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One linker, many relations: unifying Mandarin *de* via qualia, events and crosslinguistic insights

Jo-Wang Lin

Institute of Linguistics, Academia Sinica, Taiwan
Email: jowanglin@as.edu.tw

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Abstract

This paper argues that prenominal Mandarin *de* in XP-*de*-NP constructions serves uniformly as a polymorphic semantic linker, despite its varied syntactic environments. We propose that *de* introduces an underspecified relation variable, R, which connects the XP to the NP's individual argument. The admissible values of R derive from two sources: they are either supplied lexically by the noun through inherent or qualia-instantiated relations, or they arise from a small set of grammar-driven interface relations. We show that the semantic variation of XP-*de*-NP results from resolving R without positing lexical ambiguity. This framework further accounts for two pseudo-modification patterns without resorting to coercion. Duration pseudo-modification applies a duration modifier to a TELIC-derived event profile, while canonical fake nominal modification saturates a head-licensed, event-dependent qualia relation. Both combine with the verbal predicate via non-saturating Event-dependent Restrict. Modifier-ordering asymmetries follow from the preservation of qualia roles, dependencies among lexical relations and the distinction between lexical saturation and adjunct modification. Finally, the relation-variable mechanism is shown to be shared crosslinguistically with the English clitic *'s*, although the latter is restricted to DP-like possessors. This unified account highlights *de* as a single polymorphic linker that systematically mediates XP-NP relations across diverse constructions.

1. Introduction

The particle *de* is one of the most frequently used function words in Mandarin Chinese, yet its invariant form masks a deep semantic complexity. Occurring in highly diverse syntactic environments and yielding multiple interpretations, it is familiarly characterized as one form with many functions.[1] In the surface template XP-*de*-NP, *de* can link nominal, measure-denoting, property-denoting and clausal modifiers. It also appears in so-called fake nominal

[1] In Modern Standard Chinese, the homophonous particle *de* is conventionally written as 的, 地 or 得, depending on its syntactic environment (Tian 2004, Nabuqi 2021). This paper focuses exclusively on the prenominal *de* in XP–*de*–NP

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modification. In these instances, a duration phrase appearing inside the DP object modifies the matrix event, or a seemingly individual-denoting DP conveys an event property. This paper claims that *de* functions as a constant linking operator across these environments. Combining with an XP, it seeks an admissible linking relation compatible with its sister nominal constituent. This process is driven by either a semantic relation or a grammatical interface relation and context selects which relation is relevant.

Concretely, we treat *de* as a semantic linker introducing an underspecified relation variable, R, between the modifier XP and the head noun NP. The possible values of R are constrained by the nominal head's lexical semantics – including inherently specified relations and relations made available by its Generative Lexicon (GL) Qualia Structure – alongside a small inventory of independently motivated interface relations. Selective binding (Pustejovsky 1995) is the routine GL mechanism by which a modifier accesses a specific qualia role of the head noun (e.g. Agentive, Telic, Constitutive or Formal), thereby making the corresponding relation available as a value for R. By contrast, interface relations are purely grammar-given mechanisms enabling semantic composition beyond what a noun's semantics alone can provide.

A qualia-based account of *de* as a semantic linker receives strong empirical support from two constructions: duration pseudo-modification (where a noun is modified by a duration phrase) and fake modification (where a possessive-like DP is assigned an eventive interpretation). Both have long posed syntax-semantics mismatches in Chinese linguistics. However, under a qualia-based approach to semantic composition, they admit a straightforward analysis without complicating the underlying syntax.

The paper proceeds as follows. Sections 2–4 establish the empirical and theoretical background. Sections 5–6 apply the proposed analysis to DP and clausal modification. Section 7 derives the two event-sensitive patterns; Section 8 compares Mandarin *de* with the English possessive *'s*; and Section 9 concludes.

2. The empirical landscape of XP-*de*-NP

2.1. One surface template, multiple semantic input types

The surface configuration XP-*de*-NP is pervasive in Mandarin. The modifier XP can be nominal, adjectival or clausal, yielding a correspondingly wide range of XP–*de*–NP interpretations.

(1) DP modifier (canonical genitive-like)[2]
Zhangsan de shu
Zhangsan DE book
'Zhangsan's book / a book by Zhangsan'

constructions. No claim is made as to whether these forms represent a single operator or reflect distinct grammaticalization paths and subsequent functional specializations. For further discussion, see the references cited above.

[2] This paper follows the Leipzig Glossing Rules. Additional glossing abbreviations are: DE = Mandarin particle *de*; EXP = experiential aspect; SFP = sentence-final particle. Less commonly known technical abbreviations used in this article are: EC = Existential Closure; EDR = Event-dependent Restrict; EI = Event Identification; GL = Generative Lexicon; GRC = Gapped Relative Clause; NCC = Noun Complement Clause; QPP = Qualia Preservation Principle; SB = Selective Binding; SEC = Saturated Event Clause.

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(2) AP modifier (ordinary property modification)
piaoliang de qunzi
pretty DE skirt
'a pretty skirt'

(3) Clausal modifier with propositional content
[Zhangsan pochan] de yaoyan
Zhangsan bankrupt DE rumor
'the rumor that Zhangsan went bankrupt'

(4) Eventive prenominal clause with an event-correlate head noun
[Zhangsan tan gangqin] de shengyin
Zhangsan play piano DE sound
'the sound of Zhangsan playing the piano'

(5) Gapped relative clause (standard restrictive relative clause)
[Zhangsan xie] de shu
Zhangsan write DE book
'the book that Zhangsan wrote'

While examples (1)–(5) typically motivate 'many-*de*' analyses, we take the opposite approach. Treating *de* as uniform, we ask what the XP's semantic type and the head noun's lexical resources must satisfy to derive these interpretations compositionally.

2.2. *Three clausal subtypes under* de*: NCCs, SECs and GRCs*

We identify three major types of prenominal clausal modifiers followed by *de* and adopt the following abbreviations:

A. NCC (noun complement clause): a clause typically interpreted as the propositional content of nouns like *yaoyan* 'rumor' or *xiaoxi* 'news'.
B. SEC (saturated event clause or gapless relative): a clause with an eventive profile, typically combining with event-correlate nouns such as *shengyin* 'sound' or *weidao* 'smell'.
C. GRC (gapped relative clause or restrictive relative): a clause containing a gap and interpreted as a property of individuals.

These three clausal subtypes exhibit distinct behaviors under stacking. Section 6 revisits these contrasts and derives the corresponding ordering effects.

2.3. *Predicate-oriented AP-*de *modifiers*

Finally, Mandarin permits non-predicative, non-restrictive and intensional AP modifiers such as *weiyi* 'only/unique' and *qianren* 'former' in AP–*de*–NP constructions (see also Paul 2005).

(6) (a) weiyi de jiejue fangfa
only DE solution way
'the only solution'

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(b) qianren de zongtong
former DE president
'former president'

Unlike previously discussed APs, these modifiers are non-predicative and non-restrictive, and they often encode presuppositional or temporal content (e.g. uniqueness, temporal precedence). In our unified analysis developed below, this contrast is accounted for not by positing a separate lexical entry for *de*, but by the AP modifier's own semantic type and lexical content.

2.4. Eventive fake nominal modification

A distinct puzzle concerns cases where a DP-*de*-NP subject combines with an event-evaluative predicate, yielding an eventive interpretation. This phenomenon is central to the 'fake modification' analyses in Huang (2008), Huang, Li & Li (2009), Wenshan Li (2021) and Zhang & Liu (2024), though their approaches differ substantially. In these constructions, the syntax appears to involve DP-internal modification, yet the semantics align with event predication shaped by construction-specific dependencies, creating a syntax-semantics mismatch (Huang, Li & Li 2009). Representative examples are provided in (7a, b).

(7) (a) Daiziying de yuqiu da de hen hao
Daiziying DE shuttlecock play DE very well
'Daiziying played/plays badminton well.'
(b) Ta chang-le [san tian de ge]
he sing-PFV three day DE song
'He sang (songs) for three days.'

(8) Verb-copying paraphrase of (7a)
Daiziying da yuqiu da de hen hao
Daiziying play shuttlecock play DE very well
'Daiziying played/plays badminton well.'

The subject phrase *Daiziying de yuqiu* in (7a) is not naturally interpreted as a possessed shuttlecock object; rather, it denotes an eventive description, meaning Daiziying's playing badminton. This eventive interpretation is supported by the verb-copying paraphrase in (8), which makes the underlying event predication overt.[3]

In the durative subtype in (7b), the measure phrase does not quantify the nominal individual (*song*); instead, it imposes a duration construal on the associated singing eventuality, acting as an 'event delimiter' (Zhang & Liu 2024). Later, we argue that the two eventive patterns follow distinct compositional routes.

[3] Mei (1978) and several subsequent scholars assume that the verb-copying construction underlies the relevant *de*-construction, with the first verb copy deleted and *de* inserted. However, opposing views have been advanced, most recently by Shi (2023).

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3. Previous analyses of *de* and the motivation for constrained relation resolution

3.1. Descriptive and functional-typological perspectives

Early structuralist and functional-typological accounts focused on distributional classifications of *de* (attributive, adverbial or nominalizing; e.g. Zhu 1961, 1966), or its role as a general prenominal modification marker capable of packaging words, phrases and clauses as nominal modifiers (e.g. Li & Thompson 1981, Guoying Huang 1982, Huang & Shi 2016). While these accounts establish *de*'s descriptive range, they leave unresolved how the XP-NP relation is compositionally derived and constrained.

3.2. Formal syntactic analyses

While structuralist and functional studies provide distributional classifications, formal syntactic approaches investigate what kind of head *de* is and where it merges. Given its occurrence with adjectival, nominal and clausal prenominal modifiers, a recurring hypothesis is that surface uniformity conceals structural heterogeneity. Depending on the configuration, scholars have instantiated *de* as distinct functional material, such as a complementizer, determiner, relator, conjunction-like element or relativizer (see Cheng 1986, Simpson 2001, 2002, den Dikken & Singhapreecha 2004, Paul 2005, den Dikken 2006, Li 2008, Paul 2012).

Consequently, syntactic approaches conclude that not all *de*-marked modifiers are structurally identical. Clausal *de*-modification, in particular, has been argued to diverge into distinct subtypes (Huang 2016, among others), with diagnostics separating relative-like, complement-like and other prenominal clausal patterns. We return to this issue below, distinguishing propositional/content-like modification (NCC-like), eventive prenominal clauses (SEC-like) and gapped relatives (GRC-like).

Purely structural analyses, however, leave the central semantic problem unresolved: they do not determine the relation linking XP and NP or what constrains these possibilities. A successful account must specify both the semantic type contributed by XP and the mechanism introducing and constraining the XP-NP relation.

3.3. Semantic analysis

Semantic approaches shift focus from *de*'s syntactic category to its compositional role. Since an XP can denote an individual, measure value, property or proposition, and the head noun licenses various relations to it, a semantic analysis must specify the XP's type, *de*'s semantic contribution and constraints on the resulting XP-NP relation.

Within this domain, two influential strands are Huang's (2006) property-theoretic program and Lu & Pan's (2016) and Pan & Lu's (2021) type-based linker framework. While both treat *de* as an active ingredient in semantic composition rather than a mere syntactic marker, their explanatory foci differ. Huang emphasizes type-mismatch repair via nominalization or type shifting, whereas Lu & Pan distinguish two types of linking: predicate-type modification versus argumental dependency.

3.3.1. Huang's property theory: *de* as a nominalizer/type-shifter

Huang's (2006) property theory posits that prenominal modifiers differ in semantic type, and that this type difference determines the presence/absence of *de.* Specifically, simple

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adjectives like *zang* 'dirty' denote individuals (type *e*), while complex adjectives like *hen zang* 'very dirty' denote properties (type ⟨*e*,*t*⟩). Assuming bare nouns denote individuals of type *e* and nominal modification involves conjunction/intersection, this framework requires type matching between modifier and modified noun. Consequently, simple adjectives appear prenominally without *de* because their argumental type (*e*) matches that of bare nouns.

To resolve mismatches, the system employs two repair devices: bleached *hen* 'very' type-lifts a simple adjective (from type *e* to ⟨*e*,*t*⟩) for predication, whereas *de* nominalizes a complex adjective (⟨*e*,*t*⟩ → *e*) to prevent prenominal type clashes.

This strategy offers explanatory power in that *de* appears precisely to prevent type mismatches, making its distribution principled rather than a list of lexical stipulations. However, the proposal faces technical and empirical critiques. A primary concern is compositional economy. Since intersection must target compatible types, Huang's implementation often requires indirect or repeated covert maneuvers to align them. Furthermore, Pan & Lu (2021) note that standard intersection targets ⟨*e*,*t*⟩-type meanings; thus, derivations involving ⟨*e*,*t*⟩ → *e* → ⟨*e*,*t*⟩ 'round trips' risk violating established constraints against type-shifting reversibility.

A second limitation concerns scope and generality. While Huang's account excels in the adjectival domain, many XP-*de*-NP patterns involve non-adjectival XPs (DPs, PPs, clauses). Here, interpretations involve systematically constrained relations (e.g. argument/role relations with event nominals) resembling selection-driven composition rather than optional pragmatic bridging. Indeed, research on Mandarin NP-internal dependencies highlights these exact constraints, underscoring the restricted interpretive freedom within nominal domains (Lu & Pan 2019).

3.3.2. Lu & Pan's type-based linker framework: de_{p} vs. de_{a}

Lu & Pan (2016) and Pan & Lu (2021) develop a broader type-driven semantics where the central question is not only whether the XP's type is appropriate, but also what kind of link is established with the head noun. A key premise is that Mandarin bare common nouns naturally denote properties (type ⟨*e*,*t*⟩), enabling straightforward intersective modification when the modifier is also predicate-type. Accordingly, Lu & Pan explicitly frame their system around semantic-type alignment, with *de* mediating these alignments.

Building on this, Pan & Lu (2021) propose a bipartite division of *de*-linking mechanisms:

A. de_p targets predicate-type modification. It marks (or converts to) predicate-type meanings, enabling an intersective, property-combining derivation when the XP is a property modifier (Pan & Lu 2021: 57–61).
B. de_a targets argumental dependency. It applies when the XP contributes an argumental or participant-like meaning (often a DP or clause) and the construction requires a dependency irreducible to simple predicate intersection (Pan & Lu 2021: 62–63).

Crucially, they treat de_a as an argument-introducing and linking element, not merely a marker of predicative modification.

This bifurcation offers two immediate virtues for theoretical modeling. First, it accommodates both ordinary intersective adjectival modification and the highly relational readings common in DP-*de*-NP and CP-*de*-NP patterns, avoiding a forced, uniform nominalization story. Second, it makes explicit the intuition that *de* is always a linker, operating in two

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distinct modes: type-management for predicate modification (de_p) versus dependency formation for argumental/clausal modification (de_a).

Nevertheless, a residual challenge remains, which motivates the unified approach proposed later in this paper. Once de_a is formalized as an operator linking the XP to the head noun in an argument-like way, the theory must still specify how the dependency is interpreted and constrained. Research on NP-internal argumental modifiers in Mandarin demonstrates that the interpretive space is not freely pragmatic; rather, it is systematically biased by the lexical semantics and argument structure of the head noun (especially with event nominals). This yields stable priority effects and rigid ordering/interpretation correlations that a purely underspecified relation variable would miss.

Consequently, a successful semantic theory must not only permit relational readings but also predict why certain head nouns strongly select for content/source/effect/participant relations and why these relations behave differently from adjunct-like modification. To address this, Section 3.4 turns to a familiar blueprint from the genitive literature: an underspecified relation variable whose values are lexically and contextually constrained.

3.4. From linking to constrained relation resolution

When a theory permits *de* to link argument-like or clausal modifiers to a head noun (as in Lu & Pan's de_a component), the key remaining task is no longer establishing whether linking is possible, but rather determining how the link is interpreted and constrained.

A natural framework comes from the semantics of genitives and relational nouns, which treat genitive-like morphology as introducing an underspecified relation variable R, whose value is fixed or sharply restricted by lexical and contextual information (Partee 1983/1997, Partee & Borschev 2000, Vikner & Jensen 2002, Partee & Borschev 2003). The methodological lesson for Mandarin *de* is straightforward: positing a relation variable requires principled constraints on admissible R-values to prevent interpretive arbitrariness.

Generative Lexicon (GL) theory supplies exactly the sort of lexical constraint such a framework requires, as it structures noun meaning internally via Qualia Structure and provides controlled mechanisms for accessing that structure in composition (Pustejovsky 1993, 1995, Pustejovsky & Ježek 2008). Importantly for the metalanguage of this paper, GL distinguishes routine qualia-guided linking (selective binding) from genuine type-mismatch repair (coercion). Keeping this distinction explicit is essential because much of *de*'s relational variability resembles lexically guided role targeting, while only a limited subset of cases plausibly involves repair driven by selectional pressure.

Similarly, Mandarin research on *wùxìng*/qualia roles likewise argues that implicit-relational readings inside nominal modification are lexically constrained (Wei & Yuan 2013, Yuan 2014, Li Qiang 2015, Li Xianhe 2021). However, this literature remains largely descriptive and typically lacks the implementation of a single-denotation linker with an explicit R-variable regulated by a head-driven qualia-based constraint.

Accordingly, Section 4 implements a unified architecture that (i) treats *de* as a single semantic linker introducing an underspecified R and (ii) restricts admissible values of R to relations supplied by the lexical semantics of the nominal head or a small inventory of grammar-given interface relations. Context then selects among the remaining compatible candidates only when the grammar underdetermines the choice.

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4. Theoretical framework: *de* as a relation-variable linker and the admissible values of R

This section proposes a unified theoretical framework for Mandarin XP-*de*-NP by analyzing *de* as a uniform linker whose compositional semantics integrates with the metalanguage of Generative Lexicon (GL) theory. The principal components are as follows.

First, the model adopts a relation-variable architecture inspired by Partee's work on English genitives (Partee 1983/1997, Partee & Borschev 1998, 2000, Vikner & Jensen 2002, Partee & Borschev 2003, among others). In this framework, *de* introduces an underspecified relation variable R linking the pre-*de* modifier to the individual associated with the post-*de* nominal constituent. Within Mandarin scholarship, this relation R is often described as *weici yinhan* 'predicate implication'.

Second, the permissible values of R are confined to those licensed by the lexical resources of the head noun such as inherent argument relations or qualia-induced relations, alongside a small closed set of type-driven interface relations.

Third, the architecture distinguishes between two GL generative devices, enforcing a division of labor. 'Selective binding' (subselection/exploitation) serves as the routine mechanism that converts a noun's internal qualia roles into accessible relations for nominal modification. By contrast, coercion arises only when composition would otherwise fail, and thus holds a limited, diagnostically constrained role within the overall system.

4.1. GL background: qualia structure and distinct generative devices

Within Pustejovsky's (1995) *Generative Lexicon* framework, the qualia structure for a lexical item offers a structured representation of word meaning beyond simple sense listing, enabling dynamic composition, polysemy resolution and type coercion. For nouns, this structure captures their essential semantic dimensions through a limited set of qualia roles functioning as compositional targets.

(9) Qualia Structure of Nouns

(a) FORMAL: what kind of entity the noun denotes and what intrinsic properties or dimensions distinguish it within a larger domain.
$Q_{\text{FORMAL}}(N) = \lambda u \lambda x[\text{FORMAL}_N(u,x)]$
(*u* may be a classifying property of *x* or a value on an intrinsic dimension.)

(b) CONSTITUTIVE: what the denoted entity is made of, what parts or components it has or what constitutes its content.
$Q_{\text{CONSTITUTIVE}}(N) = \lambda u \lambda x[\text{CONSTITUTIVE}_N(u,x)]$
(*u* is typically a material/part but can be a measure value.)

(c) TELIC: the purpose, function, characteristic use or characteristic activity associated with the denoted entity.
$Q_{\text{TELIC}}(N) = \lambda u_e \lambda x_e \lambda e_v[\text{TELIC}_N(e,u,x)]$
(*e* is a TELIC-associated event involving the nominal individual *x* and the role filler *u*; *v* is the type of event.)

(d) AGENTIVE: how the denoted entity comes into being, including its source, creator or characteristic mode of production.
$Q_{\text{AGENTIVE}}(N) = \lambda u_e \lambda x_e \lambda e_v[\text{AGENTIVE}_N(e,u,x)]$
(*e* is an AGENTIVE-associated event through which *x* originates, with *u* as the relevant source or creator.)

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These descriptions characterize the lexical content of the four qualia roles without imposing a uniform argument structure on them. A non-event-dependent role may relate a role filler *u* directly to the nominal individual *x*, whereas an event-dependent role may additionally introduce an event argument *e*.[4] The corresponding relation schemas are made explicit by the Selective Binding rules in (10). Compositional processes then determine whether any argument is subsequently saturated or existentially closed.

Furthermore, GL distinguishes two mechanisms for disambiguating lexical meaning in composition. Selective binding applies when a modifier composes with a noun by targeting a specific internal role, typically a role-instantiated relation, rather than directly modifying the entity denoted by the noun. Classic cases include adjective–noun combinations such as *fast car* and *fast typist*, where *fast* predicates over a qualia-licensed event associated with the noun (e.g. driving/typing) rather than the physical object or person. Accordingly, selective binding can yield event-dependent predicates when it targets the TELIC or AGENTIVE quale.

Coercion, by contrast, is a repair mechanism triggered by type mismatch. It applies when a selecting expression requires a semantic type that its argument does not provide, and no facet of the argument directly satisfies the predicate's requirements. A canonical illustration is *They want a 24-hour library*, where *want* selects a proposition but *library* denotes an entity. In this case, coercion shifts the NP into a propositional reading, yielding the interpretation 'They want [there to be] a 24-hour library'.

4.2. Relation variables and genitives: motivation for R and lexical constraint

The interpretive flexibility of Mandarin DP-*de*-NP mirrors the well-documented variability of English genitives (DP's NP). A standard semantic approach to genitives introduces a free relation variable R (Partee 1983/1997, Partee & Borschev 1998), whose value is determined by either lexical information (especially with relational nouns) or contextual resolution (for non-relational nouns).

Building on this, GL-oriented analyses (e.g. Vikner & Jensen 2002) further stress that the head noun's lexical semantics, particularly its qualia structure, limits which relations count as natural, thereby reducing reliance on unconstrained pragmatics. We draw the same conclusion for Mandarin *de*, but implement it via an explicit head-driven filter and a strict division of labor between selective binding and coercion.

4.2.1. Selective binding as a qualia-relation generator

Pustejovsky (1995, esp. Section 7.3) introduces 'selective binding' (hereafter SB) to demonstrate that modification need not apply to the noun's entire referent; rather, it can target an internal qualia role encoded in the noun's lexical meaning (cf. *fast typist*). Building on this concept and Vikner & Jensen's (2002) genitive implementation, we treat selective binding as a general rule for retrieving and instantiating a qualia role as a role-instantiated relation.

[4] We draw this distinction simply because the event arguments associated with the FORMAL and CONSTITUTIVE qualia roles do not figure in our subsequent discussion, rather than because such roles cannot themselves take an event argument.

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If a noun's argument structure is not inherently relational, selective binding targets a qualia role q contributed by the noun, yielding a role-instantiated relation that serves as a candidate value for the variable R. Formula (10a) represents the non-event-dependent case,[5] while (10b) illustrates the event-dependent case. If the targeted qualia relation includes an event argument that remains open for further composition, selective binding generates an event-dependent relation.

Furthermore, within this framework, selective binding targets a nominal constituent Nom headed by N (abbreviated as N-indexed Nom_N) rather than the bare N alone. This accounts for the fact that XP-*de* modifiers can stack, allowing an unsaturated qualia role to be inherited across a larger nominal constituent.

(10) SELECTIVE BINDING

(a) $\text{SB}_q(Nom_N) = \lambda u_\tau \lambda x_e.\left[Nom'(x) \wedge Q_q(N)(u)(x)\right]$ type: $\langle \tau, \langle e, t\rangle\rangle$.

(b) $\text{SB}_q(Nom_N) = \lambda u_\tau \lambda x_e \lambda e_v\left[Nom'(x) \wedge Q_q(N)(u)(x)(e)\right]$ type: $\langle \tau, \langle e, \langle v, t\rangle\rangle\rangle$.

For each role q, Q_q(N) represents the noun-specific relational content associated with that role. Accordingly, the schemas in (10) distinguish whether the relation derived by SB is non-event-dependent or whether it preserves an event argument for subsequent composition. Specifically, in (10a), SB(Nom_N) links an individual x satisfying the description of Nom to a role filler u that occupies N's q-role with respect to x. In (10b), the same relation additionally introduces an open event argument e, which remains available for further composition. For each role q, Q_q(N) returns the relational content specific to N associated with that role. The type τ is determined by the modifier-side argument licensed by the targeted relation: it can be e, v, m, $\langle e,t\rangle$, $\langle s,t\rangle$, $\langle\langle v,t\rangle,\langle v,t\rangle\rangle$ and so forth.

Selective binding relations often introduce implicit, unidentified arguments lacking independent reference. To ensure type-driven composition proceeds smoothly, we propose that these arguments undergo existential closure at the appropriate structural boundaries (see also Pustejovsky 1995). Specifically, we assume two modes of existential closure: outermost existential closure (cf. Heim 1982, Diesing 1992) and event closure for structurally internal event arguments.

(11) EXISTENTIAL CLOSURE (EC)

(a) Outermost EC (EC_outer)
$\text{EC}_\text{outer}(\lambda y.\lambda x_1 \ldots \lambda x_n.P(y, x_1, \ldots, x_n)) = \lambda x_1 \ldots \lambda x_n.\exists y[P(y, x_1, \ldots, x_n)]$

(b) Event Closure (EC_event)
$\text{EC}_\text{event}(\lambda x_1 \ldots \lambda x_n \lambda e_v[R(x_1, \ldots x_n, e)]) = \lambda x_1 \ldots \lambda x_n.\exists e_v[R(x_1, \ldots x_n, e)]$

EC applies only when closure produces the type required for subsequent composition.

[5] For Pustejovsky's original definition of 'selective binding', see his discussion on page 129, where it is described as a function applying to a particular quale within the N′ that the modifier combines with. The specific formulation in (10a) is adapted from Vikner and Jensen's (2002: 207) coercion operator 'Co', which applies to a noun's qualia structure to derive the relational variable R by converting common nouns (unary predicates) into relational nouns (binary predicates), as given below:

(i) $Co(W) = \lambda y[\lambda x[W'(x) \wedge Q(W)(y)(x)]]$
where $Q(W)$ is a qualia role associated with the word W.

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4.2.2. Sources of R: lexically supplied and grammar-driven relations

We propose that admissible values of R derive from two sources: first, relations supplied by the nominal head's lexical semantics (including both inherent and qualia-derived meanings) and second, a small closed inventory of grammar-given or type-driven interface relations. Let SourceR(N) denote the set of relations permitted as values of R for a head noun N.

To formalize this system, we use SourceR(N_{Lex}) to represent the lexically available relations. This category includes relations inherently encoded by relational nouns (SourceR (N_{Rel})), as well as those derived from qualia-instantiated relations accessed via selective binding (SourceR(N_{Qualia})) for non-relational nouns. In contrast, SourceR(N_{Intf}) designates the set of grammar-driven interface relations associated with the nominal constituent. These comprise the Predicate-modification Interface $R_{pm,Nom}$, the Functional-Application Interface $R_{Fapp,N}$ and the Duration-Telic application Interface $R_{Dur\text{-}telic,N}$. We examine these interface relations further in subsequent empirical sections below.

4.3. The semantics of de

4.3.1. *de* does not encode definiteness

The referential properties of Mandarin DP-*de*-NP vary with syntactic position and context, indicating that *de* itself does not encode definiteness.

(12) (a) Subject position → definite reading
Zhangsan de shu zai zhuoshang.
Zhangsan DE book on table
'Zhangsan's book is on the table.'

(b) Object position → indefinite/definite reading
Ni du-guo Zhangsan de shu ma?
you read-EXP Zhangsan DE book Q
'Have you read Zhangsan's book/a book by Zhangsan?'

(c) Predicate position → predicative property reading
Ta shi Zhangsan de xuesheng.
he is Zhangsan DE student
'He is Zhangsan's student/a student of Zhangsan's.'

Accordingly, we analyze the DP-*de*-NP construction as a property-denoting predicate, which can be schematically represented as: $\lambda x[\mathrm{NP}(x) \wedge R(\mathrm{DP},x)]$. From this denotation, both the definite and indefinite readings are derived.

4.3.2. *de* as a polymorphic linker that introduces R

In line with Partee's treatment of the genitive *'s*, we analyze *de* as a semantic linker. It first combines with the meaning of the modifier XP to introduce an underspecified generalized relation R, ultimately yielding a function over the individual argument associated with the post-*de* nominal, as illustrated in (13).

Specifically, the variables in (13) are defined as follows: α_τ represents the denotation of the pre-*de* modifier XP; $R_{\langle\tau,\langle e,\rho\rangle\rangle}$ serves as a linking-relation variable of type $\langle\tau,\langle e,\rho\rangle\rangle$; x_e is the individual argument of the post-*de* nominal; and ρ denotes the output type.

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(13) Core linker meaning
$[[\text{de}]] = \lambda\alpha_{\tau}\lambda R_{\langle\tau,\langle e,\rho\rangle\rangle}\lambda x_{e}.R(\alpha)(x)$

As noted previously, the admissible values of *R* stem from relations supplied by the noun's lexical semantics, including inherent and qualia-instantiated relations, together with grammar-driven interface relations. We formalize this as the following admissibility constraint:

(14) Admissible values of R
(a) $R \in \text{SourceR}(N)$
(b) $\text{SourceR}(N) = \text{SourceR}(N_{\text{Rel}}) \cup \text{SourceR}\left(N_{\text{Qualia}}\right) \cup \text{SourceR}(N_{\text{Intf}})$

When multiple members of SourceR(N) are type- and sort-compatible with both the modifier and the nominal constituent, context determines the appropriate candidate.

Once the linker is supplied with the selected relation R, it yields the output in (15).

(15) Linker output after relation resolution
$[[\text{de}]]([[\text{XP}]])(R) = \lambda x_{e}.R_{\langle\tau,\langle e,\rho\rangle\rangle}([[\text{XP}]])(x)$

This operation establishes a relation between the XP-*de* constituent and the individual *x* without explicitly associating *x* with its Nom constituent (namely, the NP in an XP-*de*-NP construction). Yet, this dissociation is merely apparent, since restriction on *x* originates from the relation R. For instance, when R is a transitive relational noun such as *fuqin* 'father', *x* functions as a pure argument of the relational noun; conversely, when R is a qualia relation derived via selective binding, the restriction on *x* is entailed by the Nom incorporated into the SB rule (see (10)).

What merits closer attention is the output type of $R_{\langle\tau,\langle e,\rho\rangle}$ ($[[\text{XP}]]$)(x). Since the first argument $[[\text{XP}]]$ is of type τ and x is of type e, the output type of $R_{\langle\tau,\langle e,\rho\rangle}$ ($[[\text{XP}]]$)(x) must be of type ρ. Within this framework, ρ can be either type t or $\langle v,t\rangle$, depending on the targeted qualia-derived relation and its event-dependency. Specifically, if the output type is $\langle v, t\rangle$, the event variable remains in the output; conversely, if the output type is $\langle e,t\rangle$, it functions as a standard individual property.

5. Applying the unified framework to nominal modification

Before proceeding, we briefly note an ongoing syntactic debate regarding the constituency of DP-*de*-NP construction (e.g. [[DP *de*] NP] versus [DP [*de* NP]]). While we adopt [[XP *de*] NP] as a working template for current purposes, our semantic analysis does not hinge on this structural choice. Rather, the crucial requirement is that *de* introduces R and that R must be licensed by the head noun's lexical resources or grammar-driven interface relations.

*5.1. DP-*de*-NP: agentive and possessive/control readings*

The phrase *Zhangsan de shu* 'Zhangsan's book' is ambiguous between 'the book written by Zhangsan' and 'the book Zhangsan owns'. Under our proposed framework, this ambiguity arises because the noun *shu* 'book' supplies multiple available relations, allowing context to select among them. Consequently, this example illustrates the core use case of the relation-

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variable architecture: the semantic function of *de* remains constant, while the relation variable R is selected from the head noun's set of admissible relations. For the case under discussion, *de* is instantiated as shown in (16):

(16) *de* in DP-*de*-NP structure
$[[\text{de}]] = \lambda x_e.\lambda R_{\langle e,\langle e,t\rangle\rangle}.\lambda y_e.R(x)(y)$

In ordinary DP-*de*-NP interpretations, an event-dependent qualia relation generated by SB (10b) may undergo event closure EC_{event} on its event argument, yielding a two-place relation of type $\langle e,\langle e,t\rangle\rangle$.

5.1.1. Agentive (authorship) reading

The authorship reading derives from the head noun's AGENTIVE role, which is accessed via selective binding. Since the creation event argument is not required for subsequent composition, it is existentially closed by existential closure (EC) as defined in (11).

(17) Lexical entry of *shu* 'book'
(a) Argument structure: $[[\text{shu}]] = \lambda x_e.\text{book}(x)$
(b) Agentive relation for *shu*
$\text{SB}_{\text{AGENTIVE}}(\text{shu}) = \lambda y\lambda x\lambda v\left[\begin{array}{c}\text{book}(x) \wedge \text{write}(v)\\ \wedge \text{Agent}(v,y) \wedge \text{Product}(v,x)\end{array}\right]$
(c) $\text{EC}_{\text{event}}(\text{SB}_{\text{AGENTIVE}}(\text{shu})) = \lambda y\lambda x\exists v\left[\begin{array}{c}\text{book}(x) \wedge \text{write}(v)\\ \wedge \text{Agent}(v,y) \wedge \text{Product}(v,x)\end{array}\right]$

Following this, the noun phrase *Zhangsan de shu* 'Zhangsan's book' is computed as follows, yielding an individual property. In this derivation, because the variable x's restriction book (x) is built into the definition of $\text{SB}_{\text{AGENTIVE}}(shu)$, the variable x is automatically restricted to book(x).

(18) (a) $[[\text{Zhangsan}]] = \text{ZS}$
(b) $[[\text{Zhangsan de}]] = [[\text{de}]](\text{ZS}) = \lambda R\lambda x.R(\text{ZS})(x)$
(c) $[[\text{Zhangsan de shu}]] = (\lambda R\lambda x.R(\text{ZS})(x))(\text{EC}_{\text{event}}(\text{SB}_{\text{AGENTIVE}}(\text{shu})))$
$= \lambda x_e\exists v_v.[\text{book}(x) \wedge \text{write}(v) \wedge \text{Agent}(v,\text{ZS}) \wedge \text{Product}(v,x)]$

5.1.2. Possessive/control reading

The possessive reading is derived similarly, but with the variable R resolved to a different lexically licensed relation. Following Vikner & Jensen (2002: 196), we treat possession as a relation broadly available for artifacts. Consequently, for a noun like *book*, beyond its basic TELIC role ('to be read'), we assume it may support a facet of possession, control or use (i.e. having the object under one's authority or effective use). We model this as another admissible relation:

(19) Possession relation
$R_{\text{POSSESS}} = \text{SB}_{\text{POSSESS}}(\text{shu}) = \lambda y_e\,\lambda x_e.[\text{book}(x) \wedge \text{possess}(y,x)]$

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(20) Possession composition
$[[\text{Zhangsan de shu}]]$
$= [\lambda R \lambda x.R(\text{ZS})(x)](\text{SB}_{\text{POSSESS}}(\text{shu}))$
$= \lambda x.\text{book}(x) \wedge \text{possess}(\text{ZS},x)$

Accordingly, both readings of *Zhangsan de shu* are derived by selecting different head-licensed relations from the lexical resources of *shu*, while the semantic contribution of *de* remains constant.

5.2. Num-CL-de-NP: modifier readings and the exclusion of counting

Many scholars have observed that Mandarin Num-CL-N sequences permit both counting/quantificational ('n individuals') and measure/modifier readings ('an amount or unit characterized by Num-CL'). Post-classifier *de* strongly favors the latter, yielding an attributive, measure-oriented interpretation rather than ordinary counting (Tang 1990, 1993, 2005, Xu-Ping Li 2011, Li & Rothstein 2012, among others).

We argue that this contrast arises from the interaction between the typed linker and the head-licensed admissibility condition. Specifically, a Num-CL sequence takes *de* to form an XP-*de*-NP structure only when acting as a non-counting modifier expressing an admissible noun-licensed relation. Demonstrating this, Sections 5.2.1 and 5.2.2 apply these constraints to intrinsic-dimension and amount/unit measurements, respectively. Section 5.2.3 then explains why ordinary counting construals fail to license *de.*

5.2.1. Intrinsic-dimension measurement

Consider *san-bang de xigua* 'a three-pound watermelon'. The measure phrase *san-bang* ('3 lb') specifies the watermelon's intrinsic weight, distinguishing it from, for instance, the two- or four-pound subclasses. This intrinsic-dimension measurement aligns with the FORMAL role, situating objects within a broader classificatory domain.

(21) Formal-licensed intrinsic-dimension measurement relation
(a) $[[\text{xigua}]] = \lambda x.\text{watermelon}(x)$
(b) $\text{SB}_{\text{FORMAL}}(\text{xigua}) \in \text{SourceR}(\text{xigua})$
$\text{SB}_{\text{FORMAL}}(\text{xigua}) = \lambda m \lambda x.[\text{watermelon}(x) \wedge \text{weight}(x) = m]$

(22) (a) $[[\text{san} - \text{bang}]] = 3\text{ lb}$
(b) $[[\text{san} - \text{bang de}]] = [[\text{de}]]([[\text{san} - \text{bang}]]) = \lambda R \lambda x.R(3\text{ lb})(x)$
(c) $[[\text{san} - \text{bang de xigua}]]$
$= \lambda x.[\text{watermelon}(x) \wedge \text{weight}(x) = 3\text{lb}]$

5.2.2. Amount/unit measurement

Consider this example from Yen-Hui Audrey Li (2013: 105):

(23) Wo yi-kouqi chi-wan yi-da-ge de xigua, zhang-si-le.
I one-breath eat-finish one-big-CLF DE watermelon full-dead-SFP
'I finished eating a big watermelon (in amount) in one breath; I am too full.'

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Here, *de* is optional (Audrey Li 2013: 99, 107), but it typically requires perceptual or classificatory material like *da* 'big'; without this adjectival enrichment, *de* insertion often degrades. Unlike (22), the Num-Adj-Cl-*de* sequence in (23) measures the actual amount or unit of watermelon consumed rather than classifying it within a measurable subclass. While the modifier *yi-da-ge* remains a measure-denoting expression of type *m*, it quantifies the watermelon's material or mereological constitution.

Thus, the relevant qualia role is CONSTITUTIVE. Recall from (9b) that the relation $\text{CONSTITUTIVE}_N(u)(x)$ normally describes an object x's material or parts u. However, because a physical object is also constituted by its spatial extent and physical mass, an intrinsic measurement (e.g. length, weight or volume) specifies the amount of matter or space constituting it. Here, the argument u is of type measure value (or degree/amount), as shown below:

(24) $\text{CONSTITUTIVE}_N(m)(x) \Longleftrightarrow N(x) \wedge \text{Unit_Measure}(x) = m$

Consequently, the CONSTITUTIVE-induced relation for example (23) is shown in (25) with its semantic composition given in (26):

(25) CONSTITUTIVE-licensed amount/unit-measurement relation
  (a) $[[\text{xigua}]] = \lambda x.\text{watermelon}(x)$
  (b) $\text{SB}_{\text{CONSTITUTIVE}}(\text{xigua}) \in \text{SourceR}(\text{xigua})$
  $\text{SB}_{\text{CONSTITUTIVE}}(\text{xigua})$
  $= \lambda m \lambda x.[\text{watermelon}(x) \wedge \text{Unit_Measure}(x) = m]$

(26) (a) $[[\text{yi} - \text{da} - \text{ge}]] = \text{one_big_unit}\ (\text{type}\ m)$
  (b) $[[\text{yi} - \text{da} - \text{ge de}]] = [[\text{de}]](\text{one_big_unit})$
  $= \lambda R \lambda x.R(\text{one_big_unit})(x)$
  (c) $[[\text{yi} - \text{da} - \text{ge de xigua}]]$
  $= \lambda x.[\text{watermelon}(x) \wedge \text{Unit_Measure}(x) = \text{one_big_unit}]$

This yields the intended quantity reading: 'watermelon measured as one big unit' (or 'a big unit/amount of watermelon'). Thus, (21) and (25) instantiate the same measure-linking type, differing only in which head-licensed measurement relation supplies the value of R.

5.2.3. The exclusion of the counting reading

Why, then, is *liang ben de shu* ('two CL *de* book') ill-formed under the intended counting reading of 'two books'? We assume the default counting structure given in (27) (Tang 1990):

(27) Default counting structure
  $[_{\text{DP}}\ \text{D}\ [_{\text{NumP}}\ \text{Num}\ [_{\text{ClP}}\ \text{Cl}\ [_{\text{NP}}\ \text{N}]]]]$

In this configuration, Cl is a functional head taking an NP complement; therefore, the position between Cl and NP is not a free modifier-attachment site. Consequently, the Num-Cl sequence forms part of the quantificational nominal structure rather than acting as an independent modifier constituent available as α_τ to the linker in (13).[6] Thus, *liang ben de shu*

[6] On an ordinary counting parse, Cl_{count} is an NP-taking functional head ($\langle\langle e,t\rangle,\langle n,\langle e,t\rangle\rangle\rangle$). The pre-*de* Num–Cl string therefore does not constitute an independently composable modifier α_τ required by the XP–*de*–NP linker

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is excluded under an ordinary counting construal, whereas a measure/modifier construal remains compatible with the linker structure.

Importantly, this does not exclude *liang ben (de) shu* from surfacing under a non-counting construal. Tang (1993: 744, 2005: 436) notes that with certain [+sortal] classifiers, *de* becomes acceptable precisely when the phrase receives an attributive/taxonomic interpretation, sorting the entity according to the Num-Cl sequence. Li & Rothstein (2012: 700–701) similarly demonstrate that when *de* appears with count classifiers, ordinary low-numeral counting is disrupted and a non-counting (measure/attributive) construal is induced.

*5.3. Sequential composition and ordering of multiple DP-***de** *modifiers*

The framework naturally accommodates complex nominals with multiple *de*-modifiers. Each modification layer introduces a relation variable R resolved via the head noun's lexical semantics. These modifiers operate via sequential selective binding, each saturating a distinct relation within the head noun's qualia structure. The resulting nominal remains semantically coherent only if necessary lexical resources remain accessible across all derivational layers.

5.3.1. Composition of multiple DP-*de* modifiers

Consider the following grammatical example (adapted from Lu & Pan 2019: 48):

(28) Zhangsan de beijiguang de zhaopian
Zhangsan DE aurora DE photo
'A photo of the aurora taken by Zhangsan'

The head noun *zhaopian* 'photo' licenses multiple semantic relations with its modifiers: a content/theme relation (specifying what the photo depicts) and an agent/creator relation (specifying who took it). Lu and Pan observe that, empirically, the content modifier occurs closer to the head noun than the agent modifier. To account for how these lexical relations remain accessible across successive layers of *de*-modification, we adopt the following inheritance constraint:

(29) QUALIA PRESERVATION PRINCIPLE (QPP)

When a nominal projection headed by a noun N is built up through successive modification, N's qualia structure remains accessible at every level of the nominal projection. If an expression saturates a specific relation anchored in N's qualia structure, the resulting projection inherits that structure with the targeted relation now marked as bound (i.e. used). Subsequent modification can then target only remaining unbound qualia-licensed relations.

The QPP formalizes two interface commitments: (i) preserving the lexical head's qualia inventory across recursive nominal expansion, and (ii) resource sensitivity, preventing a previously saturated qualia-anchored relation from being saturated again.

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configuration. The problem is not that *de* excludes a particular semantic type; rather, the ordinary counting structure fails to provide the modifier constituent for the linker in (13).

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While the QPP builds on Pustejovsky's treatment of qualia-based composition, it extends the GL framework in a direction not explicitly formalized there. According to Pustejovsky (1995: 103), the variables contained in a qualia structure must be fully resolved in the resulting syntactic representation – whether by being syntactically realized, logically bound or existentially closed (a condition he terms 'Qualia Saturation'). At the same time, his mechanism of Selective Binding allows a modifier to operate on a specific qualia role of the head without altering the overall semantic type of the phrase. The QPP extends these local compositional processes by tracking which qualia roles remain accessible across successive layers of modification after each modifier–head combination. This recursive, resource-sensitive mechanism accounts for the strict ordering constraints among multiple Mandarin *de*-modifiers, thereby broadening GL's account of qualia-sensitive modification from individual compositional operations to hierarchically iterated modification.

The QPP exhibits a principled parallel to Baker-style linking constraints UTAH (Uniformity of Theta Assignment Hypothesis)/RUTAH (Relativized UTAH) (Baker 1988, 1997), as both govern the mapping of a structured inventory of semantic roles onto syntactic configurations, thereby yielding stable role-configuration mappings. Our proposal recasts this linking logic within the nominal domain as stepwise access to qualia-anchored relation slots under iterative *de*-linking.

This analogy highlights the resource-sensitive character of qualia-based modification: once a qualia relation has been saturated, it is unavailable to subsequent modifiers. Non-iterable qualia roles therefore block *de*-stacking when successive modifiers target the same relation, as in *Zhangsan de Lisi de xiaoshuo* 'lit. Zhangsan's Lisi's novel' under the reading where both Zhangsan and Lisi saturate the AGENTIVE role. By contrast, multiple *de*-modifications are possible when successive modifiers engage distinct qualia roles remaining accessible within the inherited qualia structure, as in (28). Sections 6.3–6.4 return to a different type of recursive modification, namely those involving gapped relative clauses.

We now turn to the compositional derivation of (28). (30) gives the lexical components of *zhaopian* 'photo' required for semantic composition. To compose (28), selective binding must target the TELIC and AGENTIVE qualia roles to produce the content and agent relations. The result is a three-place predicate with an open event argument. Since no event is required for subsequent nominal composition in this case, $\mathrm{EC}_{\mathrm{event}}$ existentially closes the event argument before the derived relation is supplied as a value of R.

(30) Lexical structure of *zhaopian* 'photo'

(a) Basic argument structure

$$[[\text{zhaopian}]] = \lambda x_e[\text{photo}(x)].$$

(b) Selective binding targets TELIC role

$$\mathrm{SB}_{\mathrm{TELIC}}(\text{zhaopian}) = \lambda y_e \lambda x_e \lambda v_v \left[\begin{array}{c} \text{photo}(x) \wedge \text{depict}(v) \\ \wedge\, \text{Content}(v,y) \wedge \text{Theme}(v,x) \end{array} \right].$$

(c) $\mathrm{EC}_{\mathrm{event}}$ applies to derive the content relation

$$R_{\mathrm{CONTENT}} = \mathrm{EC}_{\mathrm{event}}(\mathrm{SB}_{\mathrm{TELIC}}(\text{zhaopian})).$$

$$R_{\mathrm{CONTENT}} = \lambda y_e \lambda x_e \exists v_v \left[\begin{array}{c} \text{photo}(x) \wedge \text{depict}(v) \\ \wedge\, \text{Content}(v,y) \wedge \text{Theme}(v,x) \end{array} \right].$$

(d) Selective binding targets AGENTIVE role

$$\mathrm{SB}_{\mathrm{AGENTIVE}}(\text{zhaopian}) = \lambda a_e \lambda x_e \lambda v'_v \left[\begin{array}{c} \text{photo}(x) \wedge \text{photograph}(v') \\ \wedge\, \text{Agent}(v',a) \wedge \text{Theme}(v',x) \end{array} \right].$$

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(e) EC_{event} applies to derive the agent relation
$R_{AGENTIVE} = EC_{event}(SB_{AGENTIVE}(\text{zhaopian}))$.
$$R_{AGENTIVE} = \lambda a_e \lambda x_e \exists v'_v \left[\begin{array}{c} \text{photo}(x) \wedge \text{photograph}(v') \\ \wedge \text{Agent}(v', a) \wedge \text{Theme}(v', x) \end{array} \right].$$

Given these definitions, the semantic composition of (28) proceeds as follows:

(31) Inner content composition: *beijiguang de zhaopian* 'photo of aurora'
(a) $[[\text{beijiguang de}]] = [[\text{de}]](\text{aurora})$.
$[[\text{beijiguang de}]] = \lambda R_{\langle e,\langle e,t\rangle\rangle} \lambda x_e [R(\text{aurora})(x)]$.
$$R = R_{CONTENT} = \lambda y_e \lambda x_e \exists v_v \left[\begin{array}{c} \text{photo}(x) \wedge \text{depict}(v) \\ \wedge \text{Content}(v, y) \wedge \text{Theme}(v, x) \end{array} \right]$$
(b) Let $P = [[\text{beijiguang de zhaopian}]]$.
$P = [[\text{beijiguang de zhaopian}]] = [[\text{beijiguang de}]](R_{CONTENT})$.
$= \lambda x_e \exists v_v [\text{photo}(x) \wedge \text{depict}(v) \wedge \text{Content}(v, \text{aurora}) \wedge \text{Theme}(v, x)]$.

Per the QPP, the unused AGENTIVE role of the head noun *zhaopian* remains accessible for further composition. Therefore, selective binding can target this role within the complex nominal constituent *beijiguang de zhaopian.*

(32) Outer agent/creator composition
(a) $SB_{AGENTIVE}$ applies to *beijiguang de zhaopian* plus existential closure of EC_{event}
$$EC_{event}(SB_{AGENTIVE}([\text{beijiguang de zhaopian}]_{zhaopian}))$$
$$= \lambda y_e \lambda x_e \exists v'_v \left[\begin{array}{c} P(x) \wedge \text{photo}(x) \wedge \text{photograph}(v') \\ \wedge \text{Agent}(v', y) \wedge \text{Theme}(v', x) \end{array} \right]$$
(b) Substituting P yields the following composite relation $R_{AGENTIVE}$
$\lambda y_e \lambda x_e [\exists v_v [\text{photo}(x) \wedge \text{depict}(v) \wedge \text{Content}(v, \text{aurora}) \wedge \text{Theme}(v, x)]$
$\wedge \exists v'_v [\text{photo}(x) \wedge \text{photograph}(v') \wedge \text{Agent}(v', y) \wedge \text{Theme}(v', x)]]$.
(c) $[[\text{Zhangsan de}]] = \lambda R_{\langle e,\langle e,t\rangle\rangle} \lambda x_e [R(\text{ZS})(x)]$.
(d) Final composition: substitution of R in (32c) with $R_{AGENTIVE}$
$[[\text{Zhangsan de beijiguang de zhaopian}]] = [[\text{Zhangsan de}]](R_{AGENTIVE})$
$= \lambda x_e [\exists v_v [\text{photo}(x) \wedge \text{depict}(v) \wedge \text{Content}(v, \text{aurora}) \wedge \text{Theme}(v, x)]$
$\wedge \exists v'_v [\text{photo}(x) \wedge \text{photograph}(v') \wedge \text{Agent}(v', \text{ZS}) \wedge \text{Theme}(v', x)]]$.

Thus, the final expression denotes a photo depicting the aurora taken by Zhangsan. This derivation preserves both distinct event dependencies while ensuring each qualia relation is accessed only once and remains anchored in the lexical head *zhaopian.*

5.3.2. Ordering constraints among multiple DP-*de* modifiers

As Lu and Pan (2019) observe, the linear sequence of multiple *de*-modifiers is not arbitrary; reversing the canonical order seen in (28) leads to severe degradation:

(33) * beijiguang de Zhangsan de zhaopian
aurora DE Zhangsan DE photo

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The baseline order observed in (28) is agent/creator > theme/content. Possessor phrases, when present, typically scope highest (possessor > agent > theme). Within our framework, the QPP regulates which qualia relations remain accessible during successive modification, but their relative structural order is driven by semantic dependencies. For representational artifacts like photos, the creator relation must target an already-individuated token; this individuation is canonically achieved by first fixing the content facet ('what the photo is of'). Possession likewise presupposes an existing, fully individuated token. Because each modifier saturates a specific role-instantiated relation and the QPP governs subsequent inheritance, the derivational sequence must strictly adhere to these dependencies. If reversed, as in (33), semantic composition would force the creator relation to saturate before establishing the content/theme facet, violating the required lexical dependency. Although a complete syntactic formalization falls outside our scope, this semantic approach aligns with Lu and Pan's (2019) layered nominal structures, providing a principled explanation for rigid *de*-modifier ordering.

This ordering restriction reflects dependency relations among successive lexically licensed operations in iterative *de* composition. When one relation licensed by the head presupposes the output of another, the presupposed relation must be resolved first. Section 6.4 addresses a related but distinct ordering asymmetry between lexical relation saturation and predicate modification at the adjunct level, which derives from the organization of complements and adjuncts within the nominal domain.

5.4. Predicate-oriented AP modifiers and functional-application resolution

This section examines AP modifiers frequently characterized as non-restrictive, non-predicative or intensional such as *weiyi* 'only/unique', *zhuyao* 'main' and *qianren* 'former'. Unlike ordinary intersective adjectives, these elements do not denote first-order individual properties. Instead, they operate as predicate modifiers, taking a nominal predicate as input and returning a modified predicate. They can determine the cardinality of the predicate's contextual extension (*weiyi*), impose an ordering over alternatives (*zhuyao*) or shift its temporal profile (*qianren*). Recognizing this type distinction allows these modifiers to integrate seamlessly into the single-linker architecture without departing from strict bottom-up composition. As the following analysis demonstrates, while the AP introduces these specific interpretive effects, *de* maintains a uniform semantics as a polymorphic linker. Consequently, the non-restrictive or intensional profile is entirely internal to the AP, eliminating the need for a distinct semantic entry for *de*.

Recall the core linker schema in (13). The semantic type of the pre-*de* modifier strictly constrains which admissible relation can instantiate R. In ordinary intersective modification, a first-order modifier of type $\langle e,t\rangle$ combines with the current first-order, property-denoting nominal constituent, also of type $\langle e,t\rangle$, via the Predicate-Modification Interface relation (defined in Section 6.3.2) to yield a property of individuals. However, predicate-oriented APs such as *weiyi* 'only/unique', *zhuyao* 'main' and *qianren* 'former' are higher-order expressions of type $\langle\langle e,t\rangle, \langle e,t\rangle\rangle$: they take a property as input and return a modified property. Standard predicate modification cannot apply in this context, as it requires two arguments of matching first-order types rather than a functor and its argument. A qualia-instantiated relation is similarly unsuitable, as it interprets the modifier as saturating a noun-internal qualia role; the APs in question instead require the nominal predicate itself as their semantic argument. Therefore, we propose that *de*

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provides a grammar-driven interface in these contexts, linking a predicate-oriented AP to a nominal constituent via the functional-application relation defined in (34).

(34) Functional-Application Interface Relation
(a) $R_{\text{Fapp},N} = \lambda M_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}\lambda x_e.M([[N]])(x)$ Type: $\langle\langle\langle e,t\rangle,\langle e,t\rangle\rangle,\langle e,t\rangle\rangle$
(b) $R_{\text{Fapp},N} \in \text{SourceR}(N_{\text{Intf}})$

In this configuration, there is no type mismatch between the predicate-oriented modifier M and the nominal predicate N; M can directly take N as its argument. When *de* is present, it first takes M as its argument, and the interface relation $R_{\text{Fapp,N}}$ simply facilitates this standard functional application, applying M as a functor over N to yield an individual property. In this capacity, *de* functions as a pure syntactic and semantic linker. Because M and N can compose directly without mediation, this correctly predicts that *de* is optional for these modifiers.

(35) $[[M\ de]] = [[de]]([[M]]) = \lambda R_{\langle\langle\langle e,t\rangle,\langle e,t\rangle\rangle,\langle e,t\rangle\rangle}\lambda x_e.R([[M]])(x)$

To illustrate, let *liyou* 'reason' denote a simple property: $[[\text{liyou}]] = \lambda x_e.\text{reason}(x)$. For present purposes, we represent *weiyi* 'only/unique' as a predicate modifier that carries a contextually relevant uniqueness presupposition:

(36) $[[\text{weiyi}]]^c = \lambda P_{\langle e,t\rangle} : \exists!x[P(x) \wedge C(x)].\lambda x[P(x) \wedge C(x)]$,

where *C* is the contextually supplied restriction.

When *weiyi de* merges with the head noun *liyou*, the underspecified relation R resolves to the type-compatible interface relation, $R_{\text{Fapp,N}}$. Semantically, this allows the AP to apply directly to the head predicate ⟦liyou⟧, yielding an ordinary predication on individuals enriched with a uniqueness presupposition.

(37) (a) $[[\text{weiyi de liyou}]]^c = [[[\text{de}]]([[\text{weiyi}]]^c)](R_{\text{Fapp,liyou}})$
$= \lambda x.R_{\text{Fapp,liyou}}([[\text{weiyi}]]^c)(x)$
$= \lambda x.[[\text{weiyi}]]^c([[\text{liyou}]])(x)$
(b) Since $[[\text{liyou}]] = \lambda x_e.\text{reason}(x)$, (36) yields:
$[[\text{weiyi}]]^c([[\text{liyou}]]) = \lambda x[\text{reason}(x) \wedge C(x)]$,
defined only if $\exists!x[\text{reason}(x) \wedge C(x)]$
(c) $[[\text{weiyi de liyou}]]^c = \lambda x[\text{reason}(x) \wedge C(x)]$,
defined only if $\exists!x[\text{reason}(x) \wedge C(x)]$

This derivation demonstrates that the uniqueness interpretation is achieved contextually, avoiding the need to posit a separate non-restrictive or intensional meaning for *de.* Importantly, just as in previous derivations, the restriction on the individual variable originates entirely from the selected relation R (here, the N-indexed $R_{\text{Fapp,N}}$).[7] This same predicate-oriented, type-driven resolution naturally extends to other modifiers like *zhuyao* 'main'

[7] The present analysis is restricted to cases in which a predicate-oriented modifier is overtly followed by *de.* When additional modificational material intervenes between such a modifier and the lexical noun, *de* immediately following the predicate-oriented modifier is often disfavored or omitted. This suggests that such modifiers may in those cases apply directly to the resulting complex nominal property. Nothing in the present analysis therefore requires $R_{\text{Fapp,N}}$ to generalize to arbitrary complex nominal projections.

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(ordering-based) and *qianren* 'former' (temporal), with their respective semantic parameters made explicit as required.

6. Applying the unified framework to prenominal clauses

This section extends Section 4's relation-variable framework to prenominal clausal modifiers. As we will see, across NCCs, SECs and GRCs, *de* remains uniform; variation comes from (i) the clause's semantic type and (ii) which admissible relation – lexically licensed or interface-provided – is selected as the value of R.

6.1. Propositional content clauses

Consider again (3), *Zhangsan pochan de yaoyan* 'the rumor that Zhangsan went bankrupt', where the clausal modifier provides the head noun's propositional content. Following Kratzer (2006), Moulton (2009, 2015), Moltmann (2013) and Lin (2024), we analyze content nouns like *rumor* as denoting content individuals, or proposition-bearing objects. In our framework, selective binding establishes a constitutive content relation between a proposition and the proposition-bearing object, allowing the clausal modifier to saturate the proposition argument of that relation.

The relevant lexical information is as follows:

(38) (a) $[[\text{yaoyan}]] = \lambda x_e.\text{rumor}(x)$
(b) $\text{SB}_{\text{CONSTITUTIVE}}(\text{yaoyan})$
$= \lambda p_{\langle s,t\rangle}\lambda x_e.\left[\text{rumor}(x) \wedge \text{constitute}_{\text{yaoyan}}(p,x)\right]$

In (38b), selectively binding the head noun's CONSTITUTIVE role yields a role-instantiated relation, mapping a given proposition *p* to the property of being a rumor whose content is *p*. Here, *de* links the propositional modifier to the head-licensed relation. The general schema for *de* in propositional content clauses, along with an illustrative derivation, is provided below:

(39) [[de]](for propositional clauses)
$[[\text{de}_{\text{pro.cl}}]] = \lambda p_{\langle s,t\rangle}\ \lambda R_{\langle\langle s,t\rangle,\langle e,t\rangle\rangle}\ \lambda x_e.R(p)(x)$

(40) Semantic composition of (3)
(a) $[[\text{Zhangsan pochan de}]] = [[\text{de}_{\text{pro.cl}}]]([[\text{Zhangsan pochan}]])$
$= \lambda R\lambda x.R(\lambda w[\text{bankrupt}(\text{ZS},w)])(x)$
(b) $R = R_{\text{Yaoyan}} = \text{SB}_{\text{CONSTITUTIVE}}(\text{yaoyan})$
$R = \lambda p_{\langle s,t\rangle}\lambda x_e.\left[\text{rumor}(x) \wedge \text{constitute}_{\text{yaoyan}}(p,x)\right]$
(c) $[[\text{Zhangsan pochan de yaoyan}]]$
$= \lambda x_e.\left[\text{rumor}(x) \wedge \text{constitute}_{\text{yaoyan}}(\lambda w[\text{bankrupt}(\text{ZS},w)],x)\right]$

This final interpretation yields the property of being a rumor whose constitutive content is the proposition that Zhangsan went bankrupt.

Consequently, unlike complementizer-based or type-shifting accounts that underspecify the clause-noun relation, our relation-variable architecture maintains a uniform linker and derives the content interpretation directly from the head noun.

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6.2. Saturated event clauses

6.2.1. The syntactic and semantic signature of saturated event clauses

Zhang (2008: 1010, citing Chang 2006: 73) argues that SECs function like reduced clauses rather than full proposition-denoting CPs. She notes that their inability to host CP-domain evaluative adverbs cannot be dismissed as a general ban on embedding (i.e. a main clause phenomenon), because such adverbs are perfectly acceptable in full noun complement clauses (NCCs). The contrast in (41) demonstrates that SECs specifically lack the higher functional layers of the CP domain.

(41) (a) *Wo wendao-le [Lulu xingkui/juran zhufan de] weidao
I smell-PFV Lulu fortunately/unexpectedly cook DE smell
Intended: 'I smelled the smell of Lulu's fortunately/unexpectedly cooking.'
(b) Wo tingshuo-le [Lulu juran qiang-le yinhang] de baodao
I hear-PFV Lulu unexpectedly rob-PFV bank DE report
'I heard the report that Lulu unexpectedly robbed a bank.'

Similarly, while perfective *-le* and sentence-final *le* are freely licensed in NCCs, they are systematically barred from SECs:

(42) (a) *Zhangsan tan-le gangqin de shengyin
Zhangsan play-PFV piano DE sound
Intended: 'the sound of Zhangsan having played the piano'
(b) *Zhangsan tan gangqin le de shengyin
Zhangsan play piano SFP DE sound
Intended: 'the sound of Zhangsan having played the piano'

These diagnostics confirm that SECs lack the extended functional projections of proposition-denoting CPs. Semantically, they denote event properties of type $\langle v,t\rangle$, which must combine with the head noun via an event-based relation (Lin 2024: 475).

Crucially, this analysis captures the distributional asymmetry between the perfective/sentence-final markers *-le*/*le* and the progressive marker *zai.* Because *-le* and *le* close the open event variable, they shift the input to a proposition-level representation, thereby blocking the event-based composition required by SECs. Progressive *zai*, however, operates strictly within the event domain – leaving the event variable open and permitting the event property to merge successfully with the head-licensed relation.

6.2.2. Baseline: event-individual modification with an inherently relational noun

To establish a baseline template, we begin with an inherently relational event noun. Following Huang (2016), Kou & Yuan (2017) and Lin (2024), the noun *jieguo* 'result' lexically specifies a causal relation mapping events to entities:

(43) $[[\text{jieguo}]] = \lambda v_{\text{v}}\ \lambda x_{\text{e}}.[\text{result}(x) \wedge \text{cause}(v,x)]$

In the noun phrase *zhe ci shijian de jieguo* 'the result of this event', the modifier *zhe ci shijian* 'this event' denotes a contextually identified event individual. Let this individual be

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represented by v_c. The linker *de* connects this specific event to the inherently relational head noun *jieguo*.

(44) (a) $[[\text{de}_{\text{event}}]] = \lambda v_v\ \lambda R_{\langle v,\langle e,t\rangle\rangle}\ \lambda x_e.[R(v)(x)]$
(b) Applying *de* to the specific event:
$[[\text{zhe ci shijian de}]] = \lambda R_{\langle v,\langle e,t\rangle\rangle}\ \lambda x_e.[R(v_c)(x)]$
(c) Combining with the head noun *jieguo*:
$[[\text{zhe ci shijian de jieguo}]] = \lambda x.[\text{result}(x) \wedge \text{cause}(v_c,x)]$

This derivation requires neither coercion nor selective binding. Because the head noun is inherently relational, its lexically encoded event-result relation can serve directly as an admissible value for the relational variable R.

6.2.3. SEC composition and event-property-to-event-individual coercion

We now turn to the noun *shengyin* 'sound', which we analyze as an auditory effect token associated with an event. Unlike *jieguo* 'result', *shengyin* need not be relational in its basic predication (cf. *you shengyin* 'there is a sound'). Nevertheless, our framework allows this non-relational basic predication to remain compatible with a head-licensed linking option. Specifically, the noun can still supply an AGENTIVE-derived source/effect relation within its qualia structure to allow for *de*-linking through selective binding. Accordingly, we assume the basic argument structure for *shengyin* is represented in (45). Selective binding into the AGENTIVE role then yields the relation shown in (46).

(45) $[[\text{shengyin}]] = \lambda x.\text{sound}(x)$

(46) $R_{\text{Shengyin}} = \text{SB}_{\text{AGENTIVE}}(\text{shengyin}) = \lambda v_v \lambda x_e.[\text{sound}(x) \wedge \text{cause}(v,x)]$

This relation provides an admissible value for *de*'s underspecified relation variable R. The remaining issue arises from the modifier side.

Following Section 6.2.1, SECs denote event predicates (type $\langle v,t\rangle$; Lin 2024), rather than event individuals, meaning the SEC *Zhangsan tan gangqin* 'Zhangsan plays the piano' denotes the event property in (47).

(47) $[[\text{Zhangsan tan gangqin}]] = \lambda v_v.[\exists y[\text{piano}(y) \wedge \text{play}(v,\text{ZS},y)]]$

However, this event property cannot serve as the argument of the AGENTIVE-licensed source/effect relation in (46), because the relation requires an event individual for its modifier-side argument, whereas (47) provides an event property. As a result, establishing a type-compatible value for R requires shifting the SEC from an event property to an event individual. This genuine, independently motivated type mismatch triggers coercive type shifting in the narrow sense defined in Section 4. To repair the mismatch, a contextually restricted property-to-individual shift isolates a contextually identified event token. We model this coercion for episodic construals using the familiar iota-type shift (cf. Partee 1987).

(48) (a) $\sigma_{C_v}(P) = \iota v[P(v) \wedge C_v(v)]$ (with P of type $\langle v,t\rangle$)
(b) $\sigma_{C_v}(\lambda v[\exists y[\text{piano}(y) \wedge \text{play}(v,\text{ZS},y)]])$
$= \iota v[\exists y[\text{piano}(y) \wedge \text{play}(v,\text{ZS},y)] \wedge C_v(v)]$

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In (48), C_v is a contextually supplied restriction on events; the ι-term is defined only if a unique event satisfies both P and C_v. With the contextually restricted ι-operation applied, *de* composes exactly as in Section 6.2.2:

(49) (a) [[Zhangsan tan gangqin de]]
$= [[\text{de}_{\text{event}}]](\sigma_{C_v}([[\text{Zhangsan tan gangqin}]]))$
$= \lambda R \lambda x.[R(\iota v[\exists y[\text{piano}(y) \wedge \text{play}(v, \text{ZS}, y)] \wedge C_v(v)])(x)]$
(b) [[Zhangsan tan gangqin de shengyin]]
$= \lambda x.[\text{sound}(x) \wedge \text{cause}(\iota v[\exists y[\text{piano}(y) \wedge \text{play}(v, \text{ZS}, y)] \wedge C_v(v)], x)]$

This denotes the set of sound tokens produced by Zhangsan's contextually identified piano-playing event.

SECs may also receive habitual or generic interpretations in appropriate discourse contexts. Such readings involve independent generic quantification over events or situations and do not affect our central point here; we therefore set aside the detailed interaction between generic quantification and nominal composition.

6.3. Gapped relative clauses

6.3.1. The challenge: property-type modification without a qualia relation

Standard qualia roles encode intrinsic lexical knowledge, readily supplying noun-licensed relations like creation, content and use. Gapped relative clauses (GRCs), by contrast, denote individual properties obtained via abstraction over the gap. For example, *Zhangsan zhaodao de gongju* 'the tool that Zhangsan found' contains a relative clause denoting the non-inherent property of being an entity that Zhangsan found. Because this property-noun relation is not substantively recoverable from the noun's qualia structure, selective binding cannot supply the relevant value for R.

This limitation, however, does not undermine the uniform linker architecture because qualia-instantiated relations are not the only permissible values for R. As established in Section 4.2.2, R can also resolve to a grammar-given interface relation. We propose that in ordinary property-type modification, the operative relation is the Predicate-Modification Interface, notated as $R_{\text{pm,Nom}}$.

6.3.2. The Predicate-Modification Interface

Restrictive relative clauses and ordinary intersective adjectives are standardly analyzed as individual properties of type $\langle e,t \rangle$. They combine via predicate modification, yielding their intersection (Heim & Kratzer 1998). We propose that this independently motivated compositional operation serves as a grammar-given interface value for R. Let Nom denote the current property-denoting nominal constituent of type $\langle e,t \rangle$, headed by the lexical N. This interface relation is indexed to the current Nom constituent, as given below:

(50) PREDICATE-MODIFICATION INTERFACE $R_{\text{pm,Nom}}$
$R_{\text{pm,Nom}} = \lambda P_{\langle e,t \rangle}\ \lambda x.[[[Nom]](x) \wedge P(x)]$ Type: $\langle \langle e,t \rangle, \langle e,t \rangle \rangle$
$R_{\text{pm,Nom}} \in \text{SourceR}(N_{\text{Intf}})$

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In (50), we use Nom rather than N because Predicate Modification may apply to a nominal constituent larger than N. Unlike a qualia-instantiated relation, $R_{pm,Nom}$ directly implements intersective Predicate Modification rather than expressing a substantive lexical link between a modifier and a nominal. Because $R_{pm,Nom}$ already contains the nominal constituent's denotation, resolving R to this relation directly yields the fully modified property.

To illustrate, consider the noun phrase *piaoliang de qunzi* 'beautiful skirt':

(51) (a) $[[\text{piaoliang}]] = \lambda x.\text{beautiful}(x)$
(b) Apply the general linker:
$[[\text{piaoliang de}]] = \lambda R_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}\ \lambda x_e.R([[piaoliang]])(x)$
(c) Resolve R to $R_{pm,qunzi}$
$[[\text{piaoliang de}]](R_{pm,qunzi}) = \lambda x.R_{pm,qunzi}([[\text{piaoliang}]])(x)$
$= \lambda x[[[\text{qunzi}]](x) \wedge [[\text{piaoliang}]](x)]$
$= \lambda x[\text{skirt}(x) \wedge \text{beautiful}(x)]$

This yields an ordinary intersective interpretation. Importantly, this analysis does not imply that all Predicate Modification in Mandarin requires the presence of *de*, as *de*-less modification is well-attested in the right contexts. Rather, it demonstrates that within the specific *de*-marked construction under investigation, predicate modification is achieved by resolving the *de*-introduced relation variable to $R_{pm,Nom}$. The primary function of $R_{pm,Nom}$ is therefore analogous to $R_{Fapp,N}$, which is required for the predicate-oriented modification discussed earlier.

6.3.3. Derivation of modification by GRC

The derivation of a nominal constituent modified by a gapped relative clause (GRC), such as *Zhangsan zhaodao de gongju* 'the tool that Zhangsan found', parallels the derivation of the noun phrase *piaoliang de qunzi* 'beautiful skirt' from the previous subsection. We assume that a restrictive clause is derived by movement (e.g. Huang 1982) and that abstraction over the object gap independently yields an individual property of type $\langle e,t\rangle$ (Heim & Kratzer 1998). A restrictive relative thus provides precisely the appropriate input for the Predicate-Modification Interface defined in (50). Example (52) illustrates this semantic composition:

(52) (a) Relative clause property
$[[\text{Zhangsan zhaodao_}]] = \lambda x.\exists e[\text{find}(e) \wedge \text{Agent}(e,\text{ZS}) \wedge \text{Theme}(e,x)]$
(b) Apply the general linker
$[[\text{Zhangsan zhaodao_de}]] = [[de]]([[\text{Zhangsan zhaodao_}]])$
$= \lambda R_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}\ \lambda x_e.R([[\text{Zhangsan zhaodao_}]])(x)$
(c) Resolve R to $R_{pm,gongju}$
$[[\text{Zhangsan zhaodao_de}]](R_{pm,gongju})$
$= \lambda x.R_{pm,gongju}([[\text{Zhangsan zhaodao_}]])(x)$
$= \lambda x[\text{tool}(x) \wedge \exists e[\text{find}(e) \wedge \text{Agent}(e,\text{ZS}) \wedge \text{Theme}(e,x)]]$

Significantly, the current architecture achieves this without analyzing *de* as semantically vacuous. Instead, *de* introduces the constant relation variable R, which is subsequently resolved to the independently motivated Predicate-Modification Interface, $R_{pm,Nom}$.

In the simple case presented in (52), Nom corresponds directly to the property denoted by the noun *gongju* 'tool'. However, the broader Nom-based formulation proves essential in

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stacked configurations such as those discussed in the next section, where both a GRC and inner NCC or SEC occur.

6.4. Ordering constraints among prenominal clauses: a compositional account

Huang (2016) points out that, when a head noun is modified by multiple prenominal clauses, gapped relative clauses (GRCs) systematically precede noun complement clauses (NCCs) and saturated event clauses (SECs). The contrast in (53)–(54) illustrates this with (b) orders degraded relative to (a) orders.

(53) (a) Grammatical: GRC > NCC
[women zhengzai kaolü de] [yao-bu-yao kuoda zhaosheng de] wenti
we PROG consider DE want-not-want expand enrollment DE question
'the question of whether to expand enrollment that we are considering'
(b) Ungrammatical: *NCC > GRC
*[yao-bu-yao kuoda zhaosheng de] [women zhengzai kaolü de] wenti

(54) (a) Grammatical: GRC > SEC
[wo zuotian tingdao de] [Zhangsan tan gangqin de] shengyin
I yesterday heard DE Zhangsan play piano DE sound
'the sound of Zhangsan playing the piano that I heard yesterday'
(b) Ungrammatical: *SEC > GRC
*[Zhangsan tan gangqin de] [wo zuotian tingdao de] shengyin

These ordering facts derive naturally from the independently motivated distinction between the nominal head's lexical (or selectional) domain and adjunct-level modification. Because NCCs and SECs saturate relations licensed by the lexical head, they compose directly within its selectional domain. Conversely, GRCs do not saturate a lexical relation; following abstraction over the gap, they combine through the Predicate-Modification Interface with the nominal property constructed by this inner domain. (55) provides a compact schematic derivation of (53a):

(55) (a) The NCC first combines with the head
$Nom_1 = \lambda x[\text{question}(x) \wedge \text{constitute}_{\text{wenti}}(p,x)]$,
where $p = [[\text{yao} - \text{bu} - \text{yao kuoda zhaosheng}]]$ (whether to expand enrollment)
(b) The denotation of outer GRC
$Q = [[\text{women zhengzai kaolü_}]]$
$= \lambda x.\exists e[\text{consider}(e) \wedge \text{Agent}(e,\text{we}) \wedge \text{Theme}(e,x)]$
(c) Outer GRC combines with Nom_1 via the Predicate Modification Interface.
$[[\text{women zhengzai kaolü_de}]](R_{\text{pm,Nom}_1})$
$= \lambda x.R_{\text{pm,Nom}_1}([[\text{women zheng zai kaolü_}]])(x)$
$= \lambda x.R_{\text{pm,Nom}_1}(Q)(x)$
$$= \lambda x \left[\begin{array}{c} \text{question}(x) \wedge \text{constitute}_{\text{wenti}}(p,x) \\ \wedge \exists e\ [\text{consider}(e) \wedge \text{Agent}(e,\text{we}) \wedge \text{Theme}(e,x)] \end{array} \right]$$

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The outcome of (55) represents the property of being a question x whose content is p (namely, whether to expand enrollment) and which we are considering.

The case of (54a) is analogous, with Nom_1 instantiated by the property produced by the inner SEC-head combination. We will not repeat the details.

The restriction in (53) and (54) reflects the well-known complement-adjunct, or local-licensing, asymmetry in Chinese nominals (Huang 2016): head-dependent complements merge structurally closer to the nominal head than restrictive relative clauses do. Importantly, this restriction does not follow from semantic type alone. If Predicate Modification Interface could apply first while lexical relations remained freely saturable at higher structural levels, nothing would rule out a derivation in which a GRC first yields a modified property, and an NCC or SEC subsequently saturates a head-licensed relation.

To resolve this, we propose that such derivations are excluded not by type mismatches, but because the relations employed by *de* obey a strict hierarchical priority: lexical saturation must precede non-lexical modification. Mechanistically, while qualia-based selective binding preserves unbound qualia roles and passes them upward via the QPP, grammar-driven interface relations (such as $R_{pm,Nom}$) structurally block the upward transmission of this qualia structure.[8] Consequently, the application of an adjunct interface relation irreversibly closes the noun's lexical/selectional domain, effectively preventing higher nodes from accessing the QPP framework to satisfy any remaining lexical requirements.

7. Event-dependent composition in pseudo- and fake modification

This section examines duration pseudo-modification and fake modification while maintaining the ordinary linker semantics of *de.* To account for activity readings, bare nominal and verbal predicates are treated throughout as having cumulative reference (Krifka 1992, 1998 and references therein), indicated by a superscript star (Link 1983). This assumption does not affect our earlier analysis.

7.1. Duration pseudo-modification via a telic event profile and VP-level Event-dependent Restrict

As noted, in duration pseudo-modification, a DP-internal measure phrase appears to modify the matrix event, giving rise to an apparent syntax-semantics mismatch. For example, in

[8] This constraint also applies to non-clausal modifiers, as demonstrated by the contrast between (ia) and (ib).

(i) (a) Zhangsan (?de) zuotian de beijiguang de zhaopian
Zhangsan DE yesterday DE Aurora DE photo
'Zhangsan's photo of Aurora taken yesterday'

(b) *Zhangsan (de) beijiguang de zuotian de zhaopian
Zhangsan DE Aurora DE yesterday DE photo
'Zhangsan's photo of Aurora taken yesterday'

In (ia), the adjunct modifier *zuotian* 'yesterday' is positioned outside (i.e. preceding) the Theme argument *beijiguang* 'Aurora'. In (ib), however, the adjunct modifier is placed closer to the head noun than the Theme argument, resulting in ungrammaticality. This contrast clearly reflects the same structural pattern observed among NCCs, SECs and GRCs.

Furthermore, (ia) illustrates that the Agent or Possessor role is not constrained to the same extent as the Theme argument, though the marker *de* attached to it is disfavored in this configuration. We leave this detail open for future research.

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(56), the nominal constituent *san tian de ge* forms an object DP before combining with the verb.

(56) Ta chang-le [$_{DP}$ san tian de ge].
he sing-PFV three day DE song
'He sang (songs) for three days.'

A duration phrase conventionally denotes an event predicate modifier of type $\langle\langle v,t\rangle,\langle v,t\rangle\rangle$, as independently motivated by its use in verbal modification in (57) (Lin 2008).

(57) Ta zai zheli zhu-le san tian
he at here stay-PFV three day
'He stayed here for three days.'

In (57), the duration phrase takes the event property denoted by the verb as its argument and returns a property restricted to events whose runtime satisfies the relevant duration condition. Thus, the denotation of *san tian* 'three days' is (58).

(58) $[[\text{san tian}]] = \lambda P_{\langle v,t\rangle}\lambda e_v\ [P(e) \wedge \text{duration}(e) = 3 \cdot \text{days}]$

Assuming this same denotation applies to the nominal modification in (56), a type mismatch arises because a duration cannot take an individual argument. However, selective binding can access the lexical head's TELIC role, making an event argument available for duration modification. Since the duration constituent lacks a value for the role-filler argument *u*, this argument is closed by EC. The nominal argument *x* and the event argument *e* remain open.

(59) Selective binding of the TELIC role of *ge* 'song' plus EC_{outer}
$T_{\text{telic,ge}} := EC_{outer}(SB_{TELIC}(\text{ge}))$
$EC_{outer}(SB_{TELIC}(\text{ge})) = \lambda x_e\lambda e_v\exists u_e[SB_{TELIC}(\text{ge})(u)(x)(e)]$
$= \lambda x_e\lambda e_v[\text{song}^{\star}(x) \wedge \text{sing}^{\star}(e) \wedge \text{Theme}(e,x) \wedge \exists u_e[\text{Agent}(e,u)]]$.

In (59), the telic singing relation characterizes a (potentially plural) song as the theme of a pluralizable singing event. Since EC_{outer} targets only the implicit performer argument, the nominal and event arguments remain available for further composition.

The linker must now connect the higher-order duration modifier in (58) to the nominal argument by assigning a value to R. Because the TELIC-derived relation cannot accept the duration modifier directly as a role filler, we introduce a type-driven interface relation to apply the modifier directly to the head noun's underlying event predicate. As in Section 5.4, *de* initially composes with the modifier, leaving R unvalued until resolved by merging the lexical nominal head.

(60) Duration-TELIC application interface schema
$R_{\text{Dur}-\text{telic},N} = \lambda D_{\langle\langle v,t\rangle,\langle v,t\rangle\rangle}\lambda x_e\lambda e_v[D(T_{\text{telic},N}(x))(e)]$ Type: $\langle\langle\langle v,t\rangle,\langle v,t\rangle\rangle,\langle e,\langle v,t\rangle\rangle\rangle$

Under the general linker semantics in (13), the Duration-Telic interface relation in (60) serves as a valid instantiation of R. Here, $\tau = \langle\langle v,t\rangle,\langle v,t\rangle\rangle$ and $\rho = \langle v,t\rangle$. After the duration modifier D and the interface relation $R_{\text{Dur-telic,N}}$ are integrated, the resulting

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expression is a function from nominal individuals to event predicates, typed as $\langle e,\langle v,t\rangle\rangle$, as shown in (61).

(61) Duration-modifier instantiation of (13)
$[[\text{de}_{\text{dur}}]] = \lambda D_{\langle\langle v,t\rangle,\langle v,t\rangle\rangle}\ \lambda R_{\langle\langle\langle v,t\rangle,\langle v,t\rangle\rangle,\langle e,\langle v,t\rangle\rangle\rangle}\ \lambda x_e.R(D)(x)$, where $R(D)(x)$ is type $\langle v,t\rangle$.

Applying (61) to *san tian de ge* in (56) yields the derivation in (62).

(62) (a) $[[\text{san tian de ge}]] = [[\text{de}_{\text{dur}}]]([[\text{san tian}]])(R_{\text{dur}-\text{telic,ge}})$.
(b) By the definition of the Duration-TELIC interface schema in (60)
$[[\text{san tian de ge}]] = \lambda x_e.R_{\text{dur}-\text{telic,ge}}([[\text{san tian}]])(x)$
$= \lambda x_e[\lambda D_{\langle\langle v,t\rangle,\langle v,t\rangle\rangle}\lambda y_e\lambda e_v.D(\text{T}_{\text{telic,ge}}(y))(e)]([[\text{san tian}]])(x)$
$= \lambda x_e.\lambda e_v[[[\text{san tian}]](T_{\text{telic,ge}}(x))(e)]$
(c) Substituting the duration denotation in (58) and the relation $\text{T}_{\text{telic,ge}}$ from (59)
$$[[\text{san tian de ge}]] = \lambda x_e\lambda e_v\left[\begin{array}{c}\text{song}^\star(x)\wedge\text{sing}^\star(e)\wedge\text{Theme}(e,x)\\ \wedge\exists u_e[\text{Agent}(e,u)]\wedge\text{duration}(e)=3\cdot\text{days}\end{array}\right].$$

The resulting duration-modified nominal constituent now denotes an event-dependent relation over a nominal participant and an event, of type $\langle e,\langle v,t\rangle\rangle$.

Assuming Kratzer's (1996) theory of Voice introducing the external argument, we assign the transitive verb *chang* 'sing' a neo-Davidsonian denotation of type $\langle e,\langle v,t\rangle\rangle$, matching the duration-modified nominal constituent in (62c). Since both denote relations of type $\langle e,\langle v,t\rangle\rangle$, neither can take the other as an argument, blocking standard Functional Application. To resolve this and facilitate composition, we introduce the Event-dependent Restrict rule (abbreviated as EDR) in (63). This mechanism synthesizes three established operations: Higginbotham's (1985) Theta-Identification (equating two open theta roles), Kratzer's (1996) Event Identification (identifying the event arguments of Voice and VP) and Chung & Ladusaw's (2004) Restrict (restricting a verb's internal argument with a nominal property without closing the variable). EDR identifies the corresponding nominal and event arguments of the two event-dependent relations while leaving the nominal argument unsaturated.

(63) EVENT-DEPENDENT RESTRICT (EDR)
$$\text{EDR}\left(f_{\langle e,\langle v,t\rangle\rangle},g_{\langle e,\langle v,t\rangle\rangle}\right)\rightarrow\lambda x_e\lambda e_v[f(x)(e)\wedge g(x)(e)]$$

With (63), the derivation of (56) proceeds as follows.

(64) (a) Duration-modified object DP denotation
$$[[\text{san tian de ge}]] = \lambda x_e\lambda e_v\left[\begin{array}{c}\text{song}^\star(x)\wedge\text{sing}^\star(e)\wedge\text{Theme}(e,x)\\ \wedge\text{duration}(e)=3\cdot\text{days}\wedge\exists\text{u}_\text{e}\text{Agent}(e,u)\end{array}\right].$$
(b) Verb denotation
$[[\text{chang}]] = \lambda x_e\lambda e_v[\text{sing}^\star(e)\wedge\text{Theme}(e,x)]$.
(c) VP composition by EDR plus elimination of identical *sing*$^\star(e)$ and *Theme*(e,x) conjuncts by logical idempotence.
$$[[\text{chang san tian de ge}]] = \lambda x_e\lambda e_v\left[\begin{array}{c}\text{song}^\star(x)\wedge\text{sing}^\star(e)\wedge\text{Theme}(e,x)\\ \wedge\text{duration}(e)=3\cdot\text{days}\wedge\exists\text{u}_\text{e}[\text{Agent}(e,u)]\end{array}\right].$$

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(d) Outermost Existential Closure of the variable x

$$\mathrm{EC}_{\mathrm{outer}}([[\text{chang san tian de ge}]])$$
$$=\lambda e_v \exists x_e \left[\begin{array}{c} \mathrm{song}^{\star}(x) \wedge \mathrm{sing}^{\star}(e) \wedge \mathrm{Theme}(e,x) \\ \wedge \mathrm{duration}(\mathrm{e}) = 3 \cdot \mathrm{days} \wedge \exists \mathrm{u}_{\mathrm{e}}[\mathrm{Agent}(e,u)] \end{array} \right].$$

(e) Voice and Event Identification (EI) by Kratzer (1996)

(i) $[[\text{Voice}]] = \lambda y_e \lambda e_v [\mathrm{Agent}(e,y)]$

(ii) Voice-VP composition by Event Identification (EI)

$$\mathrm{EI}\left(f_{\langle e,\langle v,t\rangle\rangle}, g_{\langle v,t\rangle}\right) \rightarrow \lambda y_e \lambda e_v [f(y)(e) \wedge g(e)] \text{ (Kratzer 1996: 122)}$$
$$\mathrm{EI}([[\text{Voice}]],[[\text{VP}]])$$
$$= \lambda y_e \lambda e_v [\mathrm{Agent}(e,y)$$
$$\wedge \exists x_e [\mathrm{song}^{\star}(x) \wedge \mathrm{sing}^{\star}(e) \wedge \mathrm{Theme}(e,x) \wedge \mathrm{duration}(e)$$
$$= 3 \cdot \mathrm{days} \wedge \exists u_e \mathrm{Agent}(e,u)]]$$

(iii) Subject-VP composition

Subject denotation: $[[\text{ta}]] = \text{he}$

$$[[\text{VoiceP}]]([[\text{ta}]])$$
$$= \lambda e_v \left[\mathrm{Agent}(e,\text{he}) \right.$$
$$\left. \wedge \exists x_e \left[\begin{array}{c} \mathrm{song}^{\star}(x) \wedge \mathrm{sing}^{\star}(e) \wedge \mathrm{Theme}(e,x) \\ \wedge \mathrm{duration}(e) = 3 \cdot \mathrm{days} \wedge \exists u_e . \mathrm{Agent}(e,u) \end{array} \right] \right].$$

(iv) Agent existential simplification

$\mathrm{Agent}(e,\text{he})$ entails $\exists \mathrm{u_e Agent}(e,u)$, allowing removal of redundant conjuncts.

(v) Final Event closure

$$\exists e_v \exists x_e \left[\begin{array}{c} \mathrm{Agent}(e,\text{he}) \wedge \mathrm{song}^{\star}(x) \wedge \mathrm{sing}^{\star}(e) \wedge \mathrm{Theme}(e,x) \\ \wedge \mathrm{duration}(e) = 3 \cdot \mathrm{days} \end{array} \right].$$

Setting aside tense and the specific temporal contribution of perfective *-le*, (64) yields the intended interpretation: he sang songs for three days. Although the duration phrase is interpreted strictly within the nominal constituent, its condition nonetheless predicates over the same event variable introduced by the matrix verb. Under this analysis, the construction is narrowly licensed because the verbal predicate must align with the telic event requirements preserved in the duration-modified nominal relation.

A significant advantage of the EDR analysis is its ability to capture a core restriction on fake durative nominal modification. As observed by Zhang and Liu (2024: 465), nominals modified by a fake duration quantifier cannot serve as specific, definite or quantified objects.[9] Because the individual variable associated with the head noun in these cases is already closed by a demonstrative, universal or existential operator, it is no longer available

[9] For example, (i) is ungrammatical.

(i) *Ta chang-le san tian de na-shou/mei-shou/liang-shou ge
he read-PFV three day DE that-CL/every-CL/two-CL song
'Lit. He sang that song/every song/two songs for three days.'

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for further composition, making EDR inapplicable. Ultimately, relying on a qualia-derived relation alongside EDR provides an elegant solution to this syntax-semantics mismatch without complicating the underlying syntax.

7.2. Canonical fake modification via a head-licensed qualia relation and sentence-level Restrict

This section demonstrates that canonical fake modification exemplifies another case in which a qualia-induced event argument plays a crucial role in semantic composition. As noted by Huang (2008) and Wenshan Li (2021), among others, the pre-predicate DP-*de*-NP in fake modification does not receive a standard possessive interpretation. Instead, it functions to identify participants in the event evaluated by the subsequent V-*de*-Manner predicate. For instance, in (65) (repeated from 7a), while *Daiziying de yuqiu* 'Daiziying's shuttlecock' serves as the subject of the sentence, *Daiziying* and *yuqiu* 'shuttlecock' assume the roles of Agent and Theme of the matrix event, respectively.

(65) Daiziying de yuqiu da de hen hao
Daiziying DE shuttlecock play DE very well
'Daiziying plays badminton well.'

This structure shares a close verb-copying paraphrase in (66), where the marker *de* is replaced by the matrix verb *da* 'play'.

(66) Daiziying da yuqiu da de hen hao
Daiziying play shuttlecock play de very well
'Daiziying plays badminton well.'

This structural and interpretive similarity between these two patterns supports an eventive construal of the pre-predicate DP-*de*-NP, regardless of whether fake-modification and verb-copying are derivationally related. For the current *yuqiu* example, this dependency is captured by resolving R to an event-dependent TELIC-derived relation provided by the lexical head noun.

Following the cumulative-closure convention adopted in Section 7, the relevant lexical noun and verb denotations are shown in (67).

(67) Lexically cumulative noun and verb
(a) $[[\text{yuqiu}]] = \lambda x_e.\text{shuttlecock}^{\star}(x)$.
(b) $[[\text{da}]] = \lambda x_e \lambda e_v[\text{play}^{\star}(e) \wedge \text{Theme}(e,x)]$

Here *yuqiu* contributes a standard individual property; the eventive badminton-playing interpretation is not inherent to the nominal denotation but is derived through the event-dependent relation in (69).

Setting aside the internal semantics of postverbal *de*, which phonologically attaches to the preceding verb, we treat the entire constituent *de hen hao* 'DE very well' as a type-preserving modifier. Because *da* retains an unsaturated internal argument, the modifier applies point-wise over it, mapping an expression of type $\langle e,\langle v,t\rangle\rangle$ onto another expression of the same type, as shown in (68). This yields the main predicate denotation for (65).

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(68) (a) $[[\text{de hen hao}]] = \lambda P_{\langle e,\langle v,t\rangle\rangle}\, \lambda x_e \lambda e_v [P(x)(e) \wedge \text{very} - \text{well}(e)]$
Type $\langle\langle e,\langle v,t\rangle\rangle,\langle e,\langle v,t\rangle\rangle\rangle$
(b) $[[\text{da de hen hao}]] = \lambda x_e \lambda e_v [\text{play}^{\star}(e) \wedge \text{Theme}(e,x) \wedge \text{very} - \text{well}(e)]$

Turning to the subject DP and its semantic composition, selective binding into an event-dependent qualia role can produce a relation that links a role filler, a nominal participant and an event. Applied to *yuqiu* 'shuttlecock', the relevant head-licensed relation is the TELIC performance relation, which serves as a value for the relation variable R introduced by *de.*

(69) TELIC-derived relation provided by the head noun *yuqiu*
(a) $R_{\text{yuqiu}} = \text{SB}_{\text{TELIC}}(\text{yuqiu}) \in \text{SourceR}(\text{yuqiu})$
(b) $\text{SB}_{\text{TELIC}}(\text{yuqiu}) = \lambda u_e \lambda x_e \lambda e_v \begin{bmatrix} \text{shuttlecock}^{\star}(x) \wedge \text{play}^{\star}(e) \\ \wedge \text{Agent}(e,u) \wedge \text{Theme}(e,x) \end{bmatrix}$

Let the possessive DP *Daiziying* denote the individual d. Applying the linker *de* to d and resolving R to the TELIC-induced relation in (69) yields the event-dependent nominal relation in (70).

(70) DP subject composition
(a) $[[\text{Daiziying de yuqiu}]] = [[\text{de}]](\text{d})(\text{SB}_{\text{TELIC}}(\text{yuqiu}))$
(b) $[[\text{de}]] = \lambda\alpha_e \lambda R_{\langle e,\langle e,\langle v,t\rangle\rangle\rangle} \lambda x_e . R(\alpha)(x)$
(c) $[[\text{Daiziying de}]] = [[de]](\text{d}) = \lambda R_{\langle e,\langle e,\langle v,t\rangle\rangle\rangle} \lambda x_e . R(\text{d})(x)$
(d) $[[\text{de}]](\text{d})(\text{SB}_{\text{TELIC}}(\text{yuqiu})) = \lambda x_e . \text{SB}_{\text{TELIC}}(\text{yuqiu})(\text{d})(x)$
$= \lambda x_e \lambda e_v \begin{bmatrix} \text{shuttlecock}^{\star}(x) \wedge \text{play}^{\star}(e) \\ \wedge \text{Agent}(e,\text{d}) \wedge \text{Theme}(e,x) \end{bmatrix}$

The resulting denotation of the subject DP in (70) is of type $\langle e,\langle v,t\rangle\rangle$, establishing a relation over the Theme argument x and event argument e, where the agent is specified as d.

This subject DP denotation must now combine with the predicate denotation in (68b). As shown in (68b), the main predicate is also of the same type $\langle e,\langle v,t\rangle\rangle$. Functional Application therefore cannot apply, since neither takes the other as an argument. They can, however, combine via Event-dependent Restrict (EDR, defined in (63)), which identifies their respective nominal and event arguments. Applying EDR to (71a) initially produces duplicate occurrences of $play^{\star}(e)$ and $Theme(e,x)$ – one from (68b) and one from (70d). These duplicates are eliminated by logical idempotence, resulting in (71b).

(71) Subject-predicate composition via Event-dependent Restrict (EDR)
(a) $[[\text{Daiziying de yuqiu da de hen hao}]]$
$= \text{EDR}([[\text{Daiziying de yuqiu}]],[[\text{da de hen hao}]])$
(b) $[[\text{Daiziying de yuqiu da de hen hao}]]$
$= \lambda x_e \lambda e_v \begin{bmatrix} \text{shuttlecock}^{\star}(x) \wedge \text{play}^{\star}(e) \\ \wedge \text{Agent}(e,\text{d}) \wedge \text{Theme}(e,x) \wedge \text{very} - \text{well}(e) \end{bmatrix}.$

Notably, the above semantic composition lacks a separate Voice-composition step. This is because *Daiziying de yuqiu* 'Daiziying's shuttlecock' itself constitutes the subject and the pre-*de* individual *Daiziying* has already saturated the performer argument of the TELIC-derived relation in (69). Consequently, the Agent condition in (71b) is contributed by the pre-predicate nominal relation itself and no independent Voice projection is required.

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A desirable consequence of the EDR analysis is that the event predicate contributed by the TELIC-derived relation need not be lexically identical to the predicate contributed by the main verb. For example, in (72), the most plausible TELIC-associated event for *gāngqín* 'piano' is playing, whereas the main predicate *lian* 'practice' or *biaoyan* 'perform' characterizes events of practicing or performing, respectively.

(72) Xiaomei de gangqin lian/biaoyan de hen hao
Xiaomei de piano practice/perform de very well
'Xiaomei practices/performs (playing) the piano very well.'

Although the playing and practicing/performing predicates differ lexically, they can both describe the same event: a specific playing event may simultaneously be a practicing or performing event. In this case, there are no duplicate occurrences of the predicate $play^{\star}(e)$. Instead, the truth conditions contain one $play^{\star}(e)$ condition and one $perform^{\star}(e)$ condition, where the event denoted by the variable e is simultaneously a practicing or performing event. Consequently, EDR requires the TELIC-derived and main-predicate conditions to hold of the same event and nominal participant, but it does not demand lexical identity. In this respect, our analysis departs from strict verb-copying accounts of fake modification, which derive the construction from an underlying structure containing two identical copies of the verb.

While EDR identifies the corresponding individual and event arguments of the pre-predicate nominal relation and the main predicate, it leaves the shared individual argument unsaturated. Since no subsequent expression saturates this argument, sentence-level EC applies to bind x, yielding an event predicate of type $\langle v,t\rangle$.

(73) Outermost Existential Closure

$$\mathrm{EC}_{\mathrm{outer}}(\mathrm{EDR}([[\text{Daiziying de yuqiu}]],[[\text{da de hen hao}]])) = \lambda e_v \exists x_e \left[\begin{array}{c} \text{shuttlecock}^{\star}(x) \wedge \text{play}^{\star}(e) \wedge \text{Agent}(e,d) \\ \wedge \text{Theme}(e,x) \wedge \text{very}-\text{well}(e) \end{array} \right]$$

In an episodic context, an independently available existential operator, possibly a covert aspectual operator, existentially closes the event variable, yielding the truth conditions in (74).

(74) Episodic event closure

$$\exists e_v \exists x_e \left[\begin{array}{c} \text{shuttlecock}^{\star}(x) \wedge \text{play}^{\star}(e) \wedge \text{Agent}(e,\mathrm{d}) \\ \wedge \text{Theme}(e,x) \wedge \text{very}-\text{well}(e) \end{array} \right]$$

In (74), since $play^{\star}$ and $shuttlecock^{\star}$ are cumulative and their participant relations summative, they yield atelic or unbounded interpretations, thereby supporting activity readings characteristic of the fake modification construction (cf. Krifka 1992, 1998). In generic contexts, by contrast, the Gen operator yields the generic reading. We will not pursue the details of this interpretation here.

The above derivations illustrate how EDR operates by combining two already well-typed event-dependent relations, while EC simply closes the remaining unsaturated individual argument. The mechanisms used here are closely aligned with those employed for duration pseudo-modification. In particular, both event-sensitive constructions use the same TELIC-induced relation to feed non-saturating EDR, followed by EC. They differ only in how they construct the event-dependent nominal relation. Duration pseudo-modification derives the relation with a higher-order duration modifier that applies to an EC-derived telic event

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profile before EDR. In canonical fake modification, the pre-*de* DP first saturates the role filler (i.e. the Agent) of the qualia-induced TELIC predicate, thereby producing a relation over individuals and events. The shared mechanisms of these two constructions provide strong support for a qualia-dependent approach to a unified semantic linker analysis of *de.*

8. Cross-linguistic comparison: the English genitive *'s* and the Mandarin linker *de*

Both the English genitive *'s* and the Mandarin linker *de* support comparable authorship and possession readings, sharing a relation-variable architecture where R is constrained by the nominal head. Their distribution differs, however. As Tang (1993) argues, English *'s* is restricted to DP-like possessors, whereas Mandarin *de* occurs with a broader range of prenominal modifiers. We capture this difference by treating *de* as a polymorphic XP-linker whose modifier type varies while R resolves to a lexically licensed or grammar-given interface relation. The same polymorphism also permits event-dependent outputs.

The modifier-selection contrast between English and Chinese is illustrated in (75)–(78), while (79) presents an additional construction-specific divergence:

(75) DP modifier (parallel)
  (a) Zhangsan's book
  (b) Zhangsan de shu
  Zhangsan DE book
  'Zhangsan's book'

(76) Propositional content clause (divergent)
  (a) the rumor that Zhangsan went bankrupt
  (b) Zhangsan pochan de yaoyan
  Zhangsan bankrupt DE rumor
  'the rumor that Zhangsan went bankrupt'

(77) Gapped relative clause (divergent)
  (a) the book (that/which) Zhangsan wrote
  (b) Zhangsan xie de shu
  Zhangsan write DE book
  'the book that Zhangsan wrote'

(78) Saturated event clause (divergent)
  (a) the sound of Zhangsan playing the piano
  (b) Zhangsan tan gangqin de shengyin
  Zhangsan play piano DE sound
  'the sound of Zhangsan playing the piano'

(79) Eventive fake modification
  (a) #Daiziying's shuttlecock plays well. (Under the intended eventive reading)
  (b) Daiziying de yuqiu da de hen hao.
  Daiziying DE shuttlecock play DE very well
  'Daiziying plays badminton well.'

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Examples (75)–(78) reflect the broader selectional range of Mandarin *de*: unlike English *'s*, *de* can link modifiers of several semantic types. Example (79) differs, since its pre-linker expression is already a DP. Under our analysis, the Mandarin pattern is licensed by the event-dependent composition developed in Section 7.2, where a qualia-derived event argument remains available for restriction with the following predicate. Why English lacks the corresponding eventive reading remains an open question; the difference may stem from English genitive composition, the subsequent predicate structure or both. We leave a fuller exploration of this issue to future research.

9. Conclusion

This paper has argued that the apparent multifunctionality of Mandarin *de* does not require multiple lexical entries or complex covert syntax. Instead, *de* acts as a single polymorphic linker that introduces an underspecified relation variable, R. The diversity of XP-*de*-NP interpretations follows naturally from how R is resolved: directly via inherently relational nouns, through selective binding of a noun's Generative Lexicon (GL) qualia structure or via independently motivated interface relations. Coercion serves only as a restricted last resort for genuine type mismatches.

By adopting this architecture, we unify nominal, adjectival and clausal modification. Differences among these modifiers stem from their divergent semantic inputs and the specific relations they access, rather than distinct flavors of *de.* Furthermore, by formalizing the Qualia Preservation Principle (QPP) alongside domain-blocking interface relations, this analysis derives the strict structural ordering constraints among multiple modifiers directly from the semantics of relation saturation. Crucially, this framework also extends seamlessly to event-sensitive 'fake-modification' patterns, which have long puzzled Chinese linguists. Their idiosyncratic interpretations arise predictably from event-dependent qualia structure, Event-dependent Restrict and standard closure operations, eliminating the need to stipulate an 'eventive' *de* or complicate the syntax.

Beyond Mandarin, this study refines the syntax-semantics interface within the nominal domain, demonstrating how a general linker can remain semantically invariant while dynamically interacting with lexical structure. Typologically, a comparison with the English possessive *'s* reveals that crosslinguistic linkers likely share a relation-variable core, differing primarily in categorial selection. Finally, this framework lays the groundwork for future psycholinguistic research on the real-time processing of *de.* By experimentally tracking how the human parser computes lexically specified, qualia-induced and grammar-driven relations, we can bridge the gap between theoretical semantic models and cognitive reality.

Disclosure. During the preparation of this manuscript, the author used ChatGPT 5.6 (OpenAI), Gemini Pro 3.1 (Google), NotebookLM (Google) and Microsoft Edge Copilot from late 2025 to August 2026. The tools were accessed through their respective web/browser interfaces. They were used to synthesize prior literature, identify relevant conceptual references, detect errors in logical formulas and refine the prose. All content was thoroughly reviewed, verified and finalized by the author, who takes full responsibility for the integrity and accuracy of the published work.

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