bearing the relevant feature, and *who*, as the embedded subject, is strictly closer to it than *what*. On either formulation the violation is internal to the embedded clause, and the matrix subject *Bill* plays no part in it.

Let us focus on the minimal contrast between (6b) and (6a), which lifts the paradigm above a standard illustration of Superiority. The two sentences are identical in their embedded clause—each contains the offending sequence *what who bought*—and differ only in the matrix subject: the referential *Bill* in (6b), the *wh*-phrase *who* in (6a).

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This single substitution is enough to rescue the structure. The mere presence of a third, higher *wh*-phrase renders the embedded Superiority violation invisible—an observation traceable to Bolinger (1978) and Kayne (1983), who set the deviant *I wonder what who bought.* against the acceptable *Who wonders what who bought?* Pesetsky (2000) sharpens the effect from the opposite direction: a mono-clausal question offers no position for a rescuing third *wh*, and no comparable amelioration is available there.[4] The generalization—that an additional, higher *wh*-phrase attenuates an otherwise robust Superiority violation—has been derived in several ways, notably through Richards's (1997) Principle of Minimal Compliance, on which a single constraint-obeying dependency within a domain suffices to exempt other, overlapping dependencies from the same constraint. Superiority, on this view, is not inviolable but attenuable; the third-*wh* configuration is one of two classic environments in which it relaxes, the other being D-linking[5], under which discourse-familiar *which*-phrases escape the condition outright (Pesetsky 1987, 2000).

The rescue in (6a) does not come for free. Whereas (6c), *Who wonders who bought what?*, is ambiguous in the way first described by Baker (1970)—allowing both a reading on which *what* is resolved inside the embedded question and one on which it is paired with the matrix subject—the rescued (6a) is interpretively rigid: its embedded subject *who* cannot be construed locally and must instead pair with the matrix *who*, leaving a single, list-type reading. The plain baseline (6d), *Bill wonders who bought what*, completes the picture, exhibiting neither a Superiority violation nor matrix construal, since here the embedded subject *who* fronts in the ordinary way and *what* stays in situ within a self-contained embedded question. The paradigm thus imposes a twofold demand: to explain grammaticality—why a third *wh* licenses (6a) but *Bill* cannot license (6b)—while simultaneously accounting for the ambiguity of (6c), which allows for two distinct readings.

Not only these grammaticality facts but also the paradigm's interpretive properties have attracted an equally substantial literature. The cross-clausal pair-list readings of (6c) and (6d) were first derived at Logical Form, through the Absorption of the separate *wh*-operators into a single polyadic quantifier (Higginbotham and May 1981) and were later grounded in the semantics of embedded question denotations—the embedded clause supplying an answerhood set of ordered pairs that *wonders* takes as its argument, with exhaustivity redistributed across the matrix *wh* in (6c) (Dayal 1996, Comorovski 1996). The rescue in (6a), in turn, has been approached not only through the Principle of Minimal Compliance but through phase-based locality, on which the embedded phase shields its internal order from the matrix probe (Bošković 2002), and through Cyclic Linearization, on which the linear commitments of the embedded spell-out domain are fixed independently of the matrix (Fox and Pesetsky 2005); English throughout instantiates the single-fronting option of the broader multiple-*wh* typology (Rudin 1988). Each account captures part of the descriptive picture, yet each also presupposes machinery—successive-cyclic movement, a dedicated LF operation, or phase-opacity pressed into service as a rescue mechanism—that a system built on a single, stationary box is designed to do without.

It is this coupling of licensing and construal—grammaticality and interpretation fixed together—that the analysis in the following sections derives from a single boxed object, read by the SM and CI interfaces under different domains of locality. By grounding this derivation strictly within the latest framework of the Minimalist Program, the present study aims to offer a principled and streamlined account of the paradigm.

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4 The wide-scope construal at issue here is familiar from an older line of analysis. In classic examples of the type *Who remembers where we bought what?* (Baker 1970, Huang 1982), the embedded in-situ *what* is taken to acquire matrix scope—the pair-list reading—by moving covertly at LF to the matrix Spec-CP. Because the embedded Spec-CP is already occupied by *where*, this covert step must skip the intervening interrogative C, an island-violating movement that such accounts license by special stipulation.

5 The amelioration of Superiority via D-linking (Pesetsky 1987, 2000) is beyond the scope of this paper.

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3. The Proposal: SM and CI Read-off under Divergent Locality

The account developed here rests on a single structural object per clause—the box—which the two interfaces read under different domains of locality. On this view Superiority and its amelioration are not conditions on movement but consequences of a prior question: which phase head values the unvalued Q-feature of a redundant *wh*-phrase, and whether such a head is available at all. §3.1 sets out the assumptions the account rests on and establishes its central asymmetry: while the Sensory-Motor (SM) interface externalizes the boxed element under strict locality bounded by each individual C_Q, the Conceptual-Intentional (CI) interface accesses and interprets it across clausal (C_Q) boundaries via long-distance dependencies. That is, rather than accessing and evaluating structures within the same domain, the two interfaces must operate over distinct computational and interpretive domains. §3.2 puts this dissociation to work, deriving the paradigm in 3.1.

3.1 Assumptions: Divergent Read-off at SM and CI

The analysis in this section rests on the distinct read-off system at the SM and CI interfaces motivated on independent grounds in §2.1, and does not stipulate it anew for the multiple-*wh* paradigm. Building upon Marušič's (2005) Non-simultaneous Transfer framework—where the domains of SM and CI transfer diverge for computational efficiency—Jeon (2023) demonstrated that clausal ellipsis fundamentally stems from the asymmetric read-off and distinct locality conditions operating at the two interfaces. In this study, we extend this conceptual architecture to the realm of multiple *wh*-questions (e.g., *Who wonders who bought what?*). Rather than relying on classical syntactic mechanisms such as covert movement, LF absorption, or stipulative island-escaping constraints, we propose that the phenomena of Superiority amelioration and Baker's (1970) scope ambiguity naturally follow from the differential read-off at SM and CI over a single boxed syntactic object. Under this approach, the divergent interface evaluations—wherein the SM interface strictly obeys local phase opacity for pronunciation while the CI interface transparently penetrates clausal boundaries for *wh*-valuation and scope assignment—provide a unified, principled account for the complex syntactic and interpretive behaviors of multiple *wh*-constructions. A derivation in which an unvalued Q-feature survives to CI does not converge.

(8) (guess) which book John told Bill that you asked whether the man who Mary met wanted to read

Each stage is extended for a single stated reason—the Q-features of *which book* are still unvalued, and so the derivation must proceed—until a C_Q is reached that values them. Nothing else drives it forward: no movement requirement, no EPP, no independent trigger. In the recent minimalist framework, this valuation proceeds by access rather than by movement: $C_{[+Q]}$values the unvalued Q-feature of a *wh*-phrase not by displacing the *wh*-phrase into a local configuration with it, but by directly accessing the *wh*-phrase in situ. We take the locus of valuation and the locus of scope to coincide—the head that values a *wh*-phrase is the head at which it takes scope—but these are two read-offs of a single narrow-syntactic event, not a single operation performed at CI. Convergence, finally, is CI's verdict—a uQ no [+Q] head has valued reaches CI unvalued and crashes. This last point requires care, and the account turns on keeping three operations distinct. Because a boxed *wh*-phrase lies in the clausal domain, exempt from the PIC (§2.1), a higher [+Q] head may access and consult it across an intervening phase boundary and value its uQ in place; this valuation is an operation of the narrow syntax, effected by consultation rather than by movement or Agree, and not an operation of an interface. Scope is what CI reads off from the result: the position of the valuing head fixes the *wh*-phrase's scope, and CI interprets this without re-operating on the object.

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Two assumptions about read-off complete the picture. The first reinterprets clausal typing as a fact about access of $C_{[+Q]}$rather than successive cyclic movement. Cheng (1991) proposes the Clausal Typing Hypothesis, on which every clause must be typed; a *wh*-question is typed either by a *wh*-particle in C or by fronting a single *wh*-word to Spec-C. Once Economy of Derivation is brought to bear, movement of one *wh* suffices to type a clause, and any *wh* beyond the first contributes nothing to typing. We transpose this generalization to the access layer in multiple *wh*-questions: once one *wh*-phrase has typed a clause, any remaining *wh*-phrase is free with respect to the local head C_{Q1}—free, that is, to be valued either by C_{Q1} itself or by a higher C_{Q2}.[6] We call such a residual *wh*-phrase *redundant*. Following Cheng's (1991) Clausal Typing Hypothesis, a single *wh*-phrase is strictly sufficient to determine the interrogative typing of a clause; any remaining *wh*-element contributes nothing further to clausal typing, but rather serves solely for CI interpretation—namely, scope determination. Redundancy in this sense does not exclude the local head from valuing the residue; it means only that the residue's valuer is left open between C_{Q1} and C_{Q2}. Where earlier accounts reached for covert movement or unselective binding to interpret the second *wh*, this openness of $C_{[+Q]}$access alone does the work.

The second concerns how the single box is read: the two interfaces evaluate it under different locality regimes, and the difference follows from the kind of operation each performs. The SM interface, which decides where a term is pronounced, is strictly local, because externalization is a cyclic spell-out operation: it respects phase opacity and island constraints. The CI interface, which decides where a term is interpreted is not local in this way: a higher C_{Q2} may reach into C_{Q1}'s domain and value a box below it.

A three-*wh* pattern with a declarative complementizer shows the same convergence logic at work, and previews the treatment of Superiority given in §3.2.2. The pattern in (9) involves a declarative *that*-clause and two *wh*-phrases at a distance[7]:

(9) a. Who did you tell that she should buy what?
b.?*What did you tell who that she should buy?
c. You tell who that she should buy what.

In (9a), the only interrogative head is the matrix C_Q. In sentences (9) containing only a single C_Q, the Superiority effect of *who* over *what* is, in effect, naturally preserved. (9c) is the limiting case: with a declarative *that* again and no [+Q] head anywhere in the structure, there is no $C_{[+Q]}$ to value either *wh* or to issue an externalization instruction, and both remain in place. (9b) is the revealing failure. Here boxed *what* has been externalized at the matrix, and the residue is *who*; but no [+Q] head values its uQ—there is no higher C_{Q2} above the matrix to reach it at an interrogative edge. Its uQ therefore survives to CI unvalued, and the derivation crashes. The failure of (9b) thus illustrates that in configurations with a single C_Q, the Superiority effect of *who* over *what* is, in effect, naturally preserved as a direct consequence of interface convergence. As demonstrated in (9), the Superiority Condition is straightforwardly satisfied in structures with a single C_Q. We now turn to cases involving two C_Qs.

6 Cheng's economy argument concerns the superfluity of additional *wh*-movement for typing, not the valuation of features; nothing in it prohibits C_{Q1} from valuing a residual *wh* in its own domain. The weaker proposition adopted here—one *wh* types the clause, the rest are free relative to the local head—is all the analysis requires, and it does not inherit the stronger typological commitments of the Clausal Typing Hypothesis (see §2).

7 A declarative *that* is a valued, non-interrogative C. Where we write [−Q] on such a head elsewhere in the paper, the notation marks this valued declarative typing, not an unvalued feature; a declarative *that* is therefore not a probe and values no uQ.

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That the two regimes genuinely come apart is confirmed by a familiar pair of embedded multiple-*wh* questions of the type discussed by Lasnik and Saito (1992):

(10) a. Who wonders [what who bought]?
b. [C_{Q2} [who$_i$ wonders [C_{Q1} who$_j$ ⟦what⟧ [v*P bought what]]]]

In (10), the embedded object *what* types its own clause and is externalized at the embedded Spec-C, while the matrix C_{Q2} externalizes the matrix subject *who* at the front. The matrix C_{Q2} cannot reach across the embedded clause to externalize the embedded *what*: were it to place that lower *what* at the topmost C, the result would be the sharply deviant **What who wonders who bought?*. For the purposes of externalization, then, the boundary between C_{Q1} and C_{Q2} is impermeable—each head places only the highest element of its own access domain. Yet this same boundary is transparent to interpretation, since the higher C_{Q2} values a box within the lower domain, up to but no higher than itself. We call this the Interface Dissociation: the same syntactic output is read by SM and CI under contrary conditions. Stated over the two heads at issue, the contrast is minimal:

(11) SM (externalization): C_{Q2} ∦ C_{Q1} —opaque; no penetration (islands, phase locality)
CI (interpretation): C_{Q2} ⟶ C_{Q1} −transparent up to the valuing head; penetration across CP

The core of the account is that a single box is read by SM and CI under different locality conditions. To clarify the three distinct syntactic environments that have previously been grouped under the single term penetration, we draw the following distinctions.

(12) SM externalization is local. An element is externalized within the domain of the phase head that accesses it. A [+Q] phase head is a criterial position and closes the externalization path, so SM cannot externalize across an intervening C_Q.

(13) Penetration is non-local, but what crosses the boundary is valuation in the narrow syntax, not an operation of the interface. Because a boxed element lies in the clausal domain and is exempt from the PIC (§2.1), a higher [+Q] phase head, C_Q may consult with it across an intervening phase boundary—including a [+Q] boundary—and value its uQ. CI does not itself reach across the boundary; it reads off the scope that this valuation fixes. Valuation reaches as far up as the nearest [+Q] head able to value the element, and the position of that head fixes the scope CI reads.

(14) A [−Q] complement is not a penetration configuration at all. Verbs of the *believe* type select a [−Q] complement, so there is no C_Q to cross; the boxed element is simply accessed by the higher C_Q and externalized at the matrix.

This is the same distinction drawn in §2.1 between a box's access-visibility and its externalization-accessibility, now localized to the relation between two interrogative heads. The paradigm in 3.1 follows from this dissociation together with the assumptions stated above—the single box per clause, clausal typing recast as access, and the redundancy it creates—as the next section shows.

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3.2 Asymmetric Access at the Interfaces

We return here to the question that opened the paper, now sharpened into a problem about access: at the extended phase edge, two *wh*-phrases are available, and what must be settled is which phase heads access, and in what order. The Miracle Creed leaves this open; the present section shows that, once the choice is made explicit, the whole paradigm—its ambiguities, its rescue, and its exclusions—follows from the single distinction between a boxed and an unboxed residue, read by SM and CI under the divergent locality of §3.1.

3.2.1 C_Q access in SM interface

§ 3.1 established that Superiority is naturally preserved in single-C_Q clauses. In contrast, multiple *wh*-questions with two C_Qs give rise to SM-related Superiority violations, revealing that the scope of the *wh*-element is unambiguously determined across clause boundaries. The minimal contrast in (15) illustrates:

(15) a. Who wonders who bought what?
b. Who wonders what who bought?
c. *What did you wonder who bought ___?
d. Who does she believe Tom met?

For all their surface difference, (15a) and (15b) begin from one and the same derivation, (16). In each, the embedded object *what* is internally merged to the edge of v*P and boxed there, so that the extended phase edge presents two candidates at once:

(16) a. [C_{Q2} [who$_i$ wonders [C_{Q1} who$_j$ ⟦what⟧ [$_{v*P}$ bought ~~what~~]]]]

b. [C_{Q2} [who$_i$ wonders [C_{Q1} who$_j$ ⟦what⟧ [$_{v*P}$ bought ~~what~~]]]]

c. [C_{Q2} [who$_i$ wonders [C_{Q1} who$_j$ ⟦what⟧ [$_{v*P}$ bought ~~what~~]]]]

d. [C_{Q1} [Who… she believe [$C_{[-Q]}$ Tom ⟦who⟧ [$_{v*P}$ met Who]]]]

If, at the SM interface, C_{Q2} were to reach across the clause to consult *what* in the domain of C_{Q1} and instruct it to be pronounced at the topmost CP, the *wh*-phrase *what* would be externalized at the matrix level as in (16c), yielding ungrammaticality—precisely what is forbidden by (12). The string is therefore ungrammatical, not merely degraded: what is blocked is not the interpretation but the pronunciation of *what* at the matrix, and the system assigns it no licit SM representation at all.[8] The contrast is with (16b), where *what* is externalized locally, at the embedded Spec-C, while its scope is fixed from a distance by the valuation of (16), which is what crosses the

8 Extraction of an argument from a finite wh-island of this type is standardly reported as strongly degraded (*??*) rather than fully unacceptable, and wh/whether-islands are classed as weak islands (Chomsky 1986,Cinque 1990). The present system predicts ungrammaticality, since a matrix pronunciation site for *what* requires crossing a [+Q] boundary. We take the residual acceptability to be a processing effect rather than a grammatical one. The infinitival counterpart (*what did you wonder whether to buy*) is milder still, as expected if finiteness sharpens the [+Q] boundary that externalization may not cross.

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boundary—the pronunciation of *what* never does. Ill-formedness on the SM side and transparency on the CI side are thus not in tension: at one and the same [+Q] boundary they apply to different objects, a pronunciation site and a scope site. (16d) shows why (15d) is derived without difficulty. While the rogative predicate *wonder* in (16ab) selects an interrogative complement headed by C_Q—thereby establishing two distinct heads, C_{Q1} and C_{Q2}, where SM externalization must strictly respect the intervening C_Q boundary—the anti-rogative predicate *believe* in (16d) selects a declarative $C_{[-Q]}$ complement. Consequently, the entire derivation in (16d) contains effectively only a single C_Q (the matrix one), allowing the boxed *wh*-phrase to be directly accessed and externalized at the matrix level without crossing any intervening [+Q] boundary.

3.2.2 C_Q access in CI interface

Taken together, the two contrasts of §3.1 are unified: SM is opaque to a [+Q] boundary; CI is transparent up to the nearest higher [+Q] head. To summarize, multiple *wh*-questions with a single C_Q(e.g., *who saw what*) and those containing two C_Qs (e.g., *who wonders what who bought*) diverge in terms of Superiority compliance and *wh*-scope determination, which straightforwardly correlates with distinct read-off mechanisms at the SM and CI interfaces.

(17) Choice A (the typing target): whether C_{Q1} completes clausal typing with who_j or with boxed what.
Choice B (the host of the residue): whether the wh left over after typing is accessed by C_{Q1} or by C_{Q2}.

The Choice A yields two different sentences—the former *Who wonders who bought what*, the latter *Who wonders what who bought*. Consequently, Choice B yields two distinct interpretive readings within a single sentence, as exemplified by *Who wonders who bought what?*. In this configuration, the interpretive divergence—whether *what* takes embedded scope or matrix scope—directly hinges on whether the embedded head C_{Q1} or the matrix head C_{Q2} consults the residual *wh*. Because both derivations are freely generated in the narrow syntax, any illicit outcomes are filtered not derivationally, but by the convergence conditions at the interface read-off.

The two typing choices of §3.2.1 yield the two grammatical members of the paradigm, and the difference between them comes down to a single asymmetry: whether the *wh*-phrase left redundant after typing is the boxed object or the unboxed subject. Minimal Search from C_{Q1} terminates first on the subject who_j, reached at the extended phase edge. Cheng's (1991) clausal typing is completed by the [+Q] of who_j, and the boxed ⟦what⟧ is thereby left redundant with respect to C_{Q1}. It is precisely this redundancy that opens the two hosting options.

(18) a. [C_{Q2} [who_i wonders [C_{Q1} who_j ⟦what⟧ [$_{v*P}$ bought what]]]]

b. [C_{Q2} [who_i wonders [C_{Q1} who_j ⟦what⟧ [$_{v*P}$ bought what]]]]

c. [C_{Q2} [who_i wonders [C_{Q1} who_j ⟦what⟧ [$_{v*P}$ bought what]]]]

Because the redundant *wh* may be valued by either head (C_{Q1} or C_{Q2}), a single string supports two convergent read-offs—one on which *what* takes embedded scope, one on which it takes matrix scope—and the sentence is correspondingly ambiguous. On the first read-off, the redundant ⟦what⟧ is accessed by the embedded head

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C_{Q1} itself (18a), whose valuation confines the scope of *what* to the embedded clause. The embedded question then denotes a self-contained *who bought what*, and the matrix interrogative ranges over the subject alone; a felicitous answer accordingly names a single individual, as in *John does*. On the second read-off in (18b), C_{Q1} leaves the redundant box untouched, and ⟦what⟧ is instead accessed by the matrix head C_{Q2}. Since the [+Q] boundary at C_{Q1} is transparent to CI, this long-distance access is licit and scope is fixed by the nearest higher [+Q] head able to value the element—here C_{Q2} *what* thereby takes matrix scope and pairs with the matrix subject, so that the question calls for a ⟨wonderer, thing⟩ pair-list rather than for a single value. The SM externalization is identical across the two readings—*what* is in situ either way—and the difference lies solely in which $C_{[+Q]}$ values what at CI. This is Baker's (1970) ambiguity, and simultaneously the most direct instance of SM/CI dissociation over a single box.

The other choice in (18c) generates the derivation in which C_{Q1} completes clausal typing with the object what. Here ⟦what⟧ receives C_{Q1}'s externalization instruction and surfaces at the embedded Spec-C, where, as a criterial position, it is frozen at embedded scope. The element left redundant is now the subject who_j. The subject who_j is not boxed, but it sits at the extended phase edge of a [+Q]-typed clause, and it is there that C_{Q2} reaches it. C_{Q2} crosses the [+Q] boundary and values who_j directly, exactly as the same transparency allows the boxed object to be valued at a distance in (18c). In this derivation, then, what is frozen at embedded scope by C_{Q1} while who_j is drawn to matrix scope by C_{Q2}, and the sole convergent reading pairs the matrix and embedded subjects—⟨who_i, who_j⟩, that is, ⟨wonderer, buyer⟩. Here who_j is a variable at matrix scope: its externalization is local, at Spec-TP (the pronunciation site), while the valuation of its uQ takes place at C_{Q2} (the scope site), so that the SM site and the CI site diverge for who_j as well. The sentence has a single reading because the redundant element is the unboxed who_j, which only C_{Q2} can reach.

The difference between the two derivations reduces to a single factor: whether it is the matrix C_{Q2} or the embedded C_{Q1} that accesses the *wh*-phrase left redundant after typing. The contrast across the data in (19) reduces directly to Two Interface Condition in (12-13): a wh-phrase converges at CI if and only if its uninterpretable $[uQ]$ feature is accessed and valued by an appropriate $[+Q]$ head—either locally via a boxed position at the v^*P edge or non-locally via penetration across a $[+Q]$-typed boundary. In single-C_Q environments, standard Superiority effects naturally emerge from the access failure of stranded features.

(19) a. Who thinks that left?
b. *What did who buy?
c. Who wonders what who bought?
d. *Bill wonders what who bought.

In (19a), because the complementizer *that* selected by *think* is $[-Q]$, the entire sentence contains only a matrix C_Q; consequently, the embedded *who* is accessed by this matrix C_Q and receives an instruction at SM to be externalized at the highest matrix edge. In (19b), the clause contains only a single C_Q, which is saturated by the fronted object, leaving the unboxed subject *who* inaccessible and its $[uQ]$ unvalued. That is, single-C_Q environments naturally enforce standard Superiority effects. In (19c), since *wonder* selects a C_Q complementizer, the configuration hosts two distinct $[+Q]$ heads. The embedded C_{Q1} attracts the boxed *what*, resulting in the SM externalization *what who bought*. Rather than crashing on a Superiority violation, this string is fully grammatical. As established in §2.2, this classic puzzle of Superiority amelioration and scope ambiguities in multiple wh-

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questions is directly enabled by the higher matrix C_{Q2}. Under the current Miracle Creed framework, this avoids stipulative mechanisms such as LF absorption or covert movement, deriving the phenomenon naturally from the dual accessibility of the stranded features to either the matrix or embedded C_Q probes. This dual accessibility reinforces the SM/CI Dissociation established in §3.2.2—confirming that Superiority violations and scope dependencies are not rigid constraints on linear order or syntactic movement, but the direct interface reflex of whether CI read-off can successfully complete interpretation at the interface.

4. Conclusion

This paper has explored the intricate syntactic and semantic properties of multiple *wh*-questions within Chomsky's (2024) Miracle Creed framework, demonstrating that classical puzzles such as the third-*wh* effect—the amelioration of an intra-clausal Superiority violation by a higher *wh*-phrase—and Baker's (1970) scope ambiguity can be derived naturally without successive-cyclic movement, covert LF displacement, or specialized LF Absorption mechanisms. Embracing the Strong Minimalist Thesis (SMT), we have shown that long-distance dependencies are established not through iterated movement operations, but via interface consultation of a syntactic object enclosed in a single clause-internal box. The proposed account anchors these phenomena in a divergent read-off system, whereby the Sensory-Motor (SM) interface externalizes elements under strictly local phase-opacity conditions, whereas a higher interrogative head values the stranded feature across clausal boundaries in the narrow syntax, allowing the Conceptual-Intentional (CI) interface to read off the scope fixed by this valuation.

Under this architecture, the empirical paradigm follows directly from the asymmetrical read-off conditions at the two interfaces. On the SM side, the structural Superiority condition is invariably observed across all environments: whether a structure contains a single C_Q (as in root questions or declarative embedding) or multiple C_Q heads (as in complex interrogatives), externalization remains strictly local. Each C_Q accesses and realizes only the structurally highest *wh*-element within its own local domain, completely barring cross-clausal pronunciation instructions. CI, however, behaves altogether differently. While SM externalization is strictly sealed at each individual C_Q boundary, CI accesses and interprets structures across those very boundaries. Specifically, the matrix C_{Q2}. reaches across the embedded C_{Q1} boundary into the lower domain to consult the stationary *wh*-element and extract essential semantic and scope information. It is this fundamental divergence in how the two interfaces evaluate one and the same C_Q boundary—opaque to SM externalization, but transparent to CI interpretation—that constitutes the divergent read-off system, enabling a single stationary box to yield strictly local phonological exponence and long-distance semantic construal simultaneously.

Furthermore, which C_Q head accesses the residual *wh*-phrase simultaneously predicts the semantic scope possibilities of these constructions. When clausal typing leaves an internally merged object box at the v*P edge, the residue falls within the search space of two distinct heads—the local embedded C_{Q1} or the penetrating matrix C_{Q2}—naturally generating Baker's (1970) classic scope ambiguity, a phenomenon distinct from the third-*wh* effect above. In conclusion, the differential read-off of a single box captures both the distributional constraints and the interpretive nuances of multiple *wh*-questions, corroborating the view that the empirical richness of natural language does not stem from an overly complex syntactic derivation, but from a maximally spare computational system read under divergent interface demands.

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Examples in: English
Applicable Language: English
Applicable Level: All

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