On *shi* and *de* in Mandarin: clefts and beyond

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Zusammenfassung

Ziel der vorliegenden Dissertation ist eine einheitliche Behandlung zweier Spaltsatz-Konstruktionen im Mandarin-Chinesischen. Die beiden behandelten Spaltsatz-Typen beinhalten einen Kopulasatz, unterscheiden sich aber durch das Vorhandensein bzw. die Abwesenheit einer *de*-Partikel in satzfinaler Position, sind aber anderweitig identisch. Sie werden als „bare-*shi* cleft“ bzw. „*shi...de* cleft“ bezeichnet. Die Arbeit beginnt mit einer detaillierten empirischen Untersuchung der distributionellen Eigenschaften der beiden Spaltsatz-Typen, wobei der Schwerpunkt auf einer Analyse der Subtypen liegt, welche anhand der im Fokus stehenden Konstituenten unterschieden werden können, also DP-, PP-, Adjunkt- und CP-Spaltsätze. Im Anschluss an die Untersuchung der Distribution wendet sich die Studie den semantischen Eigenschaften der Spaltsätze zu, wobei experimentell untersucht wurde, ob die *de*-Partikel an der Kodierung einer exhaustiven Inferenz beteiligt ist oder nicht. Die experimentellen Daten legen nahe, dass die Partikel *de* nicht zu einer solchen exhaustiven Inferenz führt. Stattdessen wird ein neuer Ansatz zur Funktion der Partikel entwickelt. Unter Bezugnahme der Instrumente der Cross-Entropy und der Kullback-Leibler-Divergenz wird vorgeschlagen, dass *de* in der Spaltsatz-Konstruktion als Informationsmaximierer fungiert. Daraufhin werden Belege präsentiert, die die Behauptung motivieren, dass der Informationsmaximierer *de* von einem eigenständigen, aber homophonen Evidenzoperator zu unterscheiden ist, der eine erwartungswidrige Bedeutung kodiert. Der Rest der Dissertation ist einer formalen syntaktischen Analyse gewidmet, die das Ziel verfolgt, die Distributionseigenschaften der Spaltsätze zu erfassen, eine schwache, exhaustive Inferenz abzuleiten und Einschränkungen hinsichtlich Objekt-Spaltsätzen zu erklären. Der Beitrag der vorliegenden Arbeit ist dreifacher Natur. Empirisch gesehen ist es nach meinem Kenntnisstand die erste experimentelle Arbeit über Spaltsätze im Mandarin-Chinesischen, die die beiden Konstruktionstypen direkt vergleicht und empirische Belege für die Existenz einer zweiten, Nicht-Spaltsatz-Verwendung der satzfinalen Partikel *de* präsentiert. Theoretisch bietet diese Arbeit eine syntaktische Implementierung der Spaltsatz-Struktur, die eine Verbesserung der bestehenden biklausalen Analyse darstellt. Methodisch werden moderne psycholinguistische Techniken, einschließlich Akzeptabilitätsbeurteilungsaufgaben und Aufgaben zum selbstgesteuerten Lesen, angewandt, um einen systematischen und formalen Test der in Frage stehenden Hypothesen zu ermöglichen. Außerdem werden Rational-Speech-Act-basierte Modelle (RSA) eingesetzt, um die Funktion der Partikel *de* zu formalisieren. Nicht zuletzt verbinden die Kapitel der Dissertation

in ihrer Gesamtheit experimentelle und theoretische Ansätze zu Spaltsätzen im Mandarin-Chinesischen. Ich hoffe, dass die vorliegende Arbeit ein bedeutungsvoller erster Schritt in Richtung der Integration der gesamten Bandbreite verfügbarer Methoden in eine allgemeinere Theorie der Spaltsatz-Strukturen und ihrer Interpretation sein kann.

English Abstract

This dissertation provides a uniform treatment for the two distinct cleft constructions in Mandarin. Both cleft constructions involve a copular clause, minimally differ by the existence of a *de* particle at the sentence-final position and are otherwise identical in structure, hence the terms bare-*shi* cleft and *shi...de* cleft. The study begins with a detailed empirical survey of the distributional properties of the two Mandarin cleft types, with a focus on an analysis of individual subtypes defined on the constituents under focus, i.e. DP, PP, adjunct and CP clefts. Following the behavioral analysis the study turns to the semantic side, with experiments conducted to test whether the *de* particle is involved in encoding an exhaustive inference in *shi...de* clefts. In view of the experimental results indicating that the *de* particle does not contribute to a stronger exhaustive interpretation, a new explanation of the function of the *de* particle is offered. Making reference to the tools of cross-entropy and Kullback-Leibler divergence, it is proposed that *de* acts as an information maximizer in the *shi...de* cleft. Additional evidence is then presented to motivate the claim that the information maximizer *de* is to be distinguished from a stand-alone evidential operator *de* that encodes a contrary-to-expectation meaning. The rest of the dissertation is devoted to a formal syntactic analysis with the aim of capturing the behavioral/distributional properties, deriving a weak exhaustive inference and explaining an independently observed constraint against object clefts. The contributions of this dissertation are three-fold. Empirically, to my knowledge, it is the first experimental work on Mandarin clefts to compare the two cleft construction types directly and present empirical evidence showing the existence of a second, non-cleft use of the sentence-final particle *de*. Theoretically, this work provides a syntactic implementation of the cleft structure which improves upon existing biclausal syntactic proposals. Methodologically, up-to-date psycholinguistic techniques, including acceptability judgment tasks and self-paced reading tasks, are applied to enable a systematic, rigorous test of the hypotheses in question. Also, Rational Speech Act (RSA)-based models are also employed to formalize the function of the *de* particle in cleft constructions. Last but not least, the chapters in this dissertation, as a whole, bridge experimental and theoretical approaches to Mandarin clefts. I hope this dissertation can be a meaningful first step towards integrating the full range of available methodologies into a more general theory of cleft structures and their interpretation.

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Glossing conventions

The glossing terms of the dissertation follow the Leipzig Glossing Rules.

ACC	Accusative
ASP	Aspectual marker
C	Complementizer
CLF	Classifier
COP	Copula
DEM	Demonstrative
DEP	Dependent clause marker
EXCLAM	Exclamative
EXP	Experiential aspect marker
FUT	Future tense
IMP	Imperative
LOC	Locative
MASC	Masculine
MSG	Masculine singular
NEG	Negation
NOM	Nominalizer
PAST	Past tense
POSS	Possessive
PRF	Perfective
PROG	Progressive
PRT	Particle
Q	Question
REL	Relativizer
RES	Resultative
SBJ	Subject
SG	Singular
TOP	Topic
VN	Verbal noun

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Chapter 1

Overview

This introduction serves to explain what cleft constructions are generally, and how they are realized in Mandarin specifically. I will start by introducing some aspects of the structure and meaning of Mandarin Chinese necessary for this discussion. A short overview of the problems of the existing Mandarin cleft literature, and of the contributions of this dissertation, will be provided along the way. The bulk of the discussion will then be delivered according to two key components within the cleft construction that figure prominently in this work. First, I will investigate the particle *de*, which occurs in the *shi...de* cleft construction. I distinguish this particle's usage in clefts from other usages of *de* as a sentence-final particle, which I argue constitute a separate particle serving subtle, speaker-dimension functions. Secondly, I investigate the word *shi*, which serves as the copula in Mandarin, and its role in cleft constructions.

1.1 Introducing Mandarin clefts

The term *cleft* describes "a specific syntactic pattern which serves to separate a discourse prominent constituent structurally from the rest of the clause" (Hartmann & Veenstra 2013). A typical cleft construction contains four parts: an impersonal pronoun, a copula verb, an

informationally prominent part that is the *focus* (i.e. the *cleft phrase*/*cleft pivot*), and an embedded relative clause that is the *background* (i.e. the *cleft clause*).

These parts are exemplified in (1).

(1)

It	is	John	that/who will come to school tomorrow.
Impersonal pronoun	Copula	Cleft phrase/pivot	Cleft clause

The background information that is encoded in the relative clause is relatively old information that has been provided by the context. The focus part provides new information that can be potentially used to answer a question or correct existing information in a preceding statement.

How these components of the cleft constructions are arranged is language specific (Hartmann & Veenstra 2013; Hole & Zimmermann 2013).[1] (2) illustrates a cleft answer to a *wh*-question in Mandarin. There is no overtly (phonetically) realized pronominal element before the copulative element, and while the focused part is separate from the part encoding background information, no overt relativizer (that would drive a wedge/partitioner between these two parts, such as *that or who*) is involved.[2]

(2) Who will come to school tomorrow?

Shi [Yuehan]$_{\text{Focus}}$ [mingtian yao lai xuexiao]$_{\text{Background}}$.
COP John tomorrow will come school
'It is John who will come to school tomorrow. '

Cleft constructions aside, another focusing strategy in Mandarin makes use of a canonical SVO sentence, with the focused part often indicated via a facilitating stress.[3] Thus, the above *wh*-question in (2) is alternatively addressed by a plain SVO answer such as in example (3).

(3) Who will come to school tomorrow?

[Yuehan]$_{\text{Focus}}$ [mingtian yao lai xuexiao]$_{\text{Background}}$.
John tomorrow will come school
'John will come to school tomorrow.'

[1] Mandarin is a language used across mainland China and Taiwan, with an exceptionally broad geographical distribution. Depending on where the speaker is from, a vast degree of inter-language/dialect/personal variation is expected. Throughout this dissertation, all examples (except for cited examples of which sources are acknowledged) are based on reported judgments obtained from at least 5 native speakers from Beijing.

[2] The glossing terms of this dissertation follow the Leipzig Glossing Rules. See Glossing Convention for details. Throughout this dissertation, tones are ignored for the Mandarin examples.

[3] Mandarin is considered a VO language with some OV traits (Comrie 2008). DPs and PPs in Mandarin conform to the OV type in that postpositions are widely available and relative clauses are head-final (cf. Hole & Zimmermann 2013).

Focus placement may vary depending on the stress accent (further subject to question-answer congruence), i.e. there is no fixed focus position. (4) lists four possible focus interpretations based on the shifting stress.

(4) [Yuehan]$_1$ [mingtian]$_2$ [yao lai]$_3$ [xuexiao]$_4$.
John tomorrow will come school
'[John]$_{F1}$ [will come]$_{F3}$ to [school]$_{F4}$ [tomorrow]$_{F2}$.'

Apart from the canonical focus construction, another focusing strategy in Mandarin involves the exclusive operators *zhiyou*/*zhi* 'only' (henceforth the exclusive focus construction). The former operator patterns similarly with the so-called constituent *only* in English (Rooth 1985), by associating with the constituent it precedes. The latter corresponds to Rooth' adverb *only*, such that it may associate with any focus within its c-command domain. Thus, in (5a), *zhiyou* cannot associate with other elements than *Yuehan* 'John' (with which it forms an 'only'-phrase). In contrast, in (5b), *zhi* resides in an adverb position and allows for three focus interpretations (possible foci: the verb *zaihu* 'care about', the DP *ni* 'you', the VP *zaihu ni* 'care about you').

(5) a. Zhiyou Yuehan mingtian yao lai.
only John tomorrow will come
'Only John will come tomorrow.'

b. Wo zhi zaihu ni.
I only care.about you
'I only care about you.'

The Mandarin clefts are idiosyncratic in that they comprise two subtypes, differing by the occurrence of a particle at the sentence-final position. The cleft construction in (2) (repeated as 6a) features the copula *shi*, but does not feature a sentence-final particle, hence the name *the bare-shi cleft.* A minimally different cleft type with a sentence-final particle at the end of the sentence is termed *the shi...de cleft*, as shown in (6b).

(6) a. Shi [Yuehan]$_{\text{Focus}}$ [mingtian yao lai xuexiao]$_{\text{Background}}$.
COP John tomorrow will come school
"It is John who will come to school tomorrow. '

b. Shi [Yuehan]$_{\text{Focus}}$ [mingtian yao lai xuexiao]$_{\text{Background}}$ de.
COP John tomorrow will come school DE
"It is John who will come to school tomorrow. '

The question of which of the two clefts is the basic cleft construction in Mandarin is still under heated debate. For example, the two clefts are treated in Lee (2005) as sharing the same discourse function. Cheng (2008) treats *shi* and *de* separately as two components of a cleft construction, where *shi* is a canonical copula and *de* expresses a speech act meaning of assertion. It is unclear which type of the cleft construction is the default. Hole (2011) makes a clear distinction between the bare-*shi* cleft and the *shi...de* cleft, pointing out purportedly different felicity conditions (in terms of exhaustiveness), according to which only the *shi...de* cleft contributes an exhaustive inference.[4] In other words, the distinction between cleft types critically comes down to the question of what does *de* do in the cleft construction.

1.2 A very short overview of the more recent Mandarin cleft literature

Despite a great body of existing works on Mandarin clefts on the market, it is still subject to a great deal of debate what exactly the *de* particle contributes in the cleft construction, and whether (or to what extent) the bare-*shi* cleft without the *de* particle shares the same interpretation as the *shi...de* cleft. Within a single cleft type, four kinds of cleft phrase have been observed, including DP, adjuncts, VP and CP. These subcategories have so far not received a satisfactory, uniform treatment – instead, past analyses target only specific subgroups of Mandarin cleft types, and lack the explanatory power to address Mandarin clefts in the general case. Furthermore, existing analyses on the exhaustive meaning of clefts concentrate either entirely on syntactic derivation (e.g. Simpson & Wu 2002; Paul & Whitman 2008; Cheng 2008; Hole 2011) or on experimental investigations (e.g. Liu & Yang 2017; Hsu 2019), but not on both. These shortcomings demonstrate the need for an analysis which can capture the distribution of all kinds of cleft phrases and their corresponding meanings. This dissertation intends to provide exactly such an analysis.

1.3 Other functions of the *de* particles

Before going into details about the way *de* is used in a cleft construction, it serves our purpose well to see what other functions *de* has, and why they are not the same function as is used in the cleft construction. It is independently assumed that *de* outside of clefts has the function of a relativizer (Li & Thompson 1981; Wan 2016), nominalizer (Chao 1968; Huang & Liao

[4] Clefts are assumed to generate an interpretation in which contextually determined alternatives to the focus value are excluded, which is called exhaustive inference. We will take a look at it in detail in the next chapter.

2013) and possessive marker (Li & Thompson 1981; Zhu 1982). These are exemplified in the examples in (7), respectively.

(7) a. [Zuotian lai zhao wo de] xuesheng jintian you lai le.
[yesterday come search I REL] student today again come ASP
'The student who came to me yesterday came again today.' [*de* as a relativizer]

b. (Context: who are those people?)
Kaiche de (ren), mai shuiguo de (ren).
drive.car NOM person, sell fruit NOM person
'A driver (one who drives), and a fruit peddler (one who sells fruit)'
[*de* as a nominalizer]

c. Mama de yifu hen piaoliang.
mother POSS clothes very pretty
'Mom's clothes are pretty.' [*de* as a possessive marker]

In example (7a), *de* establishes the (restrictive) relativization of the clausal argument to its left. *De* nominalizes the predicative argument to its left in example (7b), and establishes a possession construction in example (7c). For the above three examples, the head nouns that the *de*-phrases modify can be overtly realized (even though they may be implicit). However, the same cannot be said about *de* in the cleft construction. As shown in (8), inserting a head noun to the right of the *de* particle in the cleft construction in (2) gives rise to outright unacceptability.

(8) Who will come to school tomorrow?
Shi Yuehan mingtian yao lai xuexiao de (*ren).
COP John tomorrow will come school DE person
Intended: 'It is John who will come to school tomorrow. '

In this respect the sentence-final *de* behaves similarly to other discourse particles in Mandarin and other languages across East Asia, e.g. *la, ou*, etc. where speaker attitude is expressed. I will argue that an additional sentence-final particle *de* functions as an evidential operator. Though they share the same surface form (phonologically and morphologically), they differ in syntactic position and meaning. Therefore, I will treat them as two separate particles. An example is provided here as a preview: In a context where the hearer could not find the train information in time, she hopped onto a random train and then asked the conductor if it was indeed the right train. The conductor could well reply with an evidential operator *de* appended to the sentence, as in (9).

(9) The conductor answered: 'Wrong direction.
Ben ci lieche kaiwang Gaoxiong fangxiang de! '
this CLF train head.to Gaoxiong direction DE
'Actually this train is heading for Gaoxiong.'

Note that this is different from the use in a cleft construction, since it is expected that the evidential type of *de* is not felicitous together with continuations such as 'I feel the same' or 'just as I expected'. (10) is off as a response to (9).

(10) The passenger then replies:
?? 'Wo ye juede shi.'
I too feel true
Intended: 'I feel the same. '

However, the *de* particle as appears in cleft constructions does not have such problem. The following turn of dialogue is unproblematic.

(11) a. Mary was late and finally met John at the platform. She didn't exactly know where this train was going, and John told her
'Zhe tang lieche shi kaiwang Gaoxiong fangxiang de.'
this CLF train COP head.to Gaoxiong direction DE
'It is towards Gaoxiong direction that train is heading. '

b. Mary answers:
'Guoran xiang wo xiang de yiyang.'
just as I believe REL same
'Just as I expected. '

I will devote more examples and discussions to the distinctions in syntax and semantics between the two *de* particles in Chapter 5. In the mean time, I will be careful to distinguish between the particle *de* as it appears in clefts, i.e. 'the cleft *de*', versus the particle *de* used as an evidential marker, i.e. 'the evidential *de*'.

1.4 The Mandarin copula *shi*

In this subsection, I provide a short general overview of the functions of the copula element in Mandarin Chinese. The discussion provides an important empirical foundation, as information about these functions factors into evaluating the kind of analyses that apply to the role of the copula element in cleft constructions (as well as the kind of analyses that should be excluded).

The word *shi* we have seen in the above cleft sentences independently functions as the copula element in Mandarin. According to most analyses, the copula use of *shi* developed from

an anaphoric demonstrative pronoun that occurs in a topic-comment structure (Wang 1940; Yue-Hashimoto 1969; Li & Thompson 1977; Feng 1993; Chang 2006). As (12) schematizes, the copula use emerges when the topic-comment structure becomes reanalyzed as a subject-predicate structure.

(12) $\text{Topic}_1 + [_{\text{comment}}\ \text{Pronoun}_2 + \text{Predicate}_3] \text{ -> } [\text{Subject}_1 + \text{Copula}_2 + \text{Predicate}_3]$

That is, the demonstrative pronoun, which in the comment is coreferential with the topic of a topic-comment construction, is reanalyzed as a copula that intervenes between a subject and a predicate in a subject-predicate construction. The original anaphoric pronominal use is no longer productive in modern Mandarin.

Following Higgins (1979), copular clauses with *shi* may be further classified into different types along the line of predication/specification/equation. (13) exemplifies the three copular subtypes based on the taxonomy in Higgins.

(13) a. *Shi* in the predicational copular clause
Zhangsan shi xuesheng.
Zhangsan COP student
'Zhangsan is a student.'

b. *Shi* in the specificational copular clause
Wenzhang de zuozhe shi Zhangsan.
paper POSS author COP Zhangsan
'The author of the paper is Zhangsan.'

c. *Shi* in the equative copular clause
Jinxing jiu shi qimingxing. Qimingxing jiu shi jinxing.
Venus just COP morning.star morning.star just COP Venus
'Venus is the Morning Star. The Morning Star is Venus.'

The predicational and the specificational type differ in the referentiality of the pre-copula subject and the post-copula complement. A schematization along the line of Higgins is provided in Table 1.1.

Clause Type	Subject	Complement
Predicational	Referential	Non-referential
Specificational	Non-referential	Referential

Table 1.1: Types of copular clauses based on referentiality.

The complement in the predicational clause denotes a property that is predicated of the subject referent. In contrast, in the specificational clause the subject establishes a variable and the post-copular element assigns a value for the variable. The equative clause differs from the above two types in requiring that both arguments denote entities so that one is equated with the other.[5]

Mikkelsen (2005) further postulates that a referential entity can be identified with type *e* (Partee 1986), and non-referential with type $\langle e,t\rangle$ (or $\langle s, \langle e,t\rangle\rangle$). It has been proposed that specificational clauses function similar to question–answer pairs (Ross 1972; den Dikken et al. 2000; Schlenker 2003; den Dikken 2006), i.e. the question-denoting element precedes the copula and its answer follows the copula.

Such distinction can also be observed in pseudoclefts. In the examples (14) and (15), the (a)-sentences illustrate the interpretation provided by predicational pseudoclefts, and the (b)-sentences represent the interpretation arising from specificational pseudoclefts.

(14) What John does not eat is food for the dog.

a. John feeds the things he does not eat (i.e. his leftovers) to the dog.

b. John does not eat the following thing(s): dog food.

(15) What the message contained was a secret.

a. It was not known what the message contained.

b. The message contained a secret.

In the predicational case, *what John does not eat* is a referent, and *food* is a predicate that is true of the referent. In the specificational interpretation, *what John does not eat* is the description to be specified with the value of *food for the dog*.

These interpretations can also be exemplified with the copula *shi* in Mandarin, as shown in (16a) and (16b). Reading 1 corresponds to the predicational interpretation. Reading 2 corresponds to the specificational interpretation.

(16) a. Yuehan buchi de shi gouliang.
John NEG.eat REL COP dog.food
Reading 1:'John feeds the things he does not eat (i.e. his leftovers) to the dog.'
Reading 2: 'John does not eat the following thing(s): dog food.'

[5] The focus adverb *jiu* is needed for the equative sentence to be natural (my own consultation).

b. Xin suo baohan de shi yige mimi.
letter OBJ.REL contain REL COP one.CLF secret
Reading 1: 'It was not known what the message contained.'
Reading 2: 'The message contained a secret.'

Note that in its copula use, *shi* does not receive a stress accent. This is to be distinguished from the copula under stress, which carries a verum focus interpretation (Jin 2020). The verum focus use was first observed by Li & Thompson (1981), though it is labeled there as the emphatic *shi* construction. The verum *shi* immediately precedes a predicate and is optionally preceded by a topic. The predicate encodes information familiar from prior discourse or otherwise belonging to mutual knowledge, and the construction encodes the speaker's commitment to the truthfulness of said information.

(17) A: 'I thought he had no money, so he wouldn't participate in the campaign. '
B: Ta SHI meiqian, danshi you guqi.
he COP NEG.have.money but have integrity
'It is true that he has no money, but he is a proud person.'

The previous discourse has established that the individual in question has no money. The first part of the reply from B confirms such information with a stressed copula. The second part provides additional information assuming the first part is true.

In addition, a homophonous element is also employed in Mandarin to license an affirmative response to polar questions, as in example (18), which has been proposed to share a potential connection with the copula use in terms of meaning and historical development (Yen 1986).

(18) 'You must teach me how to speak Swahili right now!'
Shi, nüwang bixia.
Yes queen Her.Majesty
'Yes, Your Majesty.'

The affirmative particle use is argued to stem from a defunct adjectival use denoting 'correct, right', retained in the modern Mandarin compound *shi-fei* 'right-wrong' which consists of two antonymic adjectival forms. An example is given in (19).

(19) Ni meishi'r bie bannong shifei.
you NEG.thing IMP fidget right.wrong
'You shouldn't make mischief when you are bored. '

To sum up, this subsection provided basic information about the copula *shi* in Mandarin. Developed from a demonstrative pronoun, *shi* occurs in all three types of copular clauses,

i.e. predicational, specificational and equative copular clauses. Additionally, when it receives stress, it carries a verum focus function. An affirmative particle use is also observed when it is used in an answer to a polar question, in relation to a residual use in frozen adjectival forms.

Since *shi* in the cleft construction does not by default receive a stress accent, given the aforementioned functions of *shi*, the function of carrying a verum focus stress can be safely eliminated in clefts. *Shi* also does not stand alone at the beginning of a sentence to answer a polar question when it is in a cleft construction, nor it has a bisyllabic partner (as in *shifei* 'right and wrong'), hence the affirmative particle use is not to be conflated with the function in clefts. For now, we tentatively treat the copula element in clefts as a canonical copula. See detailed discussions in Chapter 6.

1.5 Summary

In this chapter, I introduced cleft constructions, a specific syntactic pattern that structurally separates a discourse-prominent constituent from what is in the background. In Mandarin, there exist two similar constructions which minimally differ in the occurrence (or not) of a sentence-final particle *de* and which are both categorized as clefts (termed as the bare-*shi* cleft and the *shi...de* cleft). Related to this use, I have also introduced a separate *de* as an evidential operator that is distinct from the cleft use. The details will be formally discussed.

After discussing the uses of the copula *shi* and the particle *de* independently, the next chapter will focus on the distribution of the two cleft types, presenting details on their subtypes (DP, adjunct and CP focus) and their relevant interpretations (e.g. exhaustive inference).

1.6 Contributions

The contributions of this dissertation are three-fold.

Empirically, although a rich body of works have offered extensive coverage of the bare-*shi* cleft and the *shi...de* cleft individually, this dissertation is, to my knowledge, the first experimental work on Mandarin clefts to compare these two construction types directly. Also, the present work is the first to present empirical evidence showing that there is a second, non-cleft usage of a sentence-final particle *de*, which does not lend itself to being reduced to an instance of the bare *de*-construction previously identified in the literature.

Theoretically, this work provides a syntactic implementation of the cleft structure which improves upon existing biclausal syntactic proposals. Drawing directly upon Sheil (2016),

a unified Agree mechanism is proposed to account for the exhaustive interpretation of all cleft types (DP, PP and CP), which can be maintained without resorting to focus movement (building upon the independent constraint against movement that is too 'short', cf. Bošković 1997; Abels 2003; Grohmann 2003).

Methodologically, up-to-date psycholinguistic techniques, including acceptability judgment tasks and self-paced reading tasks, are applied to enable a systematic, rigorous testing of several key issues in question. These issues include the hypothesis of whether *de* introduces an exhaustive reading, the association of the stand-alone use of the *de* particle with sentences of maximal informativity, and the correlation between the exhaustive interpretation of a *wh*-question with the felicity of a cleft answer. In addition, Rational Speech Act (RSA)-based models, which find important applications in the field of experimental pragmatics, are also employed to characterize the function of the particle *de* in cleft constructions. Last but not least, the chapters in this dissertation, as a whole, bridge experimental and theoretical approaches to Mandarin clefts.

1.7 Roadmap

This dissertation is structured as follows. I start in Chapter 2 by presenting the distributional behaviors of the two types of cleft and their subtypes in detail, and discussing their exhaustive inferences. A clarification of the meaning difference between the two clefts is next in line. In Chapter 3, I turn to testing experimentally whether the *de* particle that minimally sets these two cleft construction types apart is involved in encoding an exhaustive inference. My results failed to find evidence that the two cleft types differ in the strength of exhaustive inference, establishing that the *de* particle is not the source of exhaustivity in Mandarin clefts. I proceed to offer a new explanation wherein *de* acts as an information maximizer (which I will refer to as de_{IMAX}) in Chapter 4, making reference to the tools of cross-entropy and Kullback–Leibler divergence which have found wide application in game-theoretic pragmatics. In Chapter 5, I further make a case for establishing a distinction between the *de* particle as used in the cleft construction and an additional, stand-alone use of *de* as an evidential operator encoding a contrary-to-expectation meaning (which will be separately termed as de_{EVID}). Chapter 6 is devoted to a formal syntactic analysis of the two cleft constructions that draws crucially upon small clause-based analyses of copular structures that were motivated on other languages (in line with Moro 1997, Mikkelsen 2002; 2005, den Dikken 2006; 2013, Sheil 2016). I will show

that the analysis correctly captures four empirical generalizations simultaneously, including deriving different subtypes of the clefted focus, fulfilling the requirement that the focus stay adjacent to the copula, deriving a weak exhaustive inference, and explaining the constraint against object clefts. Chapter 7 concludes the dissertation.

Chapter 2

The distribution of Mandarin cleft constructions

This chapter presents a complete survey of the syntactic distribution and relevant interpretations of the cleft constructions in Mandarin. Of interest to my survey are two major cleft types, the bare *shi*-cleft and the *shi...de* cleft. In the following I start by introducing the bare *shi*-cleft first, before turning to the *shi...de* cleft. The syntactic constituent that functions as the cleft phrase consists of three subcategories, including DP, adjunct and CP.[6] Among them, DP clefts and adjunct clefts are classed together as term clefts. CP clefts are also termed as propositional assertions. The following discussion investigates these subcategories in turn, going with term clefts first before moving on to propositional assertions. A linear position constraint, referred to as the adjacency requirement, is also brought forth in the discussion. I also discuss the optional topic-taking ability common to all the three cleft types along the way, as well as the exhaustive inference that arises in the interpretation of clefts. The data provided in this chapter will serve as the empirical base on which much of the discussions in the subsequent chapters are built.

As a side note, several topics that are related to the bare *shi*-cleft and the *shi...de* cleft must be excluded due to the complicated and as yet unresolved empirical picture of the relevant constructions. For example, a verb phrase (VP) can sometimes be clefted, but their distribution seems to differ significantly from the other clefted categories (since they require additional

stress on the verb) and is far from clear. Thus, all discussions related to verb clefts are left to future work.

2.1 The bare-*shi* cleft

In the first chapter, we have seen that Mandarin features two types of cleft constructions. Both types share a copulative element that introduces an information structural partitioning of focus and background material. They differ on whether a *de* particle is located at the end of the sentence. The examples in (20) illustrate the two cleft types (repeated from chapter 1).

(20) a. Jiaoshou **shi** zai shitang chifan.
professor COP LOC dining.hall have.meal.
'It is at the dining hall that the professor has his meal.' [the bare-*shi* cleft]

b. Jiaoshou **shi** zai shitang chifan **de**.
professor COP LOC dining.hall have.meal DE.
'It is at the dining hall that the professor has his meal.' [the *shi...de* cleft]

I will first discuss the distribution of the bare *shi*-cleft in some detail. I postpone a discussion of the *shi...de* cleft to the next subsection. All the examples to be discussed here are located within a *wh*-context. Doing so allows us to make sure that the desired focus interpretation is obtained for the clefts, and other readings independently shown to be available for the cleft structure are ruled out. The literature has drawn attention to such alternative cleft types as *continuous-topic* (or *topic-comment*, *comment-clause*, *informative presupposition*) clefts (Prince 1978; Hedberg 1990; Delin & Oberlander 1995; den Dikken 2013). An illustration is given in the form of example (21) (data from den Dikken 2013). Contrary to the cleft constructions of our interest, which partition focus and background in that order, discourse-new information in (21) is encoded in the cleft relative (underlined part), instead of the cleft pivot/phrase (which is a continuous topic).

(21) Continuous-topic *it*-cleft

A: "Do you know Brian's book? "

B: "Yes, in fact it was Brian's book that got me interested in clefts. "

[6] The last type of cleft construction is often referred to as propositional assertion or broad (CP) cleft in the literature. I will occasionally opt for the term 'CP cleft', especially when its syntax is discussed in Chapter 6, where the scope of the focused constituent figures prominently. For now we consistently stick with the term 'propositional assertion'.

The following internet attested example in (22) is further exemplary of a continuous-topic *it*-cleft (data from Onea 2019). Here the rich prior context makes it even clearer the discourse-new information lies with the cleft relative.

(22) Continuous-topic *it*-cleft

"After the GOP national convention, he chose to continue attacking Republican rivals. He chose to attack the Gold Star family of a fallen soldier; and he chose to hire as campaign CEO Steven Bannon, the former head of Breitbart News whose controversial support of the 'alt-right' will keep Trump on the defensive on the issue of racism; and *it was Trump who recently chose to divide his own force –as Custer divided his force–by 'softening', 'hardening', retreating, denying and delaying on his main line of attack: the issue of immigration and deportation.*"

[http:www.wbur.org/politiker/2016/08/27/commentary-trumps-last-stand]

Example (23) additionally demonstrates that the cleft phrase may solely contain an anaphoric pronoun (data from Prince 1978, cf. also Hartmann & Veenstra 2013).

(23) Continuous-topic *it*-cleft

The leaders of the militant homophile movement in America generally have been young people. It was **they** who fought back during a violent police raid on a Greenwich Village bar in 1969...

With these alternatives in mind, a way of controlling for the desired cleft interpretation is by employing a *wh*-context under which the cleft construction is situated: A prior *wh*-question forms the question under discussion. A cleft answer then addresses it such that, assuming question-answer congruence, the focus value projected by the cleft pivot should make reference to the elements within the current discourse domain introduced by the *wh*-part (Rooth 1992; Roberts 1996; Beaver & Clark 2008; Onea & Zimmermann 2019).[7]

2.1.1 Term clefts

Now with the proper context settled, I first establish the empirical picture of term clefts in Mandarin. I start with DPs as the cleft pivot. (24) exemplifies a (bare-*shi*) DP cleft. Here the

[7] Destruel & DeVeaugh-Geiss (2018) provided experimental results showing cleft constructions are infelicitous under a *wh*-question in English. However, I find that Mandarin cleft constructions are felicitous answers to *wh*-questions. Experimental evidence will be presented in the next chapter.

(B)-sentence offers a congruent answer that addresses a prior 'who'-question by identifying the referent denoted by *jiaoshou* 'professor' as the focus value.

(24) A: Shui zai xuexiao shitang chifan?
who LOC school dining.hall have.meal
'Who has (his) meal at the school dining hall? '

B: Shi [jiaoshou]$_F$ zai shitang chifan.
COP professor LOC dining.hall have.meal
'It is the professor that has his meal in the dining hall. '

Here I have controlled the lexical choice to yield a habitual reading, which applies to the relevant cleft sentences throughout this dissertation (unless otherwise specified). Doing so enables me to avoid the cleft structures that give rise to a past tense interpretation, the default interpretation in Mandarin clefts. The prevalence of past tense anchoring often leads to attempts to analyze the cleft structure as involving a tense marker (for example, via analyzing the cleft *de* as anchoring the past tense, cf. Simpson & Wu 1999). Importantly, however, the literature has noted that cleft sentences are compatible with different tense specifications, with the past tense interpretation being the statistically preferred construal (cf. Hole 2011). The current paper hence settles for a tense-neutral anchoring, such that our analysis could be formulated independent of past time reference.

Aside from DPs, prepositional phrases (PPs) may be clefted as well, illustrated in (25).

(25) A: Jiaoshou zai nali chifan?
professor LOC where have.meal
'Where does the professor have his meal?'

B: (Ta) Shi [zai shitang]$_F$ chifan.
he COP LOC dining.hall have.meal
'It is at the dining hall that (he) has his meal. '

(26) exemplifies other clefted adjuncts.

(26) A: Jiaoshou shenmeshihou gei jiangzuo?
professor when give talk
'When does the professor give a talk?'

B: Jiaoshou shi [mingtian]$_F$ gei jiangzuo.
professor COP tomorrow give talk
'It is tomorrow that the professor gives a talk.'

By comparison, the focus construction with clefted objects is subject to constraints. Huang (1982) is among the first to note that while the copula *shi* generally marks the constituent to

its immediate right as focus, it fails to attach directly to an *in situ* object focus, as shown in the example (27).

(27) * Zhangsan zuotian yao mai shi [nei-ben shu]$_F$.
Zhangsan yesterday will buy COP that-CLF book
Intended: 'It is that book that Zhangsan wanted to buy yesterday.'

The literature mostly converges on the judgment that *in situ* object clefts are degraded in Mandarin (Li & Thompson 1981; Huang 1982; Erlewine 2020). Nevertheless, there is debate as to whether clefted objects are available under a word order different from the canonical base order, e.g. a fronted object cleft is claimed to be fine (Cheng 2008: 255), as in (28).

(28) Shi [zhe-ben shu]$_F$ Zhangsan mei kan-guo.
COP this-CLF book zhangsan not.have read-EXP
'It is this book that Zhangsan hasn't read.'

Careful scrutiny, nevertheless, calls into question Cheng's (2008) claim. When situated under a *wh*-context, an object cleft answer leads to a clearly degraded judgment, as manifested by the following contrast with a subject cleft answer, as in (29) and (30). In addition, only when the object remain in-situ with a falling stress on it (instead of being clefted) is the answer felicitous, as in (29B').

(29) Object clefts

A: Ni zhao-guo shei?
you look.for-EXP who
'Who have you looked for?'

B: ?? Shi [Zhangsan]$_F$ wo zhao-guo.
COP Zhangsan I look.for-EXP
Intended: 'It was Zhangsan that I have looked for.'

B': Shi wo zhao-guo Zhangsan.
COP I look.for-EXP Zhangsan
'It was Zhangsan that I have looked for.'

(30) Subject clefts

A: Shei zhao-guo ni?
who look.for-EXP you
'Who has looked for you?'

B: Shi [Zhangsan]$_F$ zhao-guo wo.
COP Zhangsan look.for-EXP you
'It is Zhangsan that has looked for me.'

To the extent that an utterance like (28) is acceptable at all, my elicitation finds that it invites a corrective interpretation, typically coming with a context that involves a prior, alternative referent. The object cleft answer is then construed as refuting the focus-marked constituent from the prior context, as in examples (31A) and (31B).

(31) A: Zhangsan zuotian gaosu wo ta mei kan-guo Fushide.
Zhangsan yesterday tell I he NEG read-EXP Faust
'Zhangsan told me yesterday that he had never read *Faust*. '

B: Shi zhe-ben shu Zhangsan mei kan-guo(, bushi Fushide).
COP this-CLF book zhangsan not.have read-EXP (NEG Faust)
'It was this book that Zhangsan hadn't read (not *Faust*).'

The upshot is that there exists an asymmetry between objects and other term categories in Mandarin, which constitutes a puzzle to be addressed for a proper treatment of clefts (Shyu 2001).

Another facet of the defining characteristics of the cleft already obvious from the discussions so far is the observation of an adjacency constraint. Specifically, there is a strong tendency for the focus phrase to be right-adjacent to the copula. In other words, a configuration in which discourse-old information is to the immediate right of the copula and hence more adjacent to the copula than the focus phrase would be degraded, as the example (32) illustrates.

(32) A: Who would return to work after dinner time?

B: ?? Shi wancan zhihou $[\text{laoban}]_{\text{focus}}$ hui gongsi.
COP dinner after boss return.to company
Intended: 'It is the boss who returns to work after dinner time.'

Some authors in the literature have raised objections to the adjacency restriction citing examples such as in (33) (modified from Cheng 2008:250).

(33) Zhangsan shi mingtian $[\text{zuo huoche}]_{\text{F}}$ lai.
Zhangsan COP tomorrow take train come
'Zhangsan comes by train tomorrow.' (Cheng's translation)

As Hole (2011: 1712) points out, however, Cheng's counterarguments might not be valid after all. Instead of expressing focus in the conventional sense, Hole notices that the interpretation that comes most naturally in (33) involves a corrective reply to a prior utterance such as in (34A).

(34) A: Zhangsan shi mingtian zuo qiche lai.
Zhangsan COP tomorrow take car come
'It is tomorrow that Zhangsan comes by car.'

B: Bu. Zhangsan shi mingtian [zuo huoche]$_F$ lai.
No. Zhangsan COP tomorrow take train come
'It is tomorrow that Zhangsan comes BY TRAIN.' (favored translation)

Given the context, a more apt translation of the utterance in (33) is as in (34B): The cleft pivot is a second-occurrence focus, and the part of the cleft relative that receives prosodic prominence is interpreted as a marked, corrective focus in relation to the corresponding discourse-old information from the prior utterance. By way of expressing corrective focus, structures like (33) should not receive the same treatment as a canonical cleft construction.

As is implicitly assumed here, prosody has an effect on the scope and placement of focus in the cleft. Phonological prominence may fall on the entire post-copular constituent as in (35a), or shift to smaller constituents and mark them as narrow focus, e.g. (35b).[8] We have already seen that stress can also associate with constituents within the cleft relative, giving rise to a corrective focus construal that constitutes a *prima facie* violation of the adjacency restriction, illustrated in (35c). Cheng (2008: 250) further observes that prosodic prominence cannot associate with any pre-copula element. As (35d) shows, the sentence is acceptable to the extent that *mingtian* 'tomorrow' remains a focus semantically, and becomes off with prosodic salience on the pre-copula constituent *Zhangsan* favoring another reading with *Zhangsan* receiving focus marking.

(35) a. Zhangsan shi mingtian zuo huoche lai.
Zhangsan COP tomorrow sit train come
'Zhangsan [will come by train tomorrow]$_F$.'

b. Zhangsan shi **mingtian** zuo huoche lai.
Zhangsan COP tomorrow sit train come
'Zhangsan will come by train [tomorrow]$_F$.'

c. Zhangsan shi mingtian zuo **huoche** lai.
Zhangsan COP tomorrow sit train come
'Zhangsan will come by [train]$_F$ tomorrow.'

d. *__Zhangsan__ shi mingtian zuo huoche lai.
Zhangsan COP tomorrow sit train come
Intended: '[Zhangsan]$_F$ will come by train tomorrow.'

Left out of my discussion here is the focusing strategy of clefted verbs, which has received attention in the literature (e.g. Cheng 2008; Hole 2011). Based on my elicitation, however,

[8] We again modify the original examples by changing the adverb 'yesterday' to 'tomorrow' to avoid the complexities with past tense anchorings in a bare *shi*-cleft.

V clefts only yield a corrective focus reading. Thus, the clefted verb in the second sentence uttered against the first sentence, is interpreted as a corrective focus, as in (36).

(36) Xingfu bu shi [deng]$_F$ chulai, er shi [gan]$_F$ chulai.
happiness NEG COP wait out, but COP work out
'Happiness is not obtained by waiting, but obtained by working (on it).'

So far, I have introduced two term cleft subtypes, which differ by the clefted categories (DP and adjunct). I have further drawn attention to the degraded status with object clefts, including the case with *in situ* object focus (which does not observe the linear adjacency requirement) as well as with object preposing.

2.1.2 CP clefts: propositional assertions

In relation to term clefts (which encode narrow focus), the same copulative structure can additionally introduce a full CP to the right of the copula as broad focus. I will follow Paul & Whitman (2008) by referring to such sentence focus construction in Mandarin as propositional assertions. Despite sharing the same structural correlate, the propositional assertion and the cleft address different questions under discussion. A propositional assertion is situated in a discourse structure that requires propositional information to be focused answers. Most typically, this involves a prior explanatory/interpretive context that selects for a corresponding reason, cause, consequence or inference, etc. (Heggie 1988; Declerck 1992; Delahunty 2001; von Prince 2012). Thus, the utterance in (37B) is construed as an explanation in the immediate context of (37A), while ruling out other alternative explanations (of propositional type) (von Prince 2012). The turn of dialogue in (38A) and (38B) is similar.

(37) A: Why are you cleaning up your house?

B: Shi [Zhangsan yao lai]$_F$.
COP Zhangsan will come
'(It's that) Zhangsan will come.'

(38) A: The temperature has dropped quite dramatically lately!

B: Shi [beifang de leng kongqi xiang nan yidong le]$_F$.
COP north POSS cold air towards south move PRF
'It's that [the cold air from the north is currently moving south].'

Although the prototypical interpretation received by these propositional answers appears to be an explanation, it is safe to say that propositional assertions are not confined to explanatory

and related contexts.[9] The literature does not yet have a definitive, structured taxonomy of the types of contexts where propositional assertions in Mandarin may felicitously be used. While the current dissertation will not resolve the issue, it is relevant to mention the classification by Sheil (2016) based on Scottish Gaelic, which is to date the most detailed taxonomy of the discourse structure for CP focus constructions. Sheil identifies a number of environments that license the Scottish Gaelic propositional cleft, e.g. contrasting alternatives, exemplification, contrary to expectation, *only*-reading. I find many of them are also suitable contexts for Mandarin propositional assertions. For example, in the naturally occurring utterance below, the propositional answer (39B) addresses a prior *wh*-question that requests picking a valid proposal among contrasting alternatives.

(39) A: How do we give the cat a shower? Do we use the bathtub? Put her into a shower cabinet? Use faucet water?

B: Shi [xiaoxinde yong shuichi de shui yidiandian gei ta chong]$_F$.
COP carefully use faucet POSS water piece.by.piece to her spill
'(It's that) [we slowly turn on the faucet and let the water drip on her].'

Unlike the sentence-focus construction in the sense of Lambrecht (2000), which functions to introduce new events to the discourse and is compatible with discourse-initial contexts, propositional assertions resist non-restricted contexts. In (40), the propositional assertion cannot felicitously address an *out-of-the-blue* broad focus *wh*-context:

(40) A: What's happening?

B: ?? Shi [wo zai dasao jia]$_F$.
COP I PROG clean.up house
'I am cleaning my house.'

Such sensitivity to ongoing/active questions under discussion places propositional assertions among the family of broad focus constructions like the so-called maximal focalization constructions in other languages (Huber 2006). (41) illustrates a maximal focalizable sentence in

[9] These contexts are argued to form a delineated natural class characterizing the use of English *it's (just) that S*-construction, cf. Bearth 1997, Delahunty 2001, as in (i).

(i) "But I never quite understand your friends. Why do they quarrel so?"
"It doesn't mean anything," said Maria. "It's just that they can't bear anybody to have an advantage..."

French, which employs the same morpho-syntactic strategy used for encoding identificational focus in regular (term) clefts (Clech-Darbon et al. 1999).[10]

(41) A: You look worried.

B: C'est [la petite qui est tombé edans l'escalier]$_F$.
it.is the small.FEM who is fallen in the.stairs
'The little one fell down the stairs.'

Besides context, the meaning difference between the cleft and the propositional assertion can be diagnosed in other environments. For example, the *wh*-cleft structure (i.e. the post-copula cleft phrase is a *wh*-constituent) does not have an alternative broad focus reading. An illustration is given in (42). Here the inherently focal nature of the *wh*-phrase imposes a narrow focus interpretation for the entire sentence, preempting broad focus assignment.

(42) Shi [shui]$_F$ yao lai?
COP who will come
'Who is it that will come?'

Note that propositional assertions *per se* can appear as questions. Examples (43) and (44) show that both clefts and propositional assertions can be interpreted within the scope of a polar question.

(43) A: Shui yao lai? Shi [Zhangsan]$_F$ yao lai ma?
who will come? COP Zhangsan will come Q
'Who will come? Is it Zhangsan who will come?'

B: Bu. Shi Lisi yao lai.
no COP Lisi will come
'No. It is Lisi who will come.'

(44) A: Weishenme ni yao dasao? Shi [Zhangsan yao lai]$_F$ ma?
why you will clean.up? COP Zhangsan will come Q
'Why will you clean up? Is it that Zhangsan will come?'

B: Bu. Fangjian tai zang le.
no room too dirty PRT
'No. The room is too dirty.'

Importantly, their difference in focus assignment leads to distinct inferences in question contexts: A negative answer to a cleft polar question excludes the referent of the cleft phrase

[10] A similar pattern is observed for Hungarian, Scandinavian languages, Gaelic languages, Japanese, Akan, Swahili and the Gur languages (Kuno 1973; Bearth 1997; Kiss 1998; Huber 2006; Fiedler et al. 2009; von Prince 2012).

from the set of individuals denoted by the cleft clause. The answer in (43) suggests that Zhangsan will not come. However, the entailment does not hold when a broad focus is being questioned. The negative answer in (44) is compatible with a scenario where Zhangsan will come, although the fact that Zhangsan will come is *not the explanation for* the cleaning up.

It is common for the term cleft and the propositional assertion in Mandarin to come with an optional topic. As (45) illustrates, a topic phrase serving the role of Krifka & Musan (2012)'s and Hole (2012)'s delimiter can be added at the beginning of a sentence with a clefted DP.[11]

(45) A: [Zuotian/mingtian]$_{\text{Top}}$ shei zai shitang chifan?
Yesterday/tomorrow who LOC dining.hall have.meal
'Who dined/will dine at the dining hall yesterday/tomorrow?'

B: [Zuotian/mingtian]$_{\text{Top}}$ shi [jiaoshou]$_{\text{F}}$ zai shitang chifan.
Yesterday/tomorrow COP professor LOC dining.hall have.meal
'Yesterday/Tomorrow, it was/is the professor that had/has meal in the dining hall. '

In a topicalized assertion sentence, exemplified in (46), part of the proposition is expressed as a sentence-initial topic.

(46) A: Zhangsan gangcai zenme mei gen wo dazhaohu?
Zhangsan just.now how.come have.not with me greet
'How come Zhangsan didn't greet me just now?'

B: [Ta]$_{\text{Top}}$ shi [mei kandao ni]$_{\text{F}}$.
he COP have.not see you
'For him, it's that (he) did not see you.'

The asserted content is thus expressed by an unsaturated open clause, with the missing argument coindexing with the pre-copula topic, unlike the run-of-the-mill propositional assertion where a saturated clause is being asserted.

The analysis of the pre-copula elements in the Mandarin cleft constructions as topics finds evidence in the fact that these elements can receive morphological topic marking, as in (47).

(47) a. [Zuotian/Mingtian]-ne shi [jiaoshou]$_{\text{F}}$ zai shitang chifan.
Yesterday/Tomorrow-NE COP professor LOC dining.hall have.meal
'Yesterday/Tomorrow, it is the professor that has meal in the dining hall. '

[11] Delimitation indicates that one of the alternatives provided by the focus construction can fully address the current question under discussion. Delimiters are distinguished from contrastive topics in that they conform to the expectation during common ground management that a comprehensive entity is given. On the contrary, contrastive topics diverge from this expectation.

b. [Ta]-ne shi [mei kandao ni]$_F$.
he-NE COP have.not see you
'It is that he did not see you.'

A case has been made in the literature for the bound particle *-ne* to be analyzed as a dedicated topic marker (Constant 2014). For instance, the *wh*-part in (48A) (i.e. the prior congruent question) cannot be addressed by a *ne*-marked constituent in the (B)-answer. This is welcome under a topic marker analysis, since a direct consequence of such analysis is that topic markers do not attach to a host encoding focus.

(48) A: Zuotian shei qu-le xuexiao?
yesterday who go-PRF school
'Who went to school yesterday?'

B: ?? Zhangsan-ne qu-le.
Zhangsan-NE go-PRF
Intended: 'Zhangsan went.'

Also, counterparts of the *ne* particle in other Sinitic languages have been shown to be prosodically integrated to their host, evidenced by their participating in *de*-stressing, phonological lenition, tone sandhi, etc. Prosodic integration has been observed to be characteristic of topic markers across East Asian languages (Xu & Liu 2008, Jin 2020).

Note that the sentences are immediately degraded with the topic phrase located after the copula, compatible with the claim put forward in von Prince (2012) that the pre-*shi* slot, but not post-*shi* positions, is reserved for expressing topics. As shown in (49), with *ne*-marking implementing a delimiter interpretation of its host phrase, the constituents *zuotian*/*mingtian* 'yesterday/tomorrow' are not compatible with a post-copula position, albeit they fit in nicely when being pre-copular.

(49) a. ?? Shi [zuotian/mingtian]-ne, [jiaoshou]$_F$ zai shitang chifan.
COP yesterday/tomorrow-NE professor LOC dining.hall have.meal
Intended: '(As for/Talking about) Yesterday/Tomorrow, it is the professor that has meal in the dining hall. '

b. ?? Shi [ta]-ne, [mei kandao ni]$_F$.
COP he-NE have.not see you
Intended: 'It is that he did not see you.'

In addition, elements that are independently known to resist topic-marking are ill-suited to reside in a pre-copula position. Thus, the disjunctive phrase (*A or B*), labeled as anti-topical

items (ATIs) in Tomioka (2007), is degraded when preceding the copula *shi*, in contrast to when it is located after the copula. Compare example (50a) with (50b).

(50) a. ?? Yuehan huozhe Bi'er shi mingtian qu dongwuyuan.
John or Bill COP tomorrow go zoo
Intended: 'As for John or Bill, they will go to the zoo tomorrow. '

b. Shi Yuehan huozhe (shi) Bi'er mingtian qu dongwuyuan.
COP John or COP Bill tomorrow go zoo
'It is John or it is Bill who will go to the zoo tomorrow. '

2.1.3 Exhaustive inferences of term clefts and propositional assertions

Turning now to the semantic side, an important characteristic of the cleft constructions is that they give rise to an exhaustive inference. Consider the example in (51), taken from Onea (2019). The utterance carries the inference that nobody other than Donald lied at the debate.

(51) It was Donald who lied at the debate.

A canonical declarative is also considered to give rise to a mild exhaustive focus inference when it functions as an answer to a *wh*-question, as in (52). It has been agreed widely that the exhaustive focus reading in canonical declaratives is fairly weak and subject to cancellation. We can see this by adding a continuation to the answer in (52b), e.g. a *who-else* question as in (52c), or a *too*-continuation as in (52d). Neither of the continuation answers feels degraded given the context.

(52) a. Who lied at the debate?

b. $[\text{Donald}]_F$ lied at the debate.

c. Fine, and who else lied at the debate?

d. Bill too, lied at the debate.

The above turn of dialogue can be used as a benchmark with which to compare the strength of the exhaustive inference of the cleft. In (53c) and (53d) the exhaustive reading of the cleft construction is probed using the same environment as in (52).

(53) a. Who lied at the debate?

b. It was $[\text{Donald}]_F$ who lied at the debate.

c. ? Fine, and who else lied at the debate?

d. ? Bill too, lied at the debate.

Destruel et al. (2015) have reported that a *who-else* continuation against an *it*-cleft context triggers lower acceptability compared to a canonical sentence. My own elicitation against the *too*-continuation yielded a similar judgment pattern. At the same time, past experiment works have consistently revealed a rather strong degraded acceptability for the continuation sentences in the *only*-exclusive environment, cf. (54) (Onea & Beaver 2011; Destruel 2013; DeVeaugh-Geiss et al. 2018), indicating a difference between inferences that are generated by the *only*-particle and the cleft.

(54) a. Who lied at the debate?

b. Only $[\text{Donald}]_F$ lied at the debate.

c. ?? Fine, and who else lied at the debate?

d. ?? Bill too, lied at the debate.

A mystery thus concerns the gradience among the individual exhaustive inferences for the three focus constructions as well as the underlying mechanisms that can be resorted to to generate such exhaustive readings of varying strength. A similar pattern of granularity could be found in Mandarin. In (55), continuations such as a *who-else* question or a *too*-sentence in response to a bare *shi*-cleft invite a degraded judgment.

(55) a. Who always lies at the debate?

b. Shi Zhangsan zong zai bianlunhui shang sahuang.
COP Zhangsan always LOC debate on lie
'It is Zhangsan who always lies at the debate.'

c. ? Hao, haiyou shui?
fine, else who
'Fine, who else?'

d. ? Bi'er ye zong zai bianlunhui shang sahuang.
Bill too always LOC debate on lie
'Bill too, lied at the debate. '

My consultants reported an unease and slight degradation when the continuation is attached to the cleft, compared to a noticeably lower acceptability in the environment of an 'only'-exclusive. Making sense of such subtle degradation hence becomes a question that needs to be answered. Considering that Mandarin employs two types of cleft constructions, one additional question becomes relevant: Does the type of *de* particle that appears in the *shi...de*

cleft construction influence cleft exhaustivity in Mandarin? We will come back to these questions in the next chapter.

So far the exhaustive inference is restricted to the term cleft. Standard diagnostics like the *too*-continuation test also present evidence that the propositional assertion invites an exhaustive inference similar to the term cleft, as shown in (56). The propositional answer given in the first sentence of the (B)-utterance is opposed to with other answers confirmed as plausible explanations to the issue in the prior question. The infelicity of the (B)-answer suggests that degradation also arises when a propositional assertion is uttered alongside other alternative answers.[12]

(56) A: How do we give the cat a shower? Do we use the bathtub? Put her into a shower cabinet? Use faucet water?

B: ?? Shi [xiaoxinde yong shuichi de shui yidiandian gei ta chong]. Ni
COP carefully use faucet POSS water piece.by.piece to her spill you
shuo de nei-xie ye dui.
say POSS DEM-CLF also right
'It's that [we slowly turn on the faucet and let the water drip on her]. The ones you just guessed are correct as well.'

Having gone through the descriptive generalizations of the bare *shi*-cleft, we proceed to the *shi...de* cleft, in which a *de* particle is attached to the copulative structure (i.e. cleft *de*), giving rise to a minimally different construction type.

[12] As is proposed by Sheil (2016), propositional assertions in Scottish Gaelic can also convey identificational focus, which gives rise to an exhaustive interpretation. Example (ii) provides a question 'What can be done with the devil?' as a prior context to the propositional assertion.

(ii) a. 'Did you catch anyone last night, Eoin?'

b. Cha do ghlac. Chan fhaca duine an donas a riamh 's ann a bhios
NEG catch.PAST.DEP NEG see.PAST.DEP person the devil ever COP in.3MSG C.REL be.FUT
e 'g a fhaireachdainn.
3MSG PROG 3MSG.POSS feel.VN
'No. Nobody ever saw the devil: he only feels him.'

An exhaustive interpretation can be reflected by an English paraphrase (reported by Sheil 2016): of all the things that may be done with the devil, it is only possible to feel him. It has also been mentioned that a more literal translation would be without *only*. In other words, 'only' is not an obligatory word for arriving at an exhaustive interpretation. Regardless, the propositional assertion consistently deliver the exhaustive interpretation by its morphosyntactic structure.

2.2 The *shi...de* cleft

As with the bare *shi*-cleft, the *shi...de* cleft similarly allows for clefted term categories (for example, DP, adjunct and CP). The following examples (57) and (58) exemplify a cleft structure involving a DP and a PP focus, respectively. As the data show, the focus-background information partition and the adjacency restriction also hold for the *shi...de* cleft. Note also that an optional delimiter may precede the copula.

(57) A: Shui fuze shenhe lunwen?
who take.charge review paper
'Who is in charge of reviewing the papers?'

B: [Zhei-jian shiqing]$_{Top}$-(ne) shi [jiaoshou]$_{F}$ fuze **de**.
DEM-CLF issue-(NE) COP professor take.charge DE
'It is the professor who/that is in charge of this issue. '

(58) A: Jiaoshou zai nali chifan?
professor LOC where have.meal
'Where does the professor have his meal?'

B: [Yibanlaishuo,] jiaoshou-(ne) shi [zai shitang]$_{F}$ chifan **de**.
normally professor-NE COP LOC dining.hall have.meal DE
'Normally, it is at the dining hall that the professor has his meal. '

The contrast between the subject cleft structure as in (57) and the structure in (59) further establishes that a constraint against object preposing similarly holds for the *shi...de* cleft.

(59) a. Jiaoshou fuze shenhe shenme?
professor take.charge review what
'What is the professor in charge of reviewing?'

b. ?? Shi [lunwen]$_{F}$ jiaoshou fuze shenhe **de**.
COP paper professor take.charge review DE
Intended: 'It is the papers that the professor is in charge of reviewing.'

To the extent that a focus reading for an *in situ* object is possible at all, it again yields a corrective reading with prosodic prominence associated with the object, as shown in (60B).

(60) A: Wo tingshuo Zhangsan pingshi meishi'r jiu xie xiaoshuo.
I hear Zhangsan normally nothing then write novel
'I heard that Zhangsan usually writes novels whenever he's free. '

B: Zhangsan shi xie [shi]$_{F}$ **de**.
Zhangsan COP write poem DE
'It is poems that Zhangsan writes (, not novels).'

As Cheng (2008) observes, a narrow focus reading is often facilitated by prosodic prominence attached to the focused constituent following the copula, although my elicitation shows that a narrow term focus could be equally obtained without any stress given the right context setting. (61) shows the optional stress on the clefted term categories. Note incidentally that (61c) ostensibly deviates from the adjacency restriction, see my discussion above (Hole 2011).

(61) a. Zhangsan shi zuotian zuo huoche lai de.
Zhangsan COP yesterday sit train come DE
'Zhangsan [came by train yesterday]$_F$.'

b. Zhangsan shi **zuotian** zuo huoche lai de.
Zhangsan COP yesterday sit train come DE
'Zhangsan came by train [yesterday]$_F$.'

c. Zhangsan shi zuotian zuo **huoche** lai de.
Zhangsan COP yesterday sit train come DE
'It was yesterday that Zhangsan came BY TRAIN (favored translation).'

The distribution of the bare *shi*-cleft and the *shi...de* cleft constructions are not entirely the same. A case in point is the contrast between the cleft constructions in (62)[13].

(62) Context: How to master the skill of writing?

a. ?? Xiezuo shi tongguo lianxi zhangwo.
writing COP through practice acquire
Intended: 'Writing is a skill acquired by practice. '

b. Xiezuo shi tongguo lianxi zhangwo de.
writing COP through practice acquire DE
'Writing is a skill acquired by practice./ It is through practicing that one can aquire the skill of writing. '

While the *shi...de* cleft is completely natural, the bare *shi*-cleft conveys a sense of incompleteness for many speakers I consulted. The literature has yet to find a principled way to

[13] One might doubt whether *de* functions as a nominalizer in (62). However, this possibility is undermined by the fact that the *de*-structure from (62) does not pass the conjunction test, when combining with a canonical nominalizer *de* structure. An example is given as follows.

(iii) * Gaokao zheme duo jineng li, xiezuo shi zui hexin de, he tongguo lianxi tigao de.
college.entrance.exam this many skill in writing COP most central NOM and through practice improve DE
Intended: 'Among the many skills useful for the college entrance exam, writing is the central (skill) and it is through practice that (it) is improved. '

delineate the environments of distribution between the two cleft types, and we cannot explain the behavioral differences here. We will have to leave an account of their disparity to future research.

Turning to the exhaustive reading of the *shi...de* cleft, a question of central relevance is whether the presence of *de* in this cleft type factors into the exhaustive interpretation, as in (63b) and (63c).

(63) a. Who lies at the debate?

b. Shi Zhangsan zai bianlunhui shang sahuang.
COP Zhangsan LOC debate on lie
'It is Zhangsan who lies at the debate.'

c. Shi Zhangsan zai bianlunhui shang sahuang de.
COP Zhangsan LOC debate on lie DE
'It is Zhangsan who lies at the debate.'

The two continuations with a *who-else* question and a *too* follow-up can also be applied here to test if the *shi...de* cleft elicits a similar degradation, as in (64).

(64) a. Who lies at the debate?

b. Shi Zhangsan zai bianlunhui shang sahuang de.
COP Zhangsan LOC debate on lie DE
'It is Zhangsan who lies at the debate. '

c. ? Hao, haiyou shui?
fine, else who
'Fine, who else?'

d. ? Bi'er ye zai bianlunhui shang sahuang.
Bill too LOC debate on lie
'Bill too, lies at the debate. '

The speakers I consulted tended to agree that the continuations made the cleft answer worse, although impressionistically it seems quite difficult to pinpoint where the unnatural feeling comes from. As we have seen that bare *shi*-clefts are similarly associated with a degradation in judgment, a formal study is in place to determine whether the two cleft types are exhaustive to the same degree.

If we believe cleft exhaustivity can be measured on a gradient basis, then (63c) should be observed with a stronger exhaustive inference when compared with (63b), if one assumes that the *de* particle in the cleft contributes to the exhaustive inference. Further comparison with 'only'-exclusives and canonical focus construction allows us to probe what mechanisms

potentially underlie the exhaustive inference found with the clefts. A detailed discussion of a set of experiments based on the above reasoning will be given in Chapter 3.

As a preview, together with exclusive 'only' constructions and canonical focus constructions, all four conditions are attached to a *too*-continuation (violating the exhaustive inference), and are tested under a *wh*-question context. The results show that the bare-*shi* cleft and the *shi...de*-cleft converge regarding their strength of exhaustivity. The two cleft constructions show a weak degradation compared to 'only'-exclusives. This degradation is still stronger than the one incurred by the canonical focus construction.

A caveat of the distributional generalizations above involves object preposing in the [V *de* O] cleft, that is, another type of focus construction where a *de* particle intervenes between the verb and the (first postverbal) object rather than staying to the right of the entire verb phrase (cf. Paul & Whitman 2008). Differing from the *shi...de* cleft (i.e. [V O *de*] cleft), objects as *in situ* focus are allowed under a [V *de* O] configuration. Hole (2011: 1710-1711) provides acceptable examples as in (65).

(65) Object cleft
Zhangsan shi xie de [shi]$_F$.
Zhangsan COP write DE poem
'It is poems that Zhangsan writes.'

I will leave out the discussion of [V *de* O] clefts for the entire dissertation, given that its independently known behavioral differences from the more canonical *shi...de* cleft makes it less clear whether the former is derivationally related to the latter.[14] Among the many idiosyncrasies, [V *de* O] clefts appear to be much more confined in terms of tense anchoring, having an exclusively past time reference. In addition, their use appears to be subject to regional variation among native speakers of Mandarin, with some characterizing the construction as belonging to the grammar repertoire of Northern Mandarin dialects. I believe the distribution, structure and semantics of [V *de* O] cleft should be fully addressed before an apt analysis is possible, which is out of the scope of the current dissertation.[15]

[14] However, see Hole (2011) for an account that derives the [V *de* O] cleft from the [V O *de*] cleft, where the acceptable case of object clefts in the [V *de* O] clefts is explained by assuming movement of the cleft phrase which takes place after Spell-Out.

[15] I will make no claim regarding whether in this use, *de* is identified with the cleft *de* or the evidential *de*, or whether it should be analyzed as an entirely separate particle.

With the distributional properties and diagnostics in this chapter so far, Table 2.2 summarizes the major descriptive generalizations that will be addressed later on.

Conditions	Descriptive generalizations
Cleft types	Focused phrase can be DP, adjunct, CP
Adjacency restriction	Focused phrase is located next to the copula
Weak exhaustivity	When compared with 'only'-exclusives, clefts yield a weaker exhaustive inference
Constraint against object clefts	Object clefts are degraded

Table 2.2: Generalizations to be captured in the following chapters.

In the next chapter, we engage with the weak exhaustive inference of clefts when they are compared with 'only' exclusives, as well as with testing the hypothesis that the cleft *de* contributes to the exhaustive inference.

Chapter 3

Meaning: Reducing the two cleft constructions into one

With the distribution of clefts spelled out, I now investigate whether the bare-*shi* cleft and the *shi...de* cleft differ in the strength of their exhaustive inference. Before delving into the details of my experimental design, I start by surveying the landscape of past theoretical and experimental discussions of Mandarin clefts. This research is subgrouped based on whether the cleft constructions contain the cleft *de* particle.[16] Following the literature review, I report my three experiment studies that evaluate the difference in exhaustivity between the bare-*shi* cleft and *shi...de* cleft. In short, they do not behave significantly differently in exhaustivity-violating contexts.

The purpose of my first experiment is to establish that Mandarin cleft constructions are compatible with *wh*-question contexts. This essentially will serve as a sanity check for the following two experiments. As mentioned in the previous chapter, contextualizing the cleft construction with a *wh*-question (thereby forming a question-answer pair) ensures the desired focus interpretation for the cleft constructions under discussion. Both the bare-*shi* cleft and the

[16] Within this section, all mentions of particles with surface realization *de* will refer to the cleft *de*, unless stated otherwise.

shi...de cleft will then be tested together with an additive follow-up in the second experiment, with ratings elicited on a Likert scale in an offline formal judgment study. 'Only'-exclusives and canonical informational SVO focus sentences will be employed as baselines. In the third experiment, I will adopt an online paradigm, employing a self-paced reading study with the same target materials. The formal judgment study and the self-paced reading study converged in showing that bare-*shi* clefts and *shi...de* clefts do not behave significantly differently when their exhaustive inferences are violated. The results are compatible with the assumption that *de* does not contribute to an exhaustive inference.

The experimental findings lead to two further questions. First, if the cleft *de* particle does not contribute to the exhaustive inference, what is the source of the weak exhaustivity which manifests itself in the slightly degraded acceptability pattern compared to normal information focus that my participants reported? To this end, I present various proposals from the relevant debates in the literature regarding the semantic or pragmatic sources of cleft exhaustivity. However, I will not attempt a personal take on this issue in any great detail, and will opt to postpone this until I will have presented a syntactic analysis of Mandarin clefts in Chapter 6. Second, if the cleft *de* particle does not contribute to an exhaustive reading, what is its function? This question is directly addressed in Chapter 4.

3.1 Previous theoretical work on cleft exhaustivity in Mandarin

A number of theories have quite aptly been stated with the opposition between the two constructions in mind. Central to these comparisons are the meaning contribution of sentence-final *de*, especially concerning its role in the exhaustive interpretation of Mandarin clefts. I will first introduce theories that posit a difference of the exhaustive reading between *shi...de* clefts and bare-*shi* clefts. I then discuss the alternative position assuming no such difference between the two clefts.

Several studies have claimed that only *shi...de* clefts, but not bare-*shi* clefts, trigger the exhaustive inference (Hole 2011; Hole & Zimmermann 2013; Zhan & Sun 2013). Paul & Whitman (2008) indirectly propose that *de* carries an exhaustive inference. In the sense of Kiss (1998), *shi...de* clefts are thus seen as encoding identificational focus, whereas bare-*shi* clefts encode information focus.

One approach treats the *shi...de* cleft as a concealed (specificational) pseudocleft, according to which cleft exhaustivity can be derived by making use of the semantics of a definiteness

operator (Li & Thompson 1977; Paris 1979; Li & Thompson 1981; Ross 1983; Shyu 1995; 2008; Zhan & Sun 2013). For example, some analyses posit a lexical entry of *de* that introduces a definite-headed DP, motivated by the independent role of *de* as a nominalizer in non-cleft environments, e.g. relative clause, adnominal modification. The definite DP takes the cleft relative as its argument, introducing a variable. The cleft phrase/pivot then specifies the value of that variable.[17]

In another theory attributing exhaustivity to *de*, Hole (2011) analyzes *de* as a sentence level (C-level) event-type operator. When *de* combines with its focus associate, it projects a definite-like uniqueness and familiarity presupposition yet does not lead to a definite reference at the at-issue level. Thus, given a cleft answer, the exhaustive inference can be derived by *de* checking if the focused term refers to the only maximal participant of the maximal event denoted by the predicate in the current context.

Alternative to the above postulation that the cleft *de* particleis in some way responsible for bringing about an exhaustive reading, another possibility entertained in the literature is that the particle makes a meaning contribution that is not related to the exhaustive inference, with cleft exhaustivity then derived from a distinct mechanism. The cleft *de* may express a speech act meaning of assertion (Cheng 2008; Lin 2016), and hence should reside at the sentence level. The locus of the exhaustive inference lies elsewhere, and is assumed to be commonly shared by both bare and *shi...de* clefts alike (e.g. a prosody-conditioned focus movement of the cleft phrase that leads to contrastivity in Cheng 2008).

Somewhat loosely aligned with the second approach are the proposals with the underlying assumption that there is no difference whatsoever between the bare-*shi* clefts and *shi...de* clefts: The former is simply a variant of the latter, with the option of having the cleft *de* covertly realized (Li 2006; Lin 2016; Wan 2016). According to this view, the *shi...de* cleft does not feature an additional layer of meaning (it is exactly the same as the bare-*shi* cleft), thereby entailing the

[17] Simpson & Wu (2002) posit a lexical entry of *de* as a determiner-like D^0 element applicable to cases of nonpast reference. It is postulated that *de* selects for an NP complement to its right with a phonetically null N head that further takes a clausal complement (AspP), the latter raising to the specifier of DP to derive the correct surface order. These assumptions (e.g. *de* is located in D and N is occupied by an empty element) similarly link the *shi...de* cleft to the class of nominalizing *de*. In the analysis it is not explicitly mentioned whether cleft exhaustivity is derived via the semantics of the determiner. For the current purpose, I will leave Simpson and Wu's D-analysis out of our discussion.

position where bare-*shi* clefts give rise to an exhaustive inference with comparable strength to *shi...de* clefts.[18]

The above discussions of the meaning contribution of *de* leads to clear predictions. Under a definiteness-based approach or a uniqueness operator approach to *de*, *shi...de* clefts are expected to receive a stronger exhaustive inference. Accordingly, they are expected to lead to a higher degradation of acceptability in exhaustivity-violating contexts, and could potentially be more costly to process in online tasks. Under an analysis where *de* is irrelevant to the generation of cleft exhaustivity, *shi...de* clefts are expected to behave similarly to bare-*shi* clefts in exhaustivity-violating contexts.

On a side note, apart from the above characterizations, it has been hotly debated whether *de* additionally carries a tense/aspect meaning. This is motivated by cases such as (66), which features a completed event.

(66) Zhangsan shi zuotian lai de.
Zhangsan COP yesterday come DE
'It was yesterday that Zhangsan came.'

Specifically, *de* is sometimes argued to carry a deictic past tense feature (occupying the position of a Tense projection head) or carry aspectual specifications (merged as an AspP head) (Simpson & Wu 2002; Paul & Whitman 2008). However, analyses of *de* as carrying a deictic past tense feature or aspectual specifications are insufficient, as *shi...de* clefts are flexible in their temporal-aspectual anchorings. In (67a), the *shi...de* cleft is interpreted with a habitual reading. In (67b), it gives rise to a future reading.

(67) a. Jiaoshou shi zai shitang chifan de.
professor COP LOC dining.hall have.meal DE
'It is at the dining hall that the professor has his meal.'

b. Mingwan de huiyi shi Zhang jiaoshou zhuchi de.
tomorrow.night POSS meeting COP Zhang professor preside DE
'It is professor Zhang that will preside over tomorrow night's meeting.'

[18] Yet another strand of proposals is exclusively built upon bare-*shi* clefts. For example, the analysis of von Prince (2012) and Erlewine (2020), as their many predecessors, derive the exhaustivity of bare-*shi* clefts via the semantic contribution of the copula *shi*. The ramifications of these solutions for the exhaustive reading of the *shi...de* cleft are not made explicit. It might be tacitly acknowledged that the two cleft types share the source of exhaustivity (thus falling in line with the second approach), or an agnostic position is adopted. For this reason I will gloss over this type of proposals in this chapter, and turn to a detailed discussion of them in Chapter 6, when the syntax of the cleft copulative structure is spelled out.

Aside from the lack of generality of the tense-aspect proposals (e.g. a past tense anchoring could well be the default, statistically preferred reading from a tense-neutral analysis, cf. Hole (2011)), they are also not related to the way cleft exhaustivity is generated and hence hard to evaluate with respect to our objective. Consequently, the rest of this chapter focuses exclusively on clefts with non-past reference like (67), with the experiments controlled accordingly.

3.2 The experimental landscape of Mandarin clefts

The exhaustive inference of Mandarin clefts has been investigated by a few recent experiments. The objective of these experiments is to identify the mechanism by which cleft exhaustivity is generated, that is, whether the exhaustive interpretation is part of semantics (assertion or presupposition) or conversational implicature. Importantly, however, prior experiment studies did not directly compare the exhaustivity effect found in the *shi...de* cleft and the bare-*shi* cleft. This is despite the fact that the existence of two different cleft constructions in Mandarin makes for a particularly interesting testing ground for theories about the source of exhaustivity and factors into the individual theoretical assumptions adopted in these experiments. The current section reviews existing experimental work. The next section turns to my new experiments which aim at a more fine-grained understanding of the way *de* impacts the interpretation of cleft exhaustivity.

3.2.1 Bare-*shi* clefts behave similarly to pseudoclefts

In Liu & Yang (2017), only the bare-*shi* cleft was employed as the object of investigation. Specifically, Liu & Yang (2017) examined three explanations for the exhaustive inference of the cleft sentence, as listed in (68).

(68) a. The assertion hypothesis: bare-*shi* clefts contain an exclusive operator that gives rise to exhaustivity at the at-issue level. and the resulting exhaustive pattern is predicted to pattern with that of 'only'-exclusives.

b. The presuppositional hypothesis: bare-*shi* clefts feature a definiteness operator and derive exhaustivity in a way similar to pseudoclefts.

c. The conversational implicature hypothesis: cleft exhaustivity is pragmatic by nature, derivable from a generalized conversational implicature that makes use of the Maxim of Quantity.

To test the three hypotheses, Liu & Yang (2017) ran three experiments. The first experiment was a formal judgment task directly probing the acceptability of an exhaustive inference statement. Specifically, participants first heard a target sentence and were then presented with a description in which it was explicitly stated that alternatives to the referent denoted by the focus-marked part of the prior target were excluded. An example of the focus-marking target stimuli and the follow-up statement is given in (69) (PF = plain focus, boldface my own).

(69) a. Zhe zhou, **shi**/**zhiyou**/∅ [shichangbu de yuangong]$_{\mathbf{F}}$ keyi qing nianjia.
this week, COP/only/PF marketing POSS employee can apply annual.leave
'This week, it is/only/∅ [employees from the marketing section]$_{\mathrm{F}}$ (that) can apply for annual leave.'

b. David thinks: Oh, I think I know what she meant. The other people **cannot** apply for annual leave this week.

Participants were instructed to rate the naturalness of follow-ups such as (69b) on a scale of 1 to 5 (unnatural to natural). It was reported that the statement corresponding to the bare-*shi* cleft condition received significantly lower scores than the 'only'-exclusive condition (*zhiyou*-sentences), and received significantly higher scores than the plain focus condition (canonical SVO sentences). Here Liu & Yang (2017) assumed that the 'only'-exclusive condition served as the baseline for the asserted exhaustive inference, and plain focus for conversationally implicated exhaustivity. Hence the authors concluded from the results that the source of cleft exhaustivity for the bare-*shi* cleft did not lie in the at-issue dimension, and did not belong to conversational implicature either.

In the second experiment, Liu & Yang specifically tested the implicature hypothesis, that is, that the cleft invites an exhaustive implicature. The same three focus-marking sentence types as in the first experiment were used. Differing from the previous experiment, an additional follow-up was presented that contradicted the exhaustive reading of the target sentence (following a line of works since Farkas 1990, an additive continuation is used to probe the extent to which violations to the exhaustive inference can be canceled/accommodated). Specifically, each of the sentence stimuli was situated within a context that took the form of a prior *wh*-question that came with an explicit domain restriction. Participants were shown question-answer pairs as in example (70) and then asked to rate the acceptability of the answer (target + *also*-continuation) given its prior context (boldface my own).

(70) A: Between Mo Yan and Yu Hua, who has published a new book?

B: Shi Mo Yan chu-le xinshu; shishishang, Yu Hua **ye** chu-le
COP Mo Yan publish-ASP new.book; in.fact, Yu Hua **also** publish-ASP
xinshu.
new.book
'It is Mo Yan who has published a new book; In fact, Yu Hua **also** published a new book.'

The rationale here, according to Liu & Yang, was to see whether the exhaustive inference can be cancelled. A pragmatic exhaustive inference is subject to cancellation, hence the plain focus construction, as a baseline for conversationally implicated exhaustivity, should be compatible with a subsequent exhaustivity-violating sentence. The main purpose, then, was to see how bare-*shi* clefts compare with plain focus during cancellation. The authors assume that an implicature view of cleft exhaustivity is supported if bare-*shi* clefts pattern with plain focus, and rejected if not.

It was reported that the bare-*shi* cleft condition received significantly lower ratings than the plain focus condition. From this finding it was concluded that the exhaustive inference of the bare-*shi* cleft cannot arise via an implicature.

In the third experiment, Liu & Yang tested the presupposition hypothesis, that is, that the cleft projects an exhaustive presupposition. To do so, an adjusted version of the mouse-guided sentence-picture verification paradigm (Abrusán & Szendrői 2013; Romoli & Schwarz 2015; DeVeaugh-Geiss et al. 2018) was adopted, which involves participants making decisions based on their interpretations (verification or falsification) when they are shown information incrementally. Specifically, in this task the participants first listened to a target sentence, before seeing a picture with a scenario instantiating a violation of the (possible) exhaustive inference from the target stimulus. On its side, the participants then saw a covered picture with unknown information underneath. Subjects were instructed to verify the target stimulus as true or false, and in doing so they could choose to reveal the covered picture to help with their verification. The rationale was that participants who can accommodate an exhaustivity violation more readily (this would be the case if exhaustivity arises from a conversational implicature) were more likely to uncover the picture during verification. In contrast, those who cannot accommodate the violation easily (predicted under the presupposition hypothesis) should directly reject the target stimulus as not instantiating the scenario based on the initial pictorial stimuli, without clicking to reveal the covered picture.

In this task, definite pseudoclefts were introduced and contrasted with bare-*shi* clefts. This was because the authors assumed that a definiteness component contributes to an exhaustive

presupposition, making definite pseudoclefts a good candidate for acting as the baseline of the presupposition hypothesis. If bare-*shi* clefts indeed derive their exhaustivity from presupposition, the authors argued, they are predicted to pattern with definite pseudoclefts. As with the previous tasks, exclusives and plain focus constructions were also included as baselines of asserted/implicated exhaustivity. A context was presented prior to each test stimulus to introduce an existential presupposition (again with domain restriction), exemplified in (71).

(71) Xiaohuimao, xiaobaimao, he xiaohuangmao li, youren diao-dao le yu.
Grey.kitty, white.kitty, and yellow.kitty among, someone angle-get ASP fish
'Among Grey Kitty, White Kitty and Yellow Kitty, someone caught a fish.'

The test stimuli were exemplified as in (72):

(72) a. Shi [Xiaohuimao]$_F$ diao-dao le yu.
COP Grey.kitty angle-get ASP fish
'It is Grey Kitty who caught a fish.' [bare-*shi* cleft]

b. Diao-dao le yu de shi [Xiaohuimao]$_F$.
angle-get ASP fish NOM COP Grey.kitty
'(The one) who caught a fish is Grey Kitty.' [definite pseudocleft]

The results revealed no significant difference between the percentage of choices to uncover pictures under the definite pseudocleft condition, and the percentage under the bare-*shi* cleft condition. There was a difference between the exclusive and the bare-*shi* cleft condition, as well as between the plain focus and the bare-*shi* cleft condition. It was concluded that the results supported the presupposition hypothesis.

In Liu & Yang's (2017) experiments, no mention of the *shi...de* cleft was made: the bare-*shi* cleft was the sole cleft type being taken up for investigation, hence it remains to be seen whether the results regarding exhaustivity apply to the *shi...de* cleft. In this sense, the results were insufficient in addressing the theories that crucially derive cleft exhaustivity from the *de* particle and treat *shi...de* clefts as, so to speak, the 'real' clefts in Mandarin.

Another issue with leaving out *shi...de* clefts has to do with the exact implementation of the semantic theory Liu & Yang based their claims on. Recall that Liu & Yang take the similar exhaustive pattern of *shi*-clefts and definite pseudoclefts to indicate that clefts project a maximal presupposition like definite plurals, in line with Büring & Križ (2013). Büring & Križ (2013) assume that a definite component serves as the presupposition trigger. The presence of the nominalizer *de* in Mandarin definite pseudoclefts, as in (72b) above, is generally analyzed as introducing a (covert) definite component and hence the exhaustive semantics (see the

discussion in section 3.1). This way, a uniform approach to clefts and definite pseudoclefts under the definiteness-based approach would mean that the *de*-particle in clefts is also characterized as bringing in the exhaustive reading. While this appears to be the position Liu & Yang implicitly adopt, the experiment choice of using bare-*shi* clefts over *shi...de* clefts in comparing against pseudoclefts is surprising. In sum, incorporating the *shi...de* cleft is clearly needed in order to evaluate competing theories of exhaustivity.

There are a number of other methodological concerns tied to Liu & Yang's design. For instance, recall that in their second experiment, the sentence adverb *shishishang* 'as a matter of fact' was used to introduce a 'too'-continuation (see example 70B). In oral discourse, however, *shishishang* often serves to reject prior statements and introduce a modified context, such as in example (73).

(73) Zhangsan meiyou shengqi. Shishishang, ta gaoxing huai le.
Zhangsan not be.angry. In.fact, he be.happy bad ASP
'Zhangsan was not angry. Indeed, he was so very happy.'

The lexical choice hence has the potential of complicating the kind of interpretations obtained during the task, e.g. a more degraded judgment could be associated with parsing the discourse relation introduced by the rejecting or the opposite connective.

Finally, the assumption that plain focus serves as the baseline for pragmatically triggered exhaustive inference is also problematic. Here the authors assume that plain focus qualifies as a baseline for conversationally implicated exhaustivity with the pragmatic view of Horn (1981) in mind. In other words, they appear to believe that if cleft exhaustivity has a pragmatic source, then the strength of the exhaustive reading in Mandarin clefts should be comparable to that of plain focus. As we will see in the later sections, the majority of proposals within the pragmatic approach subscribe to assigning a stronger exhaustive reading for clefts as compared against plain focus (i.e. a strengthening is available for the cleft constructions in this case, cf. Destruel et al. 2015; Onea 2019). While the exhaustive readings of both constructions might be derived via a conversational implicature, clefts are clearly in some sense more exhaustive than canonical SVO sentences. Take the example from Destruel et al. (2015) for illustration. As the contrast between (74)-(75) shows, asking a *who-else* question as a follow-up to an *it*-cleft is significantly less acceptable than after a canonical sentence.

(74) A: Who lied at the debate?
B: $[\text{Donald}]_F$ lied at the debate?

A: Fine, and who else lied at the debate?

(75) A: Who lied at the debate?

B: It was [Donald]$_F$ who lied at the debate.

A: ??Fine, and who else lied at the debate?

3.2.2 *Shi...de* clefts are sensitive to 'yes, but' response

Hsu (2019) conducted another study with the aim of investigating whether Mandarin cleft exhaustivity is semantic or pragmatic in nature. The study comprised an offline acceptability judgment task and an online self-paced reading task, making it the first work to my knowledge to conduct online investigations of cleft exhaustivity in Mandarin. Hsu found that the Mandarin *shi...de* cleft generated an exhaustive inference in ways different from the exclusive sentence. She argues that the finding was broadly in line with a semantic approach to exhaustivity. In particular, it supports the view that cleft exhaustivity pertains to the non-at-issue level of semantic meaning.

In Hsu's design, three target conditions were included: plain focus, the *shi...de* cleft and the 'only'-exclusive. The offline study followed the paradigm initiated in Onea & Beaver (2011). The gist of the design was to look into how participants react to scenarios where picture stimuli violated the exhaustive interpretation that arises from a focus-marking construction. In Onea & Beaver's (2011) original design, the Hungarian pre-verbal focus construction is tested alongside the English *it*-cleft. Participants first read the target expressions, and then encountered pictorial stimuli that contradicted the exhaustiveness inference of the test sentences. Following exposure to the pictorial stimuli, they were instructed to choose between one of three possible answers: including a *Yes* acceptance response, a *Yes, but...* partial acceptance response and a *no* response as rejection. The participants were asked to read a test sentence first, as in (76).

(76) JHOSNAK van egy kalapja.
John has one hat
'It is John who has a hat.'

A contradictory picture was shown to the participants, then they were asked to choose among the three answers, as in (77).

(77) a. Yes, and Mary also has a hat.

b. Yes, but Mary also has a hat.

c. No, Mary also has a hat.

The hypothesis of Onea & Beaver is that the stronger the exhaustive inference of the focus sentence, the more participants would tend to choose the (c)-answer, which is the most confrontative answer. The less the exhaustive inference, the more participants should tend to choose the (a)-answer, the (b)-answer being in the middle.

Following Onea & Beaver (2011), their three types of answers were formed, but in Chinese, to probe the exhaustivity across conditions in Hsu (2019). Hsu crucially assumed with Onea & Beaver (2011) that in the *Yes, but...* response, the *Yes* portion was an acceptance of the at-issue content, while the *but...* portion targets the presuppositional content. Participants were instructed to read through the three-sentence dialogues, before filling in the blanks with one of the three given responses. A sample test stimulus is given in example (78).

(78) A: Jinnian nianzhong choujiang, shui chouzhong le?
this.year year.end lottery, who win PRF
'Who won the prize at the year-end lottery?'

B: Laowang chouzhong le!
Laowang win PRF
'Laowang won it!' [plain focus]

B': Shi Laowang chouzhong le de!
COP Laowang win PRF DE
'It was Laowang who won it!' [*shi...de* cleft]

B": zhiyou Laowang chouzhong le!
only Laowang win PRF
'Only Laowang won it!' ['only'-exclusive]

C: _____ , Laoli ye choudao le!
_____ , Laoli also won PRF
'..., Laoli also won it!'

i. Dui a,
Yes PRT
'Yes'

ii. Dui a, buguo
Yes PRT, but
'Yes, but'

iii. Budui,
no
'No, '

The results revealed that out of the three possible responses (1. 'yes'; 2. 'yes, but'; 3. 'no'), 62.5% were *yes, but*-responses for the cleft condition. This was significantly higher than the proportion of *yes, but* responses triggered by other conditions (plain focus: 48.8%, 'only': 7.5%). Hsu took the pattern to indicate that the exhaustive reading of the cleft condition is encoded at the non-at-issue level, differing from 'only'-exclusives. Hsu entertained the possibility that

cleft exhaustivity may be pragmatic but did not consider the proposal desirable. Rather, she proposed a 'presuppositional assertion' analysis as the most plausible explanation, according to which cleft exhaustivity comes from the interaction between presupposed and asserted content.

To tease apart the presuppositional assertion hypothesis and the conversational implicature hypothesis, Hsu followed up with a self-paced reading study. The same test materials (target sentences and responses) were formatted into word blocks, and displayed to participants upon pressing a specific key.[19] Participants read target sentences combined with follow-up responses in a self-paced way. Reading time (RT) was measured as the time interval between two consecutive steps of pressing the button to move the word block forward. An example is presented in (79).

(79) A: Jinnian nianzhong choujiang, shui chouzhong le?
this.year year.end lottery, who win PRF
'Who won the prize at this year-end lottery?'

B: Laowang$_{\text{region 1}}$ chouzhong$_{\text{region 2}}$ le$_{\text{region 3}}$!
Laowang win PRF
'Laowang won it!' [plain focus condition]

C: Duia, buguo$_{\text{region 4}}$ Laoli$_{\text{region 5}}$ ye$_{\text{region 6}}$ choudao le$_{\text{region 7}}$!
Yes, but Laoli also won PRF
'Yes, but Laoli also won it!' [follow-up *yes, but* response]

At the sentence level, the *yes, but* response took longer to process than the rejecting *no* response type. Hsu took the result to indicate that participants were sensitive to the rejection content at the presuppositional level triggered by the *but* part of the response. Cross-conditionally, it was found that the response time of the 'only' condition and the cleft condition were longer than the plain focus condition for both *yes* and *yes, but* response types. No significant effect was found between the other pairs at the sentence level. For individual critical regions, it was observed that the 'only' condition and the cleft condition received significantly longer reading times at region 6 (i.e. word block of the additive 'also') than the plain focus condition under the *yes, but* response type. The 'only'- and cleft-conditions also patterned similarly at the region under the *yes*-type response. From these results it was concluded that the exhaustivity of *shi*-clefts was more similar to 'only'-exclusives than to canonical focus during online comprehension. It is worth pointing out that what is mysterious in Hsu's results,

[19] However, the non-focused subject condition, chosen as control in the offline study, was not included for the self-paced reading study.

which remains to be addressed, is that in the exclusive condition the *yes, but* response triggers longer delays on response time than the *yes* response. This contradicts Onea & Beaver's (2011) prediction that the *yes* response should be less compatible with a strong exhaustive inference, which potentially indicates that one more dimension is involved.

Taken together with the findings from study 1 that the cleft condition received significantly more 'yes, but' responses than the exclusive condition, Hsu argued that there was empirical support for locating Mandarin cleft exhaustivity at the presupposition level.

Hsu's (2019) experiments used *shi...de* clefts as stimuli items, and bare-*shi* clefts were not included in her study, once again rendering it not possible to directly probe the meaning contribution of the sentence-final *de*-particle. There are some other methodological issues regarding Hsu's design that might affect the way her results can be evaluated. For instance, a portion of the sentences used in Hsu (2019) employed one-time-only predicates, e.g. winning a lottery, with which the exhaustive inference can be derived independently of the construction type (cf. Szabolcsi 1997). Moreover, in Hsu's self-paced reading task, segmentation was not controlled rigidly enough, to the effect that word blocks across conditions did not register an identical word count. The above issues in the experiments of Liu & Yang (2017) and Hsu (2019) are taken into consideration in my experiment design to be discussed in the next section.

To wrap up, previous experiments on Mandarin support a presuppositional view of cleft exhaustivity, and converge on showing that the exhaustive strength of Mandarin clefts stands in between the exclusive sentence and the canonical declarative sentence (generalled viewed as encoding information focus). Liu & Yang's findings and Hsu's findings do not exactly match, and their proposals are not identical, either. Both studies make no direct comparison between the *shi...de* cleft and the bare-*shi* cleft. The existence of two cleft constructions in Mandarin was not touched upon in the study of Liu & Yang, while Hsu appears to assume implicitly that the *shi...de* cleft is the 'canonical' type of cleft construction in that it generates systematic/robust exhaustive inferences. As of yet, no controlled experiments have specifically evaluated the potential difference in exhaustivity between these two cleft types, despite obvious theoretical motivations in understanding whether there is a difference and how it plays out.[20]

Note in passing that in an unpublished study, Liu & Xu (2019) conducted an acceptability judgment study based on extracted corpus data. Subjects were instructed to rate 87 corpus-

[20] Reports that only *shi...de* clefts give rise to reliable exhaustive inferences (e.g. Hole 2011) were based on informal elicitations.

attested *shi...de* cleft sentences against another 71 corpus-attested bare-*shi* cleft sentences on a Likert scale of 1-5, both with an additive follow-up. It was found that there was no significant difference between the ratings of the *shi*-cleft sentences and the *shi...de* cleft sentences. The preliminary finding thus indicates that the cleft construction with *de* does not invite a stronger exhaustive inference. Despite the obvious merits with using natural corpus data, the study fell short of a controlled experiment, as target sentences from across conditions were not minimally different. The numbers of the test stimuli across conditions were not controlled to be identical, and test materials other than the critical region (here the sentence-final particle position) were not identical across conditions, either.[21] To verify the finding in Liu & Xu (2019), a formal, controlled experiment setting is needed. I report my studies in the next section.

3.3 My Experiments

The aim of the present section is to formally test the claim that the strength of the exhaustive inference correlates with the presence of a *de* particle. Identifying the difference (if any) between the two clefts is crucial to delineating the scope within which cleft exhaustivity in Mandarin is investigated. It further narrows down the space of possible theories on the source of exhausitivity in Mandarin and beyond. To this end, three experiments using both an offline and an online paradigm were conducted, including two acceptability judgment tasks and a self-paced reading task, which were designed to investigate the exhaustive effect of *de* in Mandarin cleft constructions. Crucially, I kept track of the exhaustive readings of *both shi...de* clefts *and* bare-*shi* clefts against the other baseline conditions. The results show that the two cleft conditions both give rise to its weak exhaustive effect, and crucially *de* does not contribute to a stronger exhaustive inference of statistical significance, when compared with bare-*shi* clefts. The findings show that there is empirical support *against* the assumption that *de* in the cleft introduces a stronger exhaustive inference, hence undermining the proposals that seek to locate the source of exhaustivity at the cleft *de*.

In the following, Section 3.3.1 starts with a pre-test establishing the quality of the experimental stimuli. Section 3.3.2 presents findings from the acceptability judgment task set in

[21] Some additional issue included that the study in Liu & Xu (2019) did not check for the tense specifications of sentence predicates or whether the predicates involved are one-time-only. In my study, these problems are addressed.

exhaustivity-violating environments, and Section 3.3.3 reports findings from the follow-up self-paced reading task under the same setting.

3.3.1 Experiment 1

The first experiment was conducted with the aim of addressing a potential concern about whether clefts and exclusives are felicitous answers to a prior *wh*-question indicating the immediate question under discussion (QUD). The step is needed, because if a cleft/exclusive answer by itself is incompatible with the preceding context, then we cannot be sure that whatever degradations we are to see in an exhaustivity-violating response is really due to the exhaustive inference being contradicted/canceled. Independently, it has been observed that English speakers are unlikely to provide an *it*-cleft answer as a natural response in contexts that involve a prior *wh*-question, in contrast to a canonical SVO sentence answer (Destruel et al. 2015) (See also a similar argument about German *es*-clefts in Tönnis 2021). The unnatural question-answer pairs are demonstrated in (80).

(80) A: Where does the professor have his meal?

B: ??It is at the dining hall that he has his meal.

It is known that counterparts of the English *it*-cleft may behave differently in this regard. Thus, in French, the *c'est*-cleft constitutes the default strategy to signal the simpler focus known as information focus instantiated in answers to *wh*-questions, especially on grammatical subjects (Destruel et al. 2015). Thus, it was necessary to examine how focus-marking constructions in Mandarin behave in terms of answering prior *wh*-questions, as a sanity check of sorts. By doing so, we are checking for the general suitability of contextualizing the stimuli with (non-clefted) *wh*-questions, which simultaneously serves the purpose of ruling out non-targeted focus readings, e.g. the continuous-topic reading (cf. discussions in Chapter 2).

Participants For the current experiment, a total of 37 participants were recruited (19 male, 18 female, average age: 28.7±2.162). All participants are native Northern Mandarin speakers who are currently enrolled in non-linguistics undergraduate and graduate programs from an anonymous college. The results from one participant were excluded for the reason that some semantically deviant fillers were rated as natural.

Materials A total of 144 target sentences were distributed over 4 lists randomized for participant, with 36 items apiece. Each list follwed a Latin square design. Each individual

rated 36 target sentences and 36 filler sentences on a Likert scale from 1 to 7 (ascending order, 1 being the least natural/least acceptable). Target sentences contained a PP-adjunct focus. Target sentences were anchored to a non-past, habitual reading to rule out interference from tense, and predicate choices were controlled to exclude one-time-only predicates. Altogether four conditions were formed: a) a *shi...de* cleft condition; b) a bare-*shi* cleft condition; c) an 'only'-exclusive condition (i.e. the exclusive 'only'-operator associates with the focus) and d) a plain focus construction as the control condition. The four conditions are exemplified in (81).

(81) Context: Where does the professor have his meal?

a. Jiaoshou shi [zai shitang]$_{\text{Foc}}$ chifan de.
professor COP LOC dining.hall have.meal DE
'It is at the dining hall that the professor has his meal.' [*shi...de* cleft]

b. Jiaoshou shi [zai shitang]$_{\text{Foc}}$ chifan.
professor COP LOC dining.hall have.meal
'It is at the dining hall that the professor has his meal.' [bare-*shi* cleft]

c. Jiaoshou zhi [zai shitang]$_{\text{Foc}}$ chifan.
professor only LOC dining.hall have.meal.
'Only at the dining hall does the professor have his meal.' ['only'-exclusive]

d. Jiaoshi [zai shitang]$_{\text{Foc}}$ chifan.
professor LOC dining.hall have.meal.
'The professor has his meal at the dining hall.' [plain focus]

Procedure The task was conducted online on Qualtrics. Participants first read through instructions and illustrations of fully natural and unnatural sentences (both checked by 5 native speakers). Upon turning to the next page on screen, the experiment started. A target sentence's *wh*-context was displayed on the same page as the target, with scores (1-7) horizontally aligned at the lower half of the page. A round checkbox was present underneath each score. After choosing a score by mouse-clicking on the box of choice, the participant clicked on the CONTINUE button to proceed to the next sentence.

Results All conditions received a mean rating higher than 6 (out of 7) in the *wh*-context. Figure 3.1 shows the boxplot of ratings by conditions.

No significant effect was observed between any pair among the four conditions by an ordinal mixed model (Christensen 2019, Tukey α-adjustment), with a random intercept for `participant` and `item` and a random by-`participant` slope. By this implementation, the maximal random effect structure that is allowed by the model was reached (Barr et al. 2013). The results showed that, compared with plain focus, *shi...de* clefts and bare-*shi* clefts did *not*

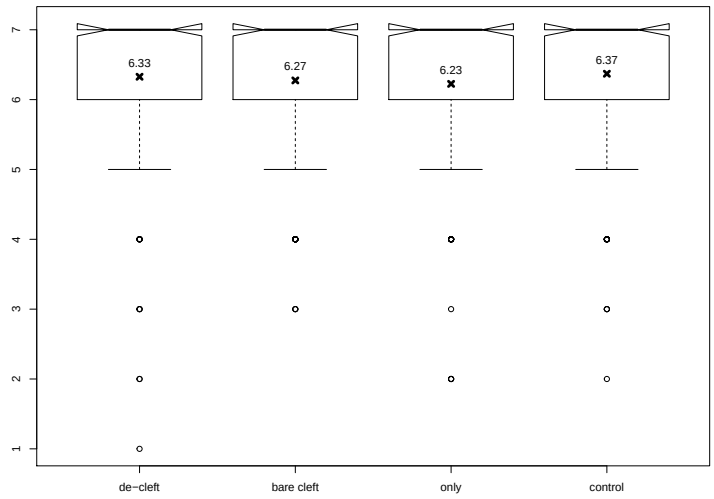


Figure 3.1: Boxplot of rating results from the pretest (black crosses represent mean value).

receive a lower level of naturalness among participants. Similarly, there was no significant unnaturalness associated with 'only'-sentences. Accordingly, it was concluded that the target stimuli in all four conditions were felicitous in *wh*-contexutalization.

3.3.2 Experiment 2

I now proceed to the second acceptability judgment task, to test whether *shi...de* clefts pattern differently than bare-*shi* clefts regarding the strength of exhaustivity, when they are presented in exhaustivity-violating contexts.

Participants A total of 42 participants (22 males, 20 females, average age: 29.5±0.37) from an anonymous university were recruited for the current experiment. The participants differed from those recruited in the pretest. All participants were college-educated (non-linguistics majors) Northern Mandarin speakers who had resided in China continuously prior to their college enrollment. Results of three participants (all males) were excluded due to missing data.

Materials Same as in the pre-test, the task consisted of four conditions. In each condition, a *wh*-question was asked first, and then answered by one of the four focus-marking constructions. Differing from the pretest, each focus answer was followed by a continuation sentence containing a *ye* 'too' particle, which introduced an alternative referent (ALT) that violated the exhaustivity triggered by the target sentences (if there is any). A sample *wh*-

question is given in example (82). Sample target sentences are listed in example (83) with their corresponding 'too'-continuation in example (84).

(82) Context: Where does the professor have his meal?

(83) Conditions:

a. Jiaoshou shi [zai shitang]$_{\text{Foc}}$ chifan de.
professor COP LOC dining.hall have.meal DE
'It is at the dining hall that the professor has his meal.' [*shi...de* cleft]

b. Jiaoshou shi [zai shitang]$_{\text{Foc}}$ chifan.
professor COP LOC dining.hall have.meal
'It is at the dining hall that the professor has his meal.' [bare-*shi* cleft]

c. Jiaoshou zhi [zai shitang]$_{\text{Foc}}$ chifan.
professor only LOC dining.hall have.meal.
'Only at the dining hall does the professor have his meal.' [*only*-exclusive]

d. Jiaoshi [zai shitang]$_{\text{Foc}}$ chifan.
professor LOC dining.hall have.meal.
'At the dining hall, the professor has his meal.' [plain focus]

(84) 'Too'-continuation
Jiaoshou ye [zai kafeidian]$_{\text{ALT}}$ chifan.
professor too LOC café have.meal
'At the café too, the professor has his meal.'

Each individual rated 36 target sentences (continuations included) and 36 filler sentences on a Likert scale from 1 to 7 (ascending order, 1 being the least natural/least acceptable). In total, 144 target sentences were distributed over 4 lists of 36 items, each according to a Latin square design.

Aside from the two cleft conditions, the 'only'-exclusive construction was used as the baseline condition for measuring the relative strength (and at-issueness) of the exhaustivity associated with identificational focus (É. Kiss 1998), and the plain focus construction was used as a baseline for non-exhaustive information focus. Given that exhaustive focus resists an additive interpretation, it was predicted that if a target sentence triggers an exhaustive inference, then a degradation on the participants' ratings should be observed when the 'too'-continuation is attached to said target sentence. Specifically, it was assumed that the juxtaposition of an 'only'-sentence with a 'too'-continuation constitutes a contradiction, because *ye* 'too' is presuppositional, hence their ratings were predicted to be significantly lower than the rest of the conditions. On the opposite end, participants were expected to accept more easily

violations of the exhaustivity attached to plain focus sentences as their exhaustive inference is weak and prone to cancellation. When it comes to the cleft constructions, under an analysis of the cleft *de* as the exhaustifier (e.g. Hole 2011), *shi...de* clefts were predicted to be more degraded when their exhaustive inference was violated by the continuation, compared with bare-*shi* clefts.

Procedures The same formatting as in the pretest was used (online Qualtrics). Participants were presented with target sentences (in *wh*-contexts) as well as the corresponding 'too'-continuations, and were instructed to rate the two parts as a whole.

Results Figure 3.2 shows the boxplot of ratings by condition (mean values are represented by black crosses, Tukey whiskers extend).

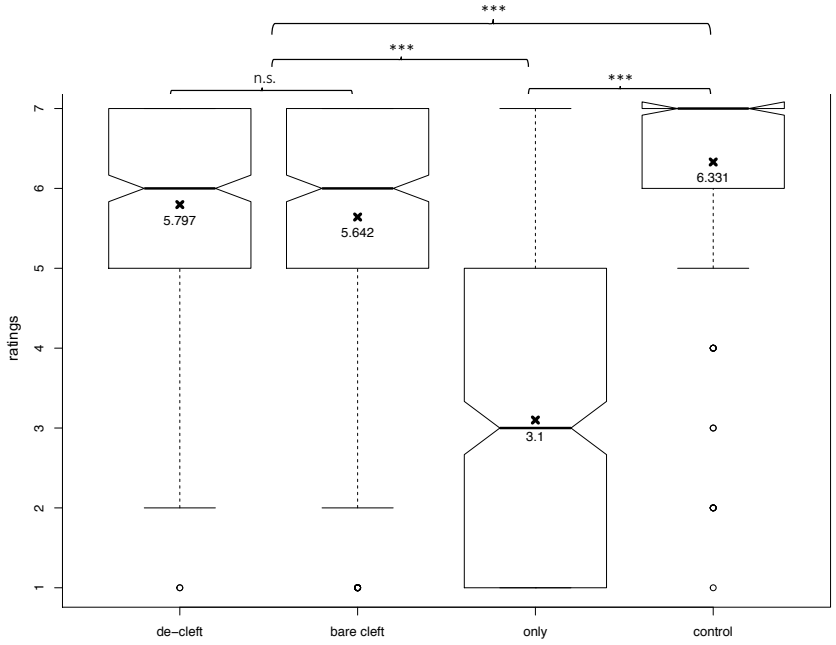


Figure 3.2: Boxplot of acceptability judgment results across conditions: Black crosses represent mean, black horizontal solid lines represent median and p-values ('***': $p < 0.001$, 'n.s.': not significant).

The 'only'-exclusive condition received the lowest rating with a mean of 3.1 out of 7. The plain focus (control) condition received the highest rating with a mean of 6.331 out of 7. *Shi...de* clefts and bare-*shi* clefts received a mean rating of 5.797 and 5.642, respectively.

To statistically analyze the differences in judgment among the four experimental conditions, I adopted the framework of ordinal mixed effect models (Christensen 2019). The factors *shi...de* cleft, bare-*shi* cleft and 'only' were contrast-coded against the reference level of the control condition. `Participant` and `item` were included and coded as random intercepts, in addition

to `participant` being coded as a random slope. A post-hoc test (with α-adjustments) showed that no significant difference was observed between the mean ratings of the *shi...de* cleft and the bare-*shi* cleft condition (β=0.198$\pm$0.14, p=0.515). Furthermore, a significantly higher rating for the plain focus condition (p <0.001) and a significantly lower rating for the 'only'-exclusive condition (p <0.001) compared with the *shi...de* clefts ($\beta_{control}$= 1.115; β_{only}= -4.171) and bare-*shi* clefts ($\beta_{control}$= 1.313; β_{only}=-3.973) were observed. The results indicate that participants found *only*-sentences to be significantly more unnatural than the other three conditions when followed up with a *too*-continuation. Among the other three conditions, the plain focus condition elicited the most natural judgment. The two cleft conditions were rated less natural compared to the plain focus condition, and did not differ significantly from each other.

3.3.3 Experiment 3

A self-paced reading (SPR) task was conducted next (Just et al. 1982), with the objective of supporting the acceptability judgment findings that participants evaluate degradations related to exhaustivity violation in *shi...de* clefts and bare-*shi* clefts in a similar way. In doing so, the experiment was guided by the hypothesis that interpretational procedures of cleft exhaustivity are reflected in underlying cognitive processes. If participants encounter sentences that are interpreted with stronger exhaustive inference during online processing, the subsequent violation of exhaustivity could be more costly to process, in which case it would be interesting to see how this is manifested by processing times that are subject to an intricate interplay of mechanisms to cope with such violations (accommodation, cancellation, etc.).

The SPR task was designed to identify the relation between reading initiating time and processing difficulty. The rationale underlying the SPR technique is known as the 'eye–mind assumption' (Just & Carpenter 1980), that is, reading time reflects processing time. Elevated reading times at a given sentence segment (relative to a control condition) are thought to signal processing difficulty at or around this sentence region. Processing difficulty may be caused, for example, by the detection of a grammatical or semantic anomaly, or by an unexpected sentence continuation such as the appearance of the disambiguating word sank in classical garden-path sentences such as *The log floated down the river sank* (Felser 2021). For this task, a reader is presented with a sentence one word at a time. In a typical setting, upon pressing the button, the reader proceeds to the next word, while the previous word disappears from the

screen. As a result, Just et al. (1982) report that 'readers pause longer on longer words, on less frequent words, on words that introduce a new topic, and at ends of sentences.' In other words, if the reader encounters a difficulty to process the sentence, such difficulty can be detected by a longer reading time.

Participants A total of 39 participants were recruited for the current experiment (19 males and 20 females, average age: 28.4±2.06). All participants were Northern Mandarin speakers who were enrolled in non-linguistics programs from an anonymous university and who have resided in China prior to their college enrollment. Three participants were excluded due to their lower-than-80% comprehension question accuracy. Each participant was compensated for their participation. On average the task took 30 minutes to finish.

Materials The same items (*wh*-contexts, target sentences, continuations) were used as in the judgment task. A total of 144 target sentences were distributed according to a Latin square design over 4 lists of 36-item each. Each target sentence belonged to one of the four conditions (the *shi...de* cleft condition, the bare-*shi* cleft condition, the 'only'-exclusive condition, and the control condition), followed by a 'too'-continuation. A *wh*-question (as context) was shown to the participants before they read the corresponding target sentence.

The segmented word-blocks are exemplified in Figure 3.3.

shi...de cleft condition					
Jiaoshou	shi	zai shitang	chifan	de	('too'-continuation)
professor	COP	LOC dining.hall	have.meal	DE	...
bare-*shi* cleft condition					
Jiaoshou	shi	zai shitang	chifan	∅	('too'-continuation)
professor	COP	LOC dining.hall	have.meal	∅	...
'only'-exclusive					
Jiaoshou	zhi	zai shitang	chifan	∅	('too'-continuation)
professor	only	LOC dining.hall	have.meal.	∅	...
plain focus					
Jiaoshou	∅	zai shitang	chifan	∅	('too'-continuation)
professor	∅	LOC dining.hall	have.meal	∅	...

'too'-continuation				
Jiaoshou	ye	zai	kafeidian	chifan
professor	too	LOC	café	have.meal

Figure 3.3: Word-block segmentation for the SPR task.

Each single vertical line indicates one word-block. A double vertical line indicates the word-block whose critical reading time were analyzed. All of the critical reading times are located within (word-blocks of) the continuation sentences. One item was eliminated from the analysis due to one of the word-blocks being too long.

In the case of 'only'-exclusives, it is predicted that participants would detect the violation of exhaustivity either at the moment they encounter the additive particle *ye* 'too' or afterwards, since *ye* 'too' provides the cue for the exhaustivity violation. If *de* introduced the exhaustive inference, *shi...de* clefts would be more costly to process and consequently exhibit longer delays of the participant reading time, compared with bare *shi*-clefts as well as plain focus.

Procedures The SPR task was conducted on the Python-based OpenSesame platform (Mathôt et al. 2012). Prior to the main session, participants went through a practice session to familiarize themselves with the task. Participants were required to press the central key on a response pad to reveal each word-block. As a new block of words was revealed, the previous word-block reverted to dashes. Both critical reading times and total reading times were recorded, where reading time was calculated by the time lag between two consecutive actions of pressing the key. After the final word of each test sentence, a binary true-false question appeared on the screen. Participants were asked about information related to the predicate of the previous test sentence, in order to verify that they paid proper attention to the sentence content. They were instructed at the beginning of the experiment to base their answers strictly on the content of the sentences that they read. Half of the comprehension questions had *true* as the correct answer, and the other half *false*. The mean comprehension question accuracy for the participant data included in our analysis was 83.7%. Data from three participants not reaching an 80% accuracy threshold were excluded from analysis.

Results Figure 3.4 shows the mean sentential reading times of the *ye* 'too'-continuation sentences corresponding to the four conditions. Each word-block on the x-axis corresponds to the word segmentation previously shown in Figure 3.3.

As for the statistic analysis, *lme4* is recruited (Bates et al. 2014) to perform a linear mixed effects analysis. The model added the reading time of the 'too'-continuation as the dependent variable in relation to the existence of the cleft *de* particle potentially violating the exhaustive inference. The model added the four conditions as its independent variables (fixed effects). The model was coded with a random intercept for `participant` and `item` and a random by-`participant` slope. α correction was applied to all scores. The results revealed that no

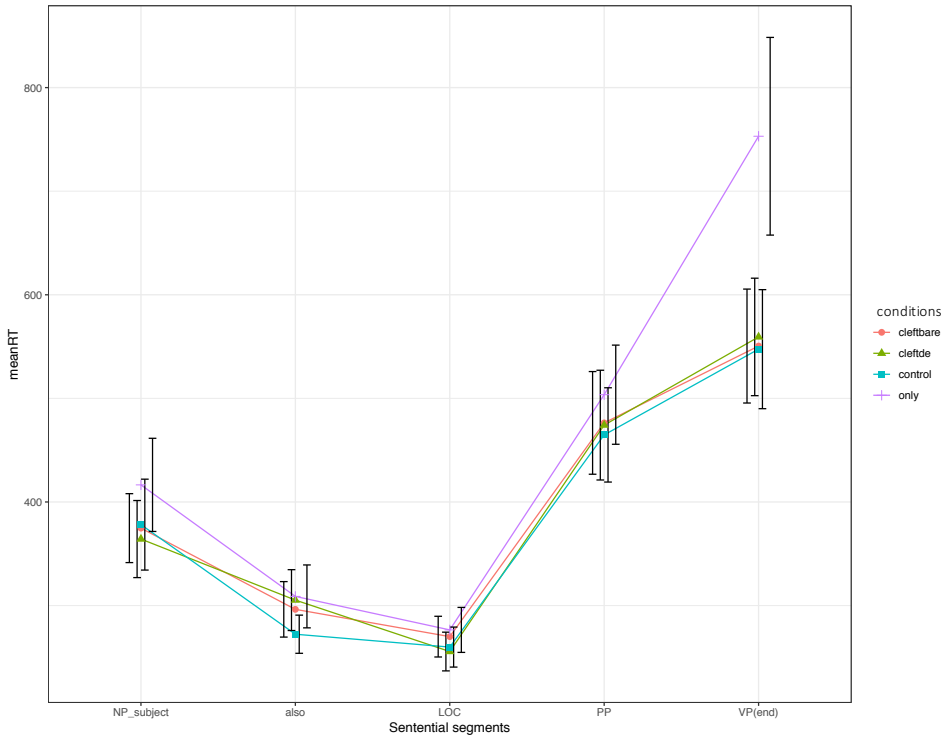


Figure 3.4: Self-paced reading results across conditions.

significant effect was observed between the mean reading time of the *shi...de* cleft and the bare-*shi* cleft conditions (β = 0.032 $\pm$ 0.026, p = 0.442), as well as between the plain focus condition and the two clefts. I take this to suggest that participants did not encounter extra difficulties in processing the cleft sentences in comparison to the corresponding plain focus sentences. The reading time of the *only*-exclusive condition was significantly longer than the other three conditions ($p_{\text{bare-}shi\text{ cleft}}$=0.048, $p_{shi...de\text{ cleft}}$<0.001, p_{control}<0.001). This suggests that participants needed additional efforts in their processing of the *only*-condition compared with the other three conditions. The pattern also held when the comparison is restricted to the reading times of the region after the introduction of *ye* (where under the current assumption the effect of exhaustivity violation started to be encountered during processing).

Additional linear mixed-effects models were applied to the reading time of each individual target region. The mean reading time on the last word-block (coded as *VP(end)* in Figure 3.4) is shown in the boxplot in Figure 3.5 (No significant effect was observed across conditions for the other word blocks). The figures indicate that across conditions, a significant effect by region is found both for the last word-block and for the sentence level.

Specifically, no significance obtained for the mean reading time at the last word-block for the *shi...de* cleft and the bare-*shi* cleft (β= 0.006 $\pm$ 0.055, p= 0.99). The reading time for

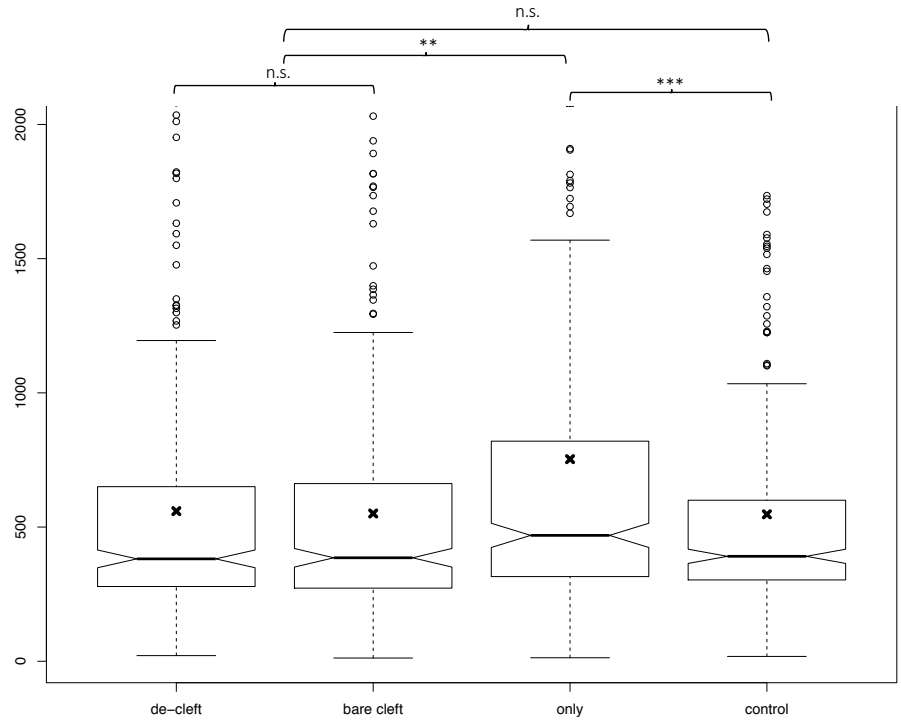


Figure 3.5: Boxplot of reading times of the last word-block across conditions: Black crosses represent the mean; horizontal black solid lines represent the median and *p*-values ('***'= $p < 0.001$, '**'= $p < 0.01$, 'n.s.'= not significant).

'only'-exclusives was significantly longer than both *shi...de* clefts(p= 0.0025) and bare-*shi* clefts (p= 0.0016). Additionally, no significant effect was found between plain focus (control condition) and the two cleft constructions at the sentence level and at the last word-block.

3.4 Discussion

The results show that the presence or absence of the sentence-final particle *de* does not correlate with the strength of the exhaustive inference in Mandarin Chinese cleft construction types: Both bare-*shi* clefts and *shi...de* clefts independently serve as felicitous answers to congruent prior *wh*-questions, fulfilling the focus-marking function. The two clefts elicit similar degradations of acceptability in exhaustivity-violating contexts, and trigger a similar reaction time lag during the online processing of exhaustivity violations.

3.4.1 What has been answered and what remains to be answered

Several conclusions can be drawn from these findings. First, the results fail to replicate the claim based on several small-size, informal elicitations (Paul & Whitman 2008; Hole 2011; Hole

& Zimmermann 2013; Zhan & Sun 2013; Zhan & Traugott 2015), according to which the *shi...de* cleft gives rise to a robust exhaustive inference, whereas the bare-*shi* cleft is characterized by a lack of (systematic) exhaustive interpretation on a par with plain focus/information focus.

Second, a delineation of the exhaustivity differences (or non-difference) between the cleft type with and without a *de* particle carries implications for the proper understanding of the exact exhaustivity mechanism. By concluding that the two clefts do not differ significantly in terms of exhaustivity strength, my findings are not compatible with approaches that locate the source of exhaustivity in Mandarin clefts with *de*. Among these approaches are the maximality proposal according to which *de* selects for a definiteness-marked nominal head such that the maximal presupposition projected by the definite component contributes to the exhaustive reading (e.g. Li & Thompson 1981). The results also undermine proposals according to which *de* is an operator triggering an identificational focus movement that generates an exhaustive focus interpretation (e.g. Paul & Whitman 2008; Hole 2011; Hole & Zimmermann 2013). In these analyses, it is at least implicitly assumed that *de* is the overt reflex of an exhaustification component, realizing at the surface level what is posited to be unpronounced in other languages (Hungarian, English, etc.). The current findings pose a challenge to this assumption.

Two natural questions arise. First, under the exhaustivity-violating environments, a weak degradation was observed in both cleft types. What is the source of this weak degradation? Why did such degradation not show up in the online task? Second, if the cleft *de* does not contribute to the exhaustive meaning, then why is it employed in the cleft sentences at all? In other words, its function needs to be clarified. Explanations to these answers are in order.

Before proceeding, however, we need to entertain the possibility that bare-*shi* clefts are a variant of *shi...de* clefts with *de* unpronounced (Li 2006; Lin 2016; Wan 2016). This possibility, if supported, would run counter to the claim investigated so far that the cleft type with *de* alone encodes exhaustivity to the exclusion of the bare-*shi* cleft. Assuming this is the case, then an exhaustification semantics for *de* could still be made compatible with the above experimental findings. This is because if bare-*shi* clefts contain a covertly realized exhaustifier *de*, then they will give rise to an exhaustive reading that is non-distinguishable from the reading in overt *shi...de* clefts.

Such possibility is untenable for various reasons. The most severe problem with subsuming bare-*shi* clefts under *shi...de* clefts comes from their distributional differences. One context of difference is embedding, demonstratedy by example (85): *Shi...de* clefts resist embedding

within a subordinative structure such as a subject clause. Bare-*shi* clefts, in contrast, are not degraded in subordinate environments (judgment obtained from 5 speakers).

(85) a. [Songxiaojie shi cong taosheng louti qu bangongshi] gei-le zhentan
Miss.Song COP from emergency stair go.to office give-PRF detective
xiansuo.
clue
'[That it was through the emergency exit that Ms. Song went to her office] gave the detective a clue.'

b. ?? [Songxiaojie shi cong taosheng louti qu bangongshi **de**] gei-le
Miss.Song COP from emergency stair go.to office DE give-PRF
zhentan xiansuo.
detective clue
Intended: '[That it was through the emergency exit that Ms. Song went to her office] gave the detective a clue.'

The contrast in acceptability would be mysterious if bare-*shi* clefts realized the same *de*-particle at the level of syntax and semantic interpretation. Meanwhile, the contrast is compatible with the position that *de* contributes an additional layer of meaning that is not present for bare-*shi* clefts, one that is not available in non-root clauses.

Note that the findings narrowed down the possible space of theories in which the explanation of cleft exhaustivity in Mandarin can be formulated, but did not by themselves provide direct evidence for *particular* theories. For instance, an exhaustive inference could arise via a presupposition triggered by an element other than *de*, or alternatively via an implicature that results from a clearly delineated focus-background partition. The former would indicates that exhaustive inferences arise from a uniqueness or maximality presupposition (Akmajian 1970; Percus 1997), triggered by the lexical meaning of a covert determiner (Heim 1991) . The pragmatic account on the other hand would state that exhaustivity arises from a conversational implicature (Prince 1978; Horn 1981; 2014), in which the exhaustivity is a result of a strengthening effect created by answers to *wh*-questions (Schulz & van Rooij 2006; Spector 2007). I first turn to both approaches in tandem and will return to my own take on the source of exhaustivity in Chapter 6.

3.4.2 Debates over cleft exhaustivity: (non-)at-issue level or pragmatics?

Exhaustivity is argued to be conventionally coded in the cleft (Hedberg 1990; Delin 1992; Rooth 1996; 1999; Hedberg 2000; Dryer 1996; Kiss 1998; Velleman et al. 2012; Büring & Križ 2013). In the early literature (Bolinger 1972; Atlas & Levinson 1981; Szabolcsi 1981), cf. also

Horvath (2005), it has been claimed that exhaustivity is simply part of the entailed (at-issue) content. Horn (1981), on the other hand, argues that a fundamental distinction between the at-issue versus non-at-issue level content should be made. The exhaustive reading belongs to the non-at-issue presupposition, rather than the level of at-issue semantic content. This distinction between two layers of meaning is motivated by the observation that the exhaustive interpretation of clefts differs from the *only*-interpretation as shown in examples (86) about English *it*-clefts.

(86) a. # I know Mary ate a pizza, but it wasn't a pizza that she ate.

b. I know Mary ate a pizza, but she didn't only eat a pizza.

The contrast in (86a) and (86b) would be accounted for, if we assume that the exhaustive reading clefts generate is not part of what is asserted (i.e. the at-issue dimension of meaning, in the sense of Potts 2005). Following this idea, in (86a), the proposition within the scope of negation from the second sentence asserts that a pizza is not a member of the contextually restricted set of individuals denoted by the sentence predicate. The negated proposition is incompatible with the first sentence, assuming that the *know*-predicate presupposes that a pizza is a member in the predicate's alternative set. Conversely, in (86b) the exhaustive meaning is asserted in the *only*-sentence, while the truth of *only*'s prejacent is presupposed/implicated. This way, (86b) creates no contradiction: The first sentence asserts that a pizza is *a member of* the predicate's alternatives, compatible with the follow-up negation that states that a pizza is not the *sole* member of the predicate's alternatives. Assigning cleft exhaustivity to the non-at-issue dimension also explains the widespread feeling that the cleft has a weaker exhaustive inference compared against *only*. This is expected, under the assumption that a non-asserted exhaustive reading is more easily violable than an asserted one.

Given this opposition, more researches have started to identify the source of the exhaustive inference at the non-at-issue level. The recent approach from Velleman et al. (2012) proposed that *it*-clefts and *only*-exclusives differ minimally in terms of what is presupposed and what is asserted. Given a proposition *p*, exclusives assert the maximality of P (i.e. no true answer is strictly stronger than *p*), while the cleft operator presupposes such maximality. The assertion made by the cleft operator corresponds to what is presupposed by the exclusive meaning. In other words, *only*-exclusives and *it*-cleft provide maximal information given a question under discussion, thus 'terminating' the questions.

Alternatively, Büring & Križ (2013) argue that the exhaustive reading of cleft constructions is presuppositional and can be derived from a pseudocleft structure. The implementation of the definite semantics in Büring & Križ (2013) involves a parthood-based relation between the cleft predicate and the cleft focus, which also derives the exhaustive reading. For the example of *it is [John]$_F$ who will come*, the presupposition that is being projected states that the referent of the cleft pivot is not a proper subpart of the referent of the cleft clause. Since the cleft construction also asserts that John will come, it follows that the extension of 'will come' contains John and only John (for the presupposition and assertion to be simultaneously satisfied). This results in an exhaustive inference.

Büring & Križ (2013) employ the notion of a conditional presupposition, deviating from earlier definiteness-based proposals (e.g. Percus 1997) that rely on the more established treatment of the definite description via a maximality operator (Heim 2015). Percus (1997) argues that the cleft construction in the form of *It is* $[\alpha]_F$ β carries an existential and a definite presupposition where all individuals α must satisfy the property given by β. This treatment is problematic, as maximality does not suffice to derive the exhaustivity of exhaustive focus in negative contexts. I refer readers to Büring & Križ (2013: 6) for detailed discussions. To see this informally, the negated Mandarin *shi*-cleft in (87) is intuitively not true in a situation where Zhangsan and Lisi will come.

(87) Bu shi Zhangsan yao lai.
NEG COP Zhangsan will come
'It is not Zhangsan that will come.'

Nevertheless, this intuition fails to be captured under a maximality presupposition account: If the iota operator applying to the predicate *yao lai* 'will come' extracts the maximal element of the individuals that will come, it then follows that the individual Zhangsan does not possess the property of being this maximal individual, hence the sentence is expected to be true under such situation, contrary to intuition. Note that the interpretation problem arises for identificational structures in general, e.g. *The 'will-comers' are not Zhangsan and Lisi.*

By contrast, Büring & Križ's (2013) parthood-based presupposition account gets us the correct prediction. Under this account, (87) presupposes that Zhangsan is not a part of the individual that will come. In the situation given here, however, the individual that will come is the maximal individual Zhangsan+Lisi, of which Zhangsan is a part. The presupposition is therefore violated, hence the sentence is correctly predicted to be anomalous due to presuppositional infelicity.

Aside from the presuppositional view, another tradition has it that cleft exhaustivity is pragmatic in nature. Horn (1981; 2005; 2014) is the most prominent account of clefts from an implicature perspective. Horn argues that exhausivity is a quantity implicature, triggered by the use of the cleft construction structure and an existential presupposition. The speaker could have mentioned other individuals, and by not doing so, the assertion invites the inference that the individual involved is the only individual that satisfies the property denoted by the sentence predicate. That is, given the cleft form *it is* α *that P*, with its projected existential presupposition that there is a referent with the property denoted by the predicate $\exists x.P(x)$ and its assertion that the referent α possesses said property $P(\alpha)$, the implicature arises that other contextually-relevant referents that potentially instantiate the property of the predicate are all ruled out as not actually instantiating the property $\forall x.x \neq \alpha \rightarrow \neg P(x)$. This view of scalar implicature (SI) is based on a neo-Gricean mechanism (articulated in Horn 2005), in which implicature arises globally and operates on speech acts.

In another more recent proposal, Pollard & Yasavul (2014) provide a dynamic analysis of truncated *it*-clefts (c.f. Mikkelsen 2007), proposing that anaphoric *it* identifies a maximal pluality of individuals within the discourse. Given a *wh*-question, each complete possible answer corresponds to a particular choice of maximal plurality with the property in question (e.g. *went to CLS*). Consider the following example (88).

(88) Who went to CLS?

a. It was Greg and Dan. #Scott did, too.

b. Greg and Dan. Scott did, too.

The *it*-cleft identifies the maximal plurality possessing the property of going to CLS with the entity denoted by the focused expression. However, no such identification exists for plain focus sentences, since they only provide potentially partial information about the identity of the maximal plurality in question. In other words, the individuals Greg and Dan in the plain focus construction can be a subset of the maximal contextually given plurality that has the property of going to CLS. In the case of the *it*-cleft, it consists of individuals that correspond to the complete answer. Thus, *it*-clefts are incompatible with the existence of other individuals who also belong to the same set.

Many experimental studies in the past decade have also endeavored to test the validation of these theoretical conclusions, i.e. they seek to test whether cleft exhaustivity arises from the semantic level (including the level of at-issue assertion and the level of presupposition), or from

pragmatic implicature. The majority of works on clefts (in English, German and Hungarian) lean towards the pragmatic explanation. In what follows, some of these experimental findings will be outlined. See Onea (2019) for a detailed and up-to-date review of the existing experimental research done on cleft exhaustivity.

Onea & Beaver (2011) first provided an experimental paradigm to test the source of exhaustivity (See also the discussion of Hsu's 2019 experiment in section 3.2.2). Specifically, they investigate how participants react to scenarios where picture stimuli violate the exhaustive interpretation (thus initiating the pictorial stimuli paradigm). From this, Onea & Beaver (2011) conclude that the exhaustiveness of Hungarian focus is pragmatic. The results show that for plain narrow foci as target, most participants tend to choose *Yes* responses, whereas for exclusives, most participants tend to choose *No* responses. For *it*-clefts and its equivalents in other languages, there is a lower rate of *Yes* answers as compared to plain focus (narrow foci in their term), and a lower rate of *No* answers as compared to exclusives. Onea & Beaver's assumption is that the cline of confrontative answers correspond to the strength of exhaustive inference. Onea & Beaver (2011) took this to suggest that the exhaustivity inference triggered by pre-verbal focus in Hungarian, and by analogy *it*-clefts, was a conversational implicature, which they took to obtain from the tendency to interpret answers to *wh*-questions as complete and, hence, exhaustive.

From an online experiment perspective, Drenhaus et al. (2011) presented ERP evidence that there is a clear difference between the processing of exhaustivity violations with *only* and *it*-clefts in German. *It*-clefts in German gave rise to N400 effects while exclusives gave rise to P600 effects.[22] From this, the authors concluded that the exhaustivity inference in *it*-clefts must be pragmatic (as opposed to the semantic effect in exclusives).[23]

Destruel et al. (2015) combined offline and online studies to compare the exhaustive readings in English and French clefts. They found a higher accuracy of verification judgments

[22] The N400 is a negativity with a latency peaking around 400 ms after the onset of a critical element. This component reflects the cost of semantic integration of non-stereotypical elements which normally do not fit with the (extra) linguistic context-expectancy (Kutas & Hillyard 1980; 1983; Nieuwland & Kuperberg 2008). The N400 cannot be taken as an indicator of truth-value violations (Fischler et al. 1983). In addition, the P600 is a positivity peaking between 600 and 900 ms with a centro-parietal distribution and has been associated with (syntactic) reanalysis and repair. However, whether the P600 can be seen as a indicator of semantic anomaly or violation is controversial.

[23] Note however that the alternative explanation that exclusives provide at-issue, while *it*-clefts provide non-at-issue exhaustivity would also account for the observed results.

and quicker reaction time for clefts as compared with 'only'-exclusives. This was taken to indicate that the not-at-issue status of the cleft exhaustive inference results in lower levels of contradiction. Here the authors cautioned by assuming that exhaustive strength is weaker when the inference lies at a non-at-issue level, regardless of its semantic or pragmatic status.[24]

DeVeaugh-Geiss et al. (2015) conducted two experiments specifically targeting three German construction types, i.e. exclusives, clefts, and pseudoclefts with a definite description. They tested the hypothesis whether the at-issueness of cleft exhaustivity differs from that of exclusives. The hypothesis was tested through contradiction tasks, i.e. putting target constructions under an environment that violates their at-issue and non-at-issue inference. As a result, negating at-issue level inferences or negating non-at-issue inferences did not create a statistically significant difference for the mean acceptability of exclusives. On the other hand, significant differences appeared in clefts. When the contradiction type was not at-issue, the mean acceptability significantly increased, compared with the mean acceptability for the contradiction type of at-issue level inference. In sum, clefts showed a different pattern from exclusives, rejecting the prediction in which the exhaustivity of clefts is semantic in the narrow sense.

DeVeaugh-Geiss et al. (2018) applied a mouse-driven picture-verification task with incremental contextual information to uncover if participants took the exhaustivity of target sentences into consideration (see also Abrusán & Szendrői 2013; Romoli & Schwarz 2015). Clefts, exclusives, pseudoclefts with a definite description and canonical focus constructions were tested in two experiments. The results reveal that clefts, like pseudoclefts, did not

[24] It needs to be pointed out that the exhaustive strength pertaining to non-at-issue level content is not yet well understood. While there has been a large body of experimental works dealing with violations of pragmatic inference (using reaction time and picture verification tasks, etc.), very few works have investigated experimentally the possibility that cleft constructions involve presupposition violations. As far as I know, no studies have systematically compared cleft exhaustivity violation with the violation triggered by non-existential presupposition, e.g. factives, iteratives and aspectual verbs. In general, behavioral studies suggest that presuppositions projected by different types of triggers impose felicity constraints on the contexts of utterance. In addition, online studies further show that while presupposed information can be rapidly integrated with the context during reading, it is not always automatically accessed. It is shown that processing slowdowns only occur, when the experiment designs are manipulated such that participants indeed access the presupposed information and relate it to the context (See detailed review by Schwarz 2016). I acknowledge the results from my experiment need to be further evaluated against the current understanding of presupposition violations provided by various types of triggers under an experimental environment. I will leave that to the future research.

systematically receive an exhaustive interpretation regardless of the type of participants or experimental settings. An exhaustive group of participants was to be distingushed against a non-exhaustive group, with the former appearing to treat clefts on par with exclusives whereas the latter treat them alike plain focus. DeVeaugh-Geiss et al. (2018) suggest that the findings are compatible with a theory such as Pollard & Yasavul (2014), in which the exhaustivity in *it*-clefts is not a real exhaustive inference, but still should be derived via a uniqueness requirement just as in definite descriptions.

On top of the experimental evidence that generally favors the pragmatic approach, another puzzle from my experiments also bears on the source of exhaustivity. Specifically, it remains to be addressed what to make of the discrepancy between the results in the acceptability judgment task and the self-paced reading task. Namely, plain focus was rated better than the two cleft types, yet the three sentence types did not differ significantly in terms of reading time (note that the two clefts still registered longer reaction times overall and in the critical region than plain focus). The pattern is particularly interesting, as it replicates the finding from another online task reported for French clefts by Destruel et al. (2015). In exhaustivity-violating scenarios French participants' response times were significantly quicker for clefts than for exclusives, while the responses times for clefts and canonical SVO sentences were not significantly different. The situation differs from English participants, who had a significant delay in response times for the cleft condition as compared to the plain focus condition. Against the context of the English-French comparison, the findings here suggest that (in terms of the underlying processing cost involved in the computation of exhaustivity) Mandarin clefts are associated with a weaker inference than English.

Here I will only briefly suggest one possible explanation. I consider the assumption that bare-*shi* clefts and *shi...de* clefts introduce an exhaustive inference via a quantity implicature (I will discuss more details of the pragmatic view of cleft exhaustivity in the immediate following). Note that at least for some processing models of quantity implicature, extra processing costs are not predicted with a violation of the implicature detected (Katzir 2007; Chemla & Bott 2014). The underlying assumption is that the computation of an implicature is only time-consuming if constructing the required alternatives involves substituting elements from the uttered sentence with words from the lexicon. In some cases, however, substitution *on the fly* is not necessary for the construction of alternatives. An example drawing upon this assumption is a picture verification task conducted by van Tiel & Shacken (2016), in which it is found that participants

did not require longer decision times when faced with scenarios violating the cleft exhaustivity associated with the prior stimuli. They argue that the results are compatible with the view that lexical alternatives are not activated during the computation of quantity implicatures. More specifically, van Tiel & Shacken (2016) tested on pragmatic inferences of free choice elements, scalar implicatures, conditionals, and clefts. Two hypotheses were under the discussion for the experiments. First, the counterfactual reasoning hypothesis argues that for clefts, the hearer computes what the speaker could have said, which always triggers a longer processing time. As an alternative, the lexical access hypothesis argues that an additional processing cost occurs only if an alternative inference requires a substitution of constituents during the reading of the cleft sentence, otherwise no extra processing cost is incurred (e.g. Katzir 2007).[25]

The results of their experiments show that the *it*-cleft patterns with the free choice inference (Jennings 1994; Kamp 1974; van Tiel & Shacken 2016) by not eliciting a longer reaction time, which supports the lexical access hypothesis. Post hoc discussions suggest that the mechanism of deriving the inferences of clefts might be similar to the free choice inference, namely, the alternative needed for their derivation can be constructed by deletion.

Tentatively, I suggest that bare-*shi* clefts and *shi...de* clefts similarly incur no extra processing costs when encountering the exhaustivity-violating continuations during the self-paced

[25] According to Katzir, alternatives were constructed from the utterance via three ways: deleting constituents, substituting constituents with elements from the lexicon, and replacing constituents with contextually given material. Thus, the sentences in (i) instantiate a standard scalar inference.

(i) a. Some dogs are mammals.
b. All dogs are mammals.

Where (ib) is an alternative to (ia), substituting *some* with another constituent from the lexicon, 'all', is required. By contrast, in constructing an alternative to the free choice sentence in (ii).

(ii) a. Benny may have tea or coffee.
b. Benny may have tea.

What is involved is the deletion of one of the disjuncts in (iia) (instead of substitution). The hearer derivee a free choice (/disjunction) reading because she infers that the speaker could have uttered alternatives such as (iib) but didn't. Based on this observation, Chemla & Bott (2014) suggest that the computation of a conversational implicature is only time consuming if constructing the required alternatives involves substituting elements from the uttered sentence with words from the lexicon. Since the alternatives needed for the derivation of free choice inferences can be constructed by removing constituents from the uttered sentence, the derivation of these inferences proceeds without a processing cost.

reading task, and in turn these two cleft types do not invite longer reaction times than plain focus.[26]

3.5 Summary

In this chapter, I reported findings from two acceptability judgment tasks and a self-paced reading task designed to probe the exhaustivity of two Mandarin cleft types (*shi...de* clefts and bare-*shi* clefts). It was shown that the exhaustive inference of the two clefts stands in between that of the plain focus construction (which has the weakest exhaustivity) and that of the exclusive focus construction (with the strongest exhaustivity). Participants rated the two cleft constructions almost identically with regard to each other under exhaustivity-violating environments. Moreover, they were similarly costly to process, yielding no significant effect when they were compared side-by-side. Based on my findings, I argue against proposals that characterize the sentence-final particle *de* as appears in the *shi...de* cleft as lexically encoding exhaustive focus.

Two outstanding questions remain to be answered. One question concerns the source of exhaustivity for the Mandarin cleft constructions. I have shown above that the patterns revealed in the current study, combined with the body of experimental works accrued so far both for Mandarin and across languages, generally support a pragmatic approach, such as the proposal by Pollard & Yasavul (2014). According to this proposal, a connection can be drawn with the independently known exhaustive interpretation associated with answerhood, which applies to the English cleft answer as in (89a). A parallel Mandarin truncated specificational answer is as in (89b). A difference with the English cleft lies in the absence of an overt *it*-subject that precedes the copula.

(89) Who went to CLS?

a. It was Greg and Dan. #Scott did, too.

b. Shi Qiaozhi he Danni. #Yuehan ye qu le.
COP George and Danny. John too go ASP
'It is George and Danny. #John did, too. '

[26] Note again that if the cleft *de* is an exhaustifier, it should introduce a lexically encoded, semantic exhaustive inference instead of introducing a quantity implicature. In such case, the *shi...de* cleft type should introduce a longer processing time in the self-paced reading task, contrary to fact.

The solution to the exhaustivity generation issue depends partly on the kind of syntactic structure assumed for Mandarin clefts. However, I will postpone the syntactic discussion until Chapter 6, where the syntactic structure of the Mandarin clefts will be elaborated on in greater detail.

The above discussion lay out alternative ways of deriving the exhaustivity without reference to *de*. This begs the second question of what role *de* contributes to the *shi...de* cleft type vis-à-vis the bare cleft type. It has been suggested that *de* selects for an assertion operator that pertains to speech act or illocutionary force (Lü 1982, Li 2006, Huang & Liao 2013, Lin 2016, Wan 2016, Soh 2018). As with other sentence-final particles that straddle the layered domains of speaker meaning, the exact semantic contribution of *de* is obviously very subtle. The above ideas about how *de* fits into the cleft construction will be subject to further scrutiny in the next chapter, in which I will ultimately bring to the fore a novel proposal that builds on a formally explicit modeling of belief update and speaker-hearer interaction.

Chapter 4

De as an informativity maximizer in clefts

In previous chapters I have presented experimental evidence establishing that *shi...de* clefts and bare-*shi* clefts do not differ in their exhaustive inferences. I now entertain the novel idea that a cleft-*de* answer is used when the speaker signals that the answer is maximally useful/informative, in response to the question under discussion in the immediate discourse.[27]

The rest of this chapter is structured as follows. I first present empirical data demonstrating the constraints that *shi...de*-cleft answers are subject to in comparison with bare-*shi* cleft answers in section 4.1. I then motivate an informal idea according to which the pragmatic constraint established above can be captured by the intuition that *shi...de*-answers must provide the maximally useful information in the context. This is followed by a formal implementation of informativity in terms of negated cross-entropy inspired by the Rational Speech Act (RSA) model (Shannon 1948; Jäger 2007; Goodman & Stuhlmüller 2013) in section 4.2. I also present results from a pilot study testing the data in a controlled experimental environment in Appendix. The current case study opens up a way for the wider applicability of the cross-entropy method (as well as related KL divergence-based methods as part of the RSA-based approach), which I argue is a natural apparatus for capturing the speaker meaning of sentence-final particles.

[27] This chapter is an extended version of a co-authored conference proceeding volume that is under review.

4.1 A new observation about the particle *de* in clefts

I draw attention to a contrast between *shi...de* clefts and bare-*shi* clefts as partial answers to an immediate prior QUD. To my knowledge, the contrast in acceptability to be introduced has never been observed in the literature. Importantly, nevertheless, I argue that the environment of partial answers here lends critical insights into the discourse role the *de* particle within the *shi...de* cleft plays in actual conversation. In the following I first discuss the empirical pattern before motivating a novel analysis based on my observation. I follow the assumption that conversation can be recognized as a signaling game (cf. Merin 2011; van Rooij 2004; Jäger 2007). Further assuming the Gricean Cooperative Principle, I argue that in a cooperative game, by marking propositions with *de*, the speakers signal that they convey the most informative answer to their knowledge against alternative answers. As far as I am aware, this observation has not been made in other literature.

This contrast between *shi...de* clefts and bare-*shi* clefts is illustrated in the example (90).[28] Imagine that it is to the knowledge of the answerer B that teacher Cai takes charge of reimbursement on Monday, and teacher Wang takes charge of reimbursement on the other weekdays (Tuesday till Friday). This information is not part of mutual knowledge, i.e. it is not already known by listener A. Given this specific knowledge state, it is less felicitous for B to utter a *shi...de* cleft answer in response to the QUD, as in (90a). On the contrary, in (90b), a *de*-less bare-*shi* cleft answer is felicitous.

(90) Speaker A: Who should I find if I want to get reimbursement? B answers:

a. ?? Zhouyi shi Cai laoshi fuze baoxiao de.
Monday COP Cai teacher in.charge reimbursement DE
Intended: 'On Monday, it is teacher Cai who is in charge of reimbursement.'

b. Zhouyi shi Cai laoshi fuze baoxiao.
Monday COP Cai teacher in.charge reimbursement
'On Monday, it is teacher Cai who is in charge of reimbursement.'

Both answers (90a) and (90b) are not the most informative one based on our intuition. Instead of teacher Cai, given that the information about teacher Wang, would better address the questioner's goal of identifying the most likely way to get the reimbursement done, as

[28] Crucially, the judgments elicited here are strongly influenced by the prior knowledge state of the speaker, which can be observed from the prior context, an out-of-the-blue utterance may not yield a similar contrast of acceptability. The same applies to subsequent reported judgments.

shown in (91). The above contrast also goes away if *de* is attached to the more informative answer about teacher Wang.

(91) Speaker A: Who should I find if I want to get reimbursement? B answers:

Cong zhouer dao zhouwu dou shi Wang laoshi fuze baoxiao de.
from Tuesday till Friday all COP Wang teacher in.charge reimbursement DE
'From Tuesday until Friday, it is teacher Wang who is in charge of reimbursement.'

Intuitively, we consider an utterance more informative if it brings more certainty on the part of the listener, so that the listener's beliefs become closer to the speaker's following the utterance. The proposition about teacher Wang is more informative, as it brings about certainty on more situations.

As mentioned above, both teacher Cai and teacher Wang's information can be provided in two parallel partial answers juxtaposed to each other. I assume here that Monday and Tuesday to Friday are contrastive topics (CT), each indexing a subquestion that is part of the prior overall question (Büring 2003). The subquestion corresponding to Monday is resolved by a contrastive focus (teacher Cai), which is part of the comment to the contrastive topic. Similarly, the topic Tuesday to Friday pairs up with the contrastive focus teacher Wang. Note here that the alternatives relevant to the computation of informativity are sensitive to contrastive topic marking. I stand by the position that the pattern of *de* attaching to a more informative partial answer extends to all environments that feature contrasting partial answers the informative contribution of which can be measured (and compared). Importantly, I believe the CT marking environment offers a particularly apt case where multiple partial answers are contrasted against one another while all addressing parallel, similar subquestions, so that a comparison of varying informativity becomes straightforward (especially when we compare with other types of partial answers such as mention-some answers, in which measuring the informative contribution of two partial answers against each other is less relevant, see my discussion in section 4.3).

Returning to the above case for illustration, altogether I entertain four possibilities where the cleft *de* particle could be attached, listed in (92).

(92) Speaker A: Who should I find if I want to get reimbursement?

B_1: Cong zhouer dao zhouwu, dou shi Wang laoshi fuze baoxiao **de**.
from Tuesday until Friday all COP Wang teacher in.charge reimburse DE
Zhouyi, shi Cai laoshi fuze baoxiao.
Monday, COP Cai teacher in.charge reimburse

'From Tuesday until Friday teacher Wang is in charge of reimbursement. On Monday, teacher Cai is in charge of reimbursement. '

B_2: ? Zhouyi, shi Cai laoshi fuze baoxiao. Cong zhouer dao zhouwu,
Monday, COP Cai teacher in.charge reimburse from Tuesday until Friday
dou shi Wang laoshi fuze baoxiao **de**.
all COP Wang teacher in.charge reimburse DE
'On Monday, teacher Cai is in charge of reimbursement. From Tuesday until Friday teacher Wang is in charge of reimbursement.'

B_3: ?? Cong zhouer dao zhouwu, dou shi Wang laoshi fuze baoxiao.
from Tuesday until Friday all COP Wang teacher in.charge reimburse
Zhouyi, shi Cai laoshi fuze baoxiao **de**.
Monday, COP Cai teacher in.charge reimburse DE
'From Tuesday until Friday teacher Wang is in charge of reimbursement. On Monday, teacher Cai is in charge of reimbursement.'

B_4: ?? Zhouyi, shi Cai laoshi fuze baoxiao **de**. Cong zhouer dao
Monday, COP Cai teacher in.charge reimburse DE from Tuesday until
zhouwu, dou shi Wang laoshi fuze baoxiao.
Friday all COP Wang teacher in.charge reimburse
'On Monday, teacher Cai is in charge of reimbursement. From Tuesday until Friday teacher Wang is in charge of reimbursement.'

In these logically possible positions of *de*, the pattern is that the cleft *de* prefers the more informative answer about teacher Wang, and not the less informative answer about teacher Cai. (92B_1) and (92B_2) are judged better compared with (92B_3) and (92B_4).[29] The pattern of answers in (92) is summarized in the following Table 4.3.

Example numbers#	Prejacents & DE & Continuations	Judgments
(B_1)	Tue–Fri DE < Mon	✔
(B_2)	Mon < Tue–Fri DE	?
(B_3)	Tue–Fri < Mon DE	??
(B_4)	Mon DE < Tue–Fri	??

Table 4.3: Pattern of judgment based on permutations of partial answers with the use of *de*.

Note incidentally that the order of presentation for the two partial resolving answers could play a role in acceptability, independent from the presence of the particle *de*. In Mandarin,

[29] B_3 and B_4 may be accepted, but only if the utterer wants to emphasize Monday as particularly relevant to the question under discussion under a different belief state. I return to this issue after example (95).

as in English, the more informative answer tends to precede the less informative ones. This may follow from the Gricean maxim of Quantity (Grice 1989): *Make your contribution as as informative as is required (for the current purposes of the exchange)*. Specifically, suppose the speaker information is structured into two information chunks/units. Now by uttering first the less informative chunk the maxim of Quantity is violated (the speaker could have uttered something more informative but she did not). If, on the other hand, she opts to utter the more informative chunk first, the maxim of Quantity is attended to during her utterance, and no violation will be incurred afterwards given that what's left is now the most informative chunk available. Hence it is predicted that a higher acceptability occurs when a more informative partial answer precedes a less informative one. This way, the observation that (92B_2) sounds less natural than (92B_1) can be accounted for on independent Gricean grounds. Meanwhile, examples with *de* attached to the partial answer about teacher Cai (which is less informative) are less acceptable in either order (92B_3)-(92B_4), indicating that such infelicity with *de*-attachment cannot be reduced to the precedence of a less informative answer over a more informative one.

The same pattern of judgment obtains for other ways to partition possible partial answers, as far as a distinction of informativeness can be inferred from among the answers provided. Thus, the pattern is replicated in the following example, in which *de* cannot attach to a proposition expressing a quantification over a relatively small number of events, when this partial answer is contrasted against another answer expressing a quantification over a majority of events. The infelicity disappears if *de* is omitted from its prejacent to yield a case of bare-*shi* clefts, as shown in (93).

(93) a. A: Who should I find if I want to get reimbursement? B answers:
Ou'er shi Cai laoshi fuze baoxiao (??de). Yiban shi Wang laoshi fuze baoxiao.
occasionally COP Cai teacher in.charge reimbursement (DE) usually COP Wang teacher in.charge reimbursement
Intended: 'Occasionally it is teacher Cai who is in charge of reimbursements. Usually it is teacher Wang who is in charge of reimbursements.'

b. A: Who should I find if I want to get reimbursement? B answers:
Youshihou shi Cai laoshi fuze baoxiao (??de). Tongchang shi Wang laoshi fuze baoxiao.
sometimes COP Cai teacher in.charge reimbursement (DE) usually COP Wang teacher in.charge reimbursement
Intended: 'Sometimes it is teacher Cai who is in charge of reimbursements. Usually it is teacher Wang who is in charge of reimbursements.'

The above observations are supported by a pilot judgment survey I conducted (20 participants, see details in the Appendix). As Figure 4.6 shows, these findings reveal that when two partial answers are juxtaposed, judgments are significantly better with *de* attached to the 'more-situation', in other words to the more informative, partial answer as opposed to the 'fewer-situation' (less informative) one.

Condition	Position of *de*	mean values
a.	Tue--Fri/usually *de* < Mon/occasionally	6.331
b.	Mon/occasionally < Tue--Fri/usually *de*	5.797
c.	Tue--Fri/usually < Mon/occasionally *de*	4.631
d.	Mon/occasionally *de* < Tue--Fri/usually	4.422

n.s. ** *** ***

Figure 4.6: Pattern of judgment based on permutations of partial answers with placement of *de*. Only English translation is provided. '<' represents linear precedence. Condition (a) thus reads as: *"From Tuesday until Friday/usually, Wang handles refunds* ***de****. On Monday/occasionally, Cai handles refunds."* ('***': $p < 0.001$; '**': $p < 0.01$; 'n.s.': not significant).

Importantly, bare-*shi* cleft answers can be used for less informative partial answers, evidenced by the felicity of juxtaposing a less informative answer with its more informative continuation in (94).

(94) Zhouyi shi Cai laoshi fuze baoxiao, zhouer zhi zhouwu shi
Monday COP Cai teacher in.charge reimbursement, Tuesday until Friday COP
Wang laoshi fuze baoxiao.
Wang teacher in.charge reimbursement
'On Monday, teacher Cai is in charge of reimbursement. On Tuesday until Friday, teacher Wang is in charge of reimbursement.'

Additionally, the felicity of the bare-*shi* cleft answer is not order-sensitive: The answer that on Tuesday until Friday teacher Wang is in charge of reimbursement can be uttered first, without altering the above judgment, as in (95).

(95) Zhouer zhi zhouwu shi Wang laoshi fuze baoxiao, zhouyi shi
Tuesday until Friday COP Wang teacher in.charge reimbursement, Monday COP
Cai laoshi fuze baoxiao.
Cai teacher in.charge reimbursement.
'On Tuesday until Friday, teacher Wang is in charge of reimbursement. On Monday, teacher Cai is in charge of reimbursement. '

Note that it is possible to have a less informative partial answer in front of the more informative one, if some order of listing is available. This could be the case with a conventional

temporal/numerical order, e.g. the tendency to list weekday/month following the ascending order of integers (1, 2, 3, ...). What I am postulating is that the maxim of Quantity and the conventional listing order will enter into competition, with the speaker opting for one principle for bringing out information and temporarily suspending the priority of another.

Moreover, the felicity is degraded when *de* attaches to both partial answers (of varying informativity) at the same time. To test this, we consulted five native speakers about the following *de*-answers in (96).

(96) Speaker A: Who should I find if I want to get reimbursement? B answers:

a. ?? Cong zhouer dao zhouwu dou shi Wang laoshi fuze baoxiao
from Tuesday until Friday all COP Wang teacher in.charge reimbursement
de. Zhouyi shi Cai laoshi fuze baoxiao de.
DE Monday COP Cai teacher in.charge reimbursement DE
'From Tuesday until Friday, teacher Wang is in charge of reimbursement. On Monday, teacher Cai is in charge of reimbursement.'

b. ?? Ou'er shi Cai laoshi fuze baoxiao de. Yiban shi Wang
occasionally COP Cai teacher in.charge reimbursement DE usually COP Wang
laoshi fuze baoxiao de.
teacher in.charge reimbursement DE
'Occasionally, teacher Cai is in charge of reimbursement. Usually, teacher Wang is in charge of reimbursement.'

The speakers either found the examples to be less natural compared to the sentences with one *de* as in (4), or were not sure what role *de* was playing here (note again the judgments crucially depend on the particular context here). The data are obviously very subtle. As the pilot judgment survey shows, the rating difference associated with different *de* placements is statistically significant, but not very far apart. This would be typical if the meaning contribution of the cleft *de* is derived from pragmatics (game-theoretic pragmatic meaning), instead of from grammar. A more general pattern of the placement of *de* will have to await formal experiments in future.

A parallel pattern is observed for PP-clefts, indicating that the pattern has nothing to do with cleft type/syntactic category, as shown in (97).

(97) Speaker A: Where did the professor have his meal lately?

a. ?? Jiaoshou zuotian shi zai shitang chifan de, haiyou jiaoshou
professor yesterday COP LOC dining.hall have.meal DE also professor
shanggeyue zai kafeidian chifan.
last.month LOC café have.meal

Intended: 'Yesterday the professor had his meal at the dining hall, furthermore last month the professor had his meal in the café. '

b. Jiaoshou zuotian shi zai shitang chifan, haiyou jiaoshou
professor yesterday COP LOC dining.hall have.meal also professor
shanggeyue zai kafeidian chifan.
last.month LOC café have.meal
'Yesterday the professor had his meal at the dining hall, furthermore last month the professor had his meal in the café. '

The observation also shows that the use of *de* requires that the prejacent it attaches to must be ranked strictly higher than the other contrasting partial answers based on an ordering of informativeness. For example, adverbs of quantification that entail symmetry of the subevents, e.g. *sometimes*, can introduce partial answers that are all equally informative relative to each other. In this case, none of these un-ordered partial answers is compatible with the particle *de*. In other words, *de* is not licensed if its prejacent is not the most informative answer, even if there is no more informative alternative answer in the context. An example is demonstrated in (98).

(98) Youshi jiaoshou shi zai shitang chifan (??de), youshi shi zai
sometimes professor COP LOC dining.hall have.meal DE sometimes COP LOC
bangongshi chifan, youshi shi zai canting chifan.
office have.meal sometime COP LOC restaurant have.meal
'Sometimes, the professor has his meal in the dining hall, sometimes in the office and sometimes in the restaurant.'

As I have mentioned above, the constraint on the proper use of *de*-clefts can be intuitively understood as a requirement for the *de*-answer to provide the most informative answer to the listener, according to the knowledge of the speaker.

4.2 Formal implementation

In the above I have proposed that the particle *de* encodes an informativity optimizer, to the effect that the proposition it attaches to offers more information that the speaker wants to convey to the listener than alternative propositions. My goal now is to provide a formal definition of the notion of informativity that underpins my analysis of the speaker meaning of the *de*-particle, adopting a framework based on information theory coupled with Bayesian statistics. My proposal is inspired by the Rational Speech Act (RSA)-based Bayesian framework (Frank & Goodman 2012; Goodman & Stuhlmüller 2013; Franke & Jäger 2012; Spector 2017),

which aims to measure the amount of information contained in a given proposition and to be able to compare it with that of minimally different propositions. In mathematical terms, informativity can be defined as bits of information that remain missing for the hearer to figure out with certainty what the real world is like. I adopt the assumption that the number of bits of information still missing to the hearer is finite (as long as the speaker is not lying) and calculable.

As a formally precise way to quantify and compare the informativity across different utterances, RSA-based modeling has found fruitful applications in topics that seek to capture the interlocutors' presumptions about their beliefs, and to predict which utterances or actions they may prefer (Frank & Goodman 2012; Goodman & Stuhlmüller 2013). A standard case is the classic scalar implicature, e.g. uttering *some P* invites the inference that *not all P* (e.g. Horn 2005). As is intuitively described in more traditional pragmatic approaches to this implicature, the *not-all* inference is canceled incrementally, with the increasing knowledge given a situation. It is argued that a RSA-based approach enables a modeling of the incremental cancellation process (Frank & Goodman 2012; Goodman & Stuhlmüller 2013). This is achieved by incorporating Bayesian statistics and information theory, more specifically by resorting to expected utility (informativity)– a quantity that depends on the speaker's belief distribution.[30] In addition, the RSA model predicts an interaction between (shared) knowledge and how detailed the speaker's belief states could influence a listener's interpretation. The advantage enjoyed by such game-theoretic modeling of beliefs, compared to the single-step calculation of expected utility, is that it enables us to optimize the speaker's distribution given incomplete information access (hence capturing the epistemic effects, pointed out by Franke 2005) and additionally allows for multiple levels of recursion (*I think that you think, that I think that...*)

[30] In general, the extent to which an implicature can be cancelled depends on what the listener knows about the speaker's knowledge state. Consider a scenario with three apples in total. The speaker and the listener have the conversational goal of conveying the information about the number of red apples in the simplest way. In the case where the speaker has complete knowledge of the number of red apples, and the listener knows that the speaker has complete knowledge, then the listener is very likely to infer that not all apples are red, upon hearing the speaker's utterance that some apples are red. Consider now an alternative scenario where the speaker has partial access to information about the apples, e.g. he only knows that one apple is red, and the listener knows the speaker does not have complete knowledge. Then the listener is less likely to draw a *not-all* inference upon hearing *some apples are red*, compared to the previous scenario. Thus, the implicature is "canceled."

so that the influence of incremental shared knowledge on the listener's interpretation can be seen clearly.

Here some explanation of my methodological choice of a Bayesian-based modeling should be in place. I believe that speaker meanings such as the ones that are encoded by East Asian sentence-final particles are most promisingly characterized under a probabilistic framework, instead of a traditional truth condition-based framework. A truth-conditional approach, using tools from logic and set theory, specifies under what condition the given sentence true is. It further assumes that the meaning of a sentence is built up from the meaning of its components. The approach as it stands faces 'surprises' when applied to pragmatic 'non-prototypical' meanings.

These could be the cases where interpreting a given meaning varies with the speaker's internal knowledge or past experience. For example, the experiment studies in van Tiel et al. (2021) show that the quantifier *most* is interpreted as referring to pluralities that make up around 75% of the total set size instead of just passing the 50% threshold, the latter being what traditionally has been claimed in the generalized quantifier truth-conditional framework. Epistemic adverbs also share the property of being vague. For instance, it is shown that in interpreting *possibly* and *probably*, speakers are attaching a probabilistic hedging towards a certain proposition that varies along the different thresholds but within a shared common knowledge range. Under truth conditional semantics, epistemic adverbs are represented in a "qualitative way with no reference to probability measures" (Herbstritt & Franke 2019). They are mainly discussed concerning their logical properties and their contribution in a compositional way (Carnap 1947; Hintikka 1961; Kripke 1980; Kratzer 1977; 1991). In other words, the propositions that they are attached to are mainly in contexts where they are either true or false without uncertainty. One observation about epistemic adverbs is that they are, in general, quite productive when it comes to compositionality: If P is a well-defined predicate, then so are "probably P," "possibly P," etc., and a semantic model which assigns a truth value to P should also assign a truth value to P composed with epistemics. This requires that each world state carries additional structure about the epistemics of its propositions. A description of a particular possible world should tell us not only if P is true or false, but also the truth value of all such compositions of P with epistemics. Furthermore, these propositions are not independent. For instance, "probably P" entails "possibly P," and "P" entails both. Surely, any truth-conditional semantic framework which accounts for epistemics can account for these,

assigning truth values to all of these extra propositions and doing so in a logically consistent manner. From this perspective, it is more convenient to apply a probability-based framework for formalizing this extra structure with no additional cost. An increasing body of works have shown that the growing field of probabilistic pragmatics can provide such linking functions. Henceforth the abstract theories of meaning can be studied with the leveraging techniques from probabilistic models. The current work makes use of existing probabilistic models with modifications, and applies them to Mandarin (and Japanese) sentence-final particles (e.g, *de, ne, no*). This class of speaker-oriented items particularly lend themselves to probabilistic modeling, as these particles signal the prior-posterior differences during the interaction between the speaker and the listener. As we are working with explicit probabilities, models can make precise predictions with varying degrees of certainty about which rules apply in a given situation.

With these advantages in mind, I now formulate the use of the *de*-particle in a Bayesian framework, in which the participants' knowledge states are represented probabilistically. Such setting allows us to represent phenomena such as imperfect speaker knowledge, or arbitrary common-knowledge priors (see Section 4.4). I start with a description of my model and its interaction with the lexical entry of the cleft *de* particle. I then demonstrate that alternative characterizations of informativity based on entailment face challenges to capture the same data, offering additional motivation for my use of probabilistic machinery.

In the model, *de* is characterized as an informativity maximizer in information-theoretic terms, by measuring the **cross-entropy** encoded in the prejacent of the particle. To do so, the following components are required:

- a set T of all possible worlds (or equivalence classes of worlds, where two worlds are equivalent if they address the QUD in the same way);
- a speaker, who holds a belief state she would like to convey. This belief state is a probability distribution $S(t)$ over the worlds $t \in T$, representing the speaker's knowledge and uncertainties;
- a listener, who forms a belief state dependent on some message. This belief state, $L(t|m)$, is also a probability distribution over worlds $t \in T$, conditioned on the message m.

Informativity thus can be measured as the amount of information provided about the speaker's belief state, representable as the negated cross-entropy (Shannon 1948) between the speaker's and the listener's belief states after the speaker communicates message m, as in (Eq-1).

(Eq-1) $$-H(S(t), L(t \mid m)) = \sum_{t \in T} S(t) \log L(t \mid m).$$

Intuitively, utterances which bring the listener's belief state closer to the speaker's have a higher informativity, while utterances which contradict the worlds deemed possible by the speaker have a negative infinite informativity. I will turn to a discussion of the application of (Eq-1) shortly.

I return to example (92B_1) for illustration, repeated as (99).

(99) Speaker A: Who should I find if I want to get a refund this week?

{Zhouer yizhi dao zhouwu}/ {tongchang}, shi Wang laoshi fuze baoxiao
{Tuesday all.the.way until Friday}/ {usually} COP Wang teacher handle refund
(de); {zhouyi}/{ou'er}, shi Cai laoshi fuze baoxiao ($^{??}$de).
DE; Monday/occasionally, COP Cai teacher handle refund DE
'From Tuesday until Friday/Usually, teacher Wang handles refunds; On Monday/Occasionally, teacher Cai handles refunds.'

Given example (99), let T be the set of all who's-in-charge assignments, each such assignment mapping one day of the workweek to one of two people who handle refunds. Let $S(t)$ be defined as in (Eq-2).

(Eq-2) $$S(t) = \begin{cases} 1 & \text{if } t = s \\ 0 & \text{otherwise} \end{cases}$$

$s \in T$ is the unique world described in the example, namely the world that the speaker holds in mind. Additionally, the speaker has perfect knowledge of world s (which is described by the distribution in (Eq-2)). Finally, let $L(t \mid m)$ be the uniform distribution over all worlds consistent with the literal meaning of m, i.e. a literal listener with a uniform prior over worlds. From this, the informativity of a message m is $\log L(s \mid m)$. If m is compatible with s, this is the negative logarithm of the number of sets of worlds compatible with m. As logarithms are monotonic, informativity can be measured by counting sets of worlds: utterances with more compatible worlds are less informative. With the above definitions in place, we are able to postulate specific numbers that are then applied to example (99).

The response featuring 'from Tuesday to Friday' is compatible with 2 sets of worlds, and *on Monday* with 16 sets of worlds (thus more uncertain and less informative). In the case of the quantifier *usually*, assuming it represents *more than half of the weekdays*, the proposition is compatible with 16 sets of worlds. As for *occasionally*, assuming a meaning of *at least*

one weekday, the second proposition is compatible with 31 sets of worlds, and is thus less informative (as it only excludes one possibility). Hence it is possible to formally capture the intuition that example (99)'s first proposition is more informative than the second. The constraint for the cleft *de* to attach to the more informative proposition can be formulated accordingly.

Now I postulate the following pragmatic constraint of *de*, in which the usefulness of an utterance is characterized in terms of informativity. Here I use the notion 'maximal' to mean the largest value given a set of numeric data: *De* attaches to the chunk that is *more* informative than alternative chunks, hence maximally informative (i.e. the most informative among all the alternatives). We will term the particle *de* fulfilling such an information maximizer use as de_{IMAX} from now on.

i. Maximal informativity condition
   $De(p)(w)$ is felicitous iff the informativity given the utterance u at w that corresponds to the proposition containing *de* and its prejacent p is maximal, i.e. $I_{\max}(u \mid w)$.
ii. Definition of $I_{\max}$
   Given alternatives to u at w triggered by the current contrastive topic marking, where $Alt(u) = \{u_1, u_2, \ldots u_i\}$, $I_{\max}(u \mid w)$ iff $\forall_j : I(u \mid w) > I(u_j \mid w)$.

4.3 Comparison with other proposals

In this section, I point out that other proposals on the market that can potentially be used for comparing utterance informativity fail to account for the data under discussion here.

4.3.1 Entailment-based partial answers

The first alternative proposal to be considered is Velleman et al. (2012)'s 'inquiry-terminating' function. The proposal postulates that clefts, like 'only'-exclusives, terminate the line of inquiry associated with the immediate QUD, in that the cleft/'only'-answer always covers all possible true (resolving) answers (see Groenendijk & Stokhof 1982), hence the proposal is applied to an exhaustive meaning that comes from a lexically defined exhaustifier component instead of coming from a Gricean implicature. However, as the previous discussions suffice to make clear, the *de*-answer does not necessarily cover all possible true answers. In fact, the *de*-answer may well be a partial answer, and other possible answers may be available. Importantly, the

use of *de* requires that no other partial answers can have a higher informativity in addressing the prior QUD.

Another potential proposal to explain the data could argue that the information encoded in the partial answers could be ranked in terms of entailment. One way to approach this is to treat partial answers as elements of partially ordered domains (Szabolcsi & Zwart 1993; Champollion 2017). That is, the partial answers encoded in the proposition could be mapped to a join semilattice. Specifically, a partial ordering is a reflexive, transitive, antisymmetric relation, defined mereologically in (100).

(100) a. Reflexivity: Everything is part of itself.

b. Transitivity: Any part of any part of a thing is itself part of that thing.

c. Antisymmetry: Two distinct things cannot both be part of each other.

d. Unique sum: Every nonempty set has a unique sum.

A free join semilattice can be described by its properties of reflexivity, transitivity, antisymmetry, taken together with the uniqueness of sums.[31] A typical model is shown in Figure 4.7.

(101) For x and y that range over ordinal objects, a binary sum $x \oplus y$ is defined as:
The sum of two things is the thing which contains both of them and whose parts each overlap with one of them.

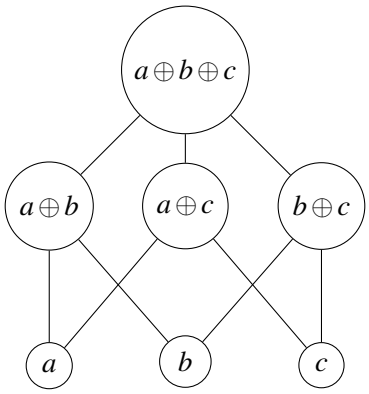


Figure 4.7: An example of a free join semilattice with binary sums.

It can be postulated that, depending on the result of mapping the summation given the partial answers, *de* is attached to the highest level of summation. However, this proposal faces

[31] The freedom property (given it is a free lattice) means that whenever two pairs of elements are distinct, their unions are distinct (Szabolcsi & Zwart 1993).

the problem that the information conveyed by contrasting partial answers is not comparable on a join semilattice. Consider again the example in (102) (simplified from (92)):

(102) Context: A: Who should I find if I want to get reimbursement? B answers:

Zhouer dao zhousan, dou shi Wang laoshi fuze baoxiao de. Zhouyi, shi Cai laoshi fuze baoxiao.
Tuesday until Wednesday all COP Wang teacher in.charge reimburse DE Monday, COP Cai teacher in.charge reimburse
'From Tuesday until Wednesday teacher Wang is in charge of reimbursement. On Monday, teacher Cai is in charge of reimbursement. '

In example (102), the information that varies in the two partial answers (Tuesday until Wednesday versus Monday) can be recognized as two elements of the join semilattice.[32] Monday is a basic element at the bottom level of the semilattice (e.g. a in Figure 4.7). It is considered an atom of the lattice, since it has no further proper part in the current context. On the other hand, Tuesday until Wednesday corresponds to a join of the atom Tuesday (b) and the atom Wednesday (c). This join can be represented by $b \oplus c$ in Figure 4.7. Though it seems that Tuesday until Wednesday (i.e. $b \oplus c$) is positioned higher than the atom Monday (a) in the semilattice, they are incomparable since a is not a proper part of $b \oplus c$ and vice versa. In other words, Monday is not a part of Tuesday until Wednesday that is distinct from Tuesday until Wednesday and vice versa (Tuesday would be a proper part of Tuesday until Wednesday). The example shows that a lattice-theoretic formulation fails to capture the intuitive notion that Tuesday until Wednesday is more informative than Monday.

The incomparability extends to other environments, such as quantification over a small number versus a majority of events. Consider the following contrast that features the two adverbs of quantification *usually* and *occasionally* in (103) (cf. 93a):

(103) Usually, teacher Wang handles refunds. Occasionally, teacher Cai handles refunds.

The events that each adverb quantifies over do not directly stand in a proper-part relationship under a semilattice formulation, and hence are not comparable. Suffice it to say that the lattice-theoretic approach is inadequate, because it doesn't cover the difference in informativity between contrasting partial answers.

[32] Note that, strictly speaking, the actual partial-answer elements to be included in the free join semilattice take the form of weekday-teacher pairs (*Monday-teacher Wang* versus *Tuesday to Friday-teacher Cai*). I am using a simplified representation, especially since the two pairs would still not stand in a part-of relation.

It is conceivable that the lattice-theoretic approach could be modified, such that *de* simply requires its prejacent to occupy the highest level among the elements considered. The incomparability problem with elements that do not stand in a part-of relation can then be resolved. However the entailment-based approach still has nothing to say about cases where the presentational order of information affects the epistemic knowledge about the speaker's belief state. The current game-theoretic pragmatic approach thus enjoys the advantage of keeping track of the dynamic update of (shared) knowledge.

One example demonstrating the dynamic update during the speaker-listener interaction made possible in a Bayesian framework is that the information presented at the beginning would imply the current knowledge state of the speaker. Before getting into the example, I hope to reiterate the differences and clarify the concepts of first level/pragmatic listener/speaker. On the entailment-based account, a listener and a speaker pay no attention to the belief states of each other, and are only sensitive to truth conditions. In other words, the listener is only capable of interpreting an utterance from a speaker literally (hence the term literal listener (L_0)). In addition, the speaker would utter a sentence in disregard of the listener's prior. In a Bayesian framework, however, the first level (pragmatic) speaker (S_1) takes into account that the L_0 only interprets the utterance literally, so she modifies her model of choosing various utterances that best convey the meaning. Additionally, the first level (pragmatic) listener (L_1) likewise anticipates the first level speaker accordingly, and updates her belief state by conditionalizing the prior based on the utterance of S_1. Thus, she takes into account the belief state of S_1 and meanwhile determines the most likely explanation for the speaker's utterance. Through these reasonings, S_1 and L_1 both apply a Bayesian inference.

Now, let's consider a setting where the listener expects a conventional temporal/numeral order. If the speaker starts with a partial answer about Tuesday (instead of about Monday), the listener realizes that the information about Monday is unexpectedly not provided. This could be accounted for by a basic probablistic model that I have demonstrated in the previous paragraph (a basic RSA model). Intuitively, the listener would infer that either the speaker does not know about Monday, or anticipates more important information about Monday in later conversation. More formally, the first level listener, upon hearing the partial answers presented in an unconventional temporal ordering, now assigns a lower informativity value (or a higher cost, depending on the details of the setting) to the partial answer with Monday.

To sum up, an entailment-based account of informativity faces two problems in adapting to the current discussion: 1) the case where two partial answers are not in a part-of relation (e.g. *Monday* vs. *Tuesday until Wednesday* or *usually* vs. *occasionally*); 2) the case involving backward inference and updates over the speaker's prior knowledge state.

4.3.2 Other types of partial answers

Note that the notion of the most informative partial answer should be treated differently from the notion of a 'mention-some' partial answer as discussed in the literature. An answer to a *wh*-question, according to Groenendijk & Stokhof (1982), should be exhaustive. In other words, the answer should mention *all* the relevant referents that fit the criteria to answer the *wh*-question. For example, a question such as *Who came to the party?* should intuitively include all the people the speaker knows came to the party yesterday. This is crucially different from another type of answer argued for in Hamblin (1973), where one only needs to mention *some* positive instances. Thus, in a context where a tourist new to town asks the following question in (104).

(104) Where can I get coffee?

It is more appropriate for the answerer to mention just one place where he can successfully get a cup of coffee (i.e. a partial answer), instead of mentioning all the relevant places exhaustively that the hearer knows (i.e. a complete answer). This is because mentioning just one element of the set of alternative 'equally best' places suffices to resolve the question.

Van Rooij (2004) argues that whether the mention-some reading suffices to resolve the question depends on the expected utility of the answers. Assuming asking the question is cost free, together with an 'empty' context and a set of answer rules that determine which answer will be given in which worlds, van Rooij shows that it is possible to calculate the expected utility of the *wh*-question in both mention-some and mention-all readings. Due to the property of mention-some and mention-all questions denoting two partitions that stand in a subset relation, s.t. $Q_{\text{some}} \subseteq Q_{\text{all}}$, the average utility of the mention-some reading of the question can never be higher than the utility of the corresponding mention-all reading. Importantly, there are cases where the expected utility of the two coincides: If the mention-some answer is known to be equally useful as the mention-all answer, and needs less effort or is shorter, then the *wh*-question receives the mention-some interpretation.

Van Rooij's utility-based analysis connects with the current model in the sense that predicting the circumstances where uttering a mention-some answer is superior to uttering a mention-all answer is based on calculating the expected utilities. Though the current chapter approached informativity using a system similar to van Rooij's, it is a lot more specific (i.e. based on cross-entropy). Van Rooij's much appreciated notion of expected utility coincides exactly with cross-entropy when informativity is used as a utility function. However, the formalism in van Rooij (2004) encompasses a broad array of utility functions in an arbitrary game, whereas the current proposal only involves informativity (identifying the most informative answers, without considering other most useful answers). In this sense, simple information theory suffices in addressing the issue in question, without the need to get ourselves entangled in a more complicated situation. In addition, the analyses are crucially different in the sense that the maximal informativity I evaluated is exclusively from the speaker's perspective. I take into account a literal listener L_0, instead of a first level listener L_1.

It is also worth pointing out that the notion of expected utility that captures mention-some answers does not extend directly to the condition governing the use of a *de*-answer. The two environments differ in that *de* only requires its prejacent to have the highest informativity compared to its alternatives. This way, *de* may attach to a partial answer even if it is not as useful as the mention-all answer: It just needs to be more useful than its potential sister partial answers (e.g. *Tuesday to Friday* versus *Monday*). In addition, capturing mention-some answers heavily relies on the cost of each utterance, i.e. a mention-some answer is in most cases significantly shorter than the mention-all answer. Unlike the contrast between mention-some and mention-all answers, the contrasting partial answers *de* potentially attaches to does not differ much in terms of cost.

4.4 Extensions

As we have seen in the previous section, entailment-based semantics is not particularly suitable for dealing with sentence-final particles that interact with the ever-updating speaker's/listener's belief states, yet Bayesian based frameworks can overcome such issues. Such Bayesian approaches are particularly suitable when we need to account for uncertainty from different perspectives, such as when modeling the pragmatic reasoning of two interlocutors with differing access to information. For example, if a listener would like to infer what a speaker meant

in a specific context, it is also necessary for her to reason about the epistemic state(s) of that speaker (Goodman & Stuhlmüller 2013; Herbstritt & Franke 2019; Scontras et al. 2021).

Furthermore, in this section, I will show that by modifying the aforementioned components of my model, the probabilistic approach promises to extend to more cases involving the speaker-listener interaction in which the respective belief states are crucial to our understanding. Specifically, I will explain how the current model is able to capture the case where the speaker and the listener have an arbitrary common-knowledge prior. Finally, I will demonstrate that with a minimal amount of changes, the model can be extended to capture a range of particles cross-linguistically.

4.4.1 Cases with enriched prior knowledge

In the setting of the model so far, I have flattened the distribution of the prior knowledge of the listener and the speaker. However, this may be changed so as to explain more data. For example, returning to the previous reimbursement-setting for illustration, consider a different knowledge state where the speaker and the listener both share a common knowledge that teacher Cai only handles refunds when teacher Wang is on vacation. In other words, they both hold non-uniform priors, with a higher probability assigned to the worlds in which teacher Wang is in charge on a majority of the days except for the days when she is on vacation.[33] In addition, the speaker knows that the listener does not have the information of when teacher Wang is on vacation. Further assuming the probability of teacher Wang being on vacation on each day is 1 percent, and each day is independent, we are able to calculate informativity with the previous function from Section 4.2.

Once again I will illustrate by feeding the non-uniform prior of a given event that is shared by the speaker and the listener with a concrete number under a simplified assumption. Given a situation where teacher Wang is out for vacation on Monday, and is back to work on Tuesday, the probability of the sets of world where teacher Cai is in charge on Monday is $0.01*(1\text{-}0.01)^4$ (given that the probability that teacher Wang is on vacation is 0.01, and there are five workdays in a week). After hearing the utterance m_1 = 'On Monday, teacher Cai is in charge of reimbursement,' the conditional probability of the sets of worlds where teacher

[33] Here the example setting is unrealistic. The purpose of using oversimplified assumptions is to enable a demonstration of the way informativity is calculated in non-uniform prior cases by feeding concrete numbers into the model.

Cai is in charge on Monday given the utterance is 0.99^4. Similarly, given the proposition m_2 = 'from Tuesday until Friday, teacher Wang handles refund', the conditional probability is 0.01. From this, the informativity of the corresponding proposition can be calculated by $\log L(s \mid m)$. The result thus yielded gives us $\log L(s \mid m_1)$, which is approximately -0.0174. This is larger than $\log L(s \mid m_2)$ (which equals -2).[34] Therefore, I predict that in this particular situation, de_{IMAX} preferably attaches to the utterance *On Monday teacher Cai handles refund*, since it is more informative. This is indeed borne out by the acceptability of the utterance in (105).

(105) Context: A great proportion of the faculty is on vacation during August. A asked: 'Who should I find if I want to get a refund this week?' B:

Zhouyi shi Cai laoshi fuze baoxiao de. zhouer yizhi dao zhouwu
Monday COP Cai teacher in.charge reimburse DE Tuesday all.the.way until Friday
dou shi Wang laoshi fuze baoxiao.
all COP Wang teacher in.charge reimburse
'On Monday, teacher Cai is in charge of reimbursement DE. From Tuesday until Friday, teacher Wang is in charge of reimbursement. '

This example hence correctly predicts the placement of the particle *de* given the informativity calculated based on a non-uniform prior.

4.4.2 Other particles

In the previous subsection, I showed that the cross-entropy approach captured the behavior of the particle *de* when the distribution of the knowledge state of the speaker and listener is no longer flattened. In this subsection, I will show that the current approach also promises to be expanded to capture the distribution of a broad range of other sentence-final particles across languages that function to compare the interlocutors' belief states. I will take the Mandarin sentence-final particle *ne* and the Japanese sentence-final particle *no* as illustration.

The Mandarin sentence-final particle *ne*

I will confine my discussion to one specific function of *ne*, in which *ne* appears at the sentence-final position in a declarative clause, termed the declarative-final use of *ne* in the Mandarin

[34] The difference between the informativity of the two propositions is related to how unlikely the event featuring *fewer* situations is. Here I assume that the probability with which teacher Cai handles refunds is 1 percent. Intuitively speaking, the smaller the number is, and the more the probability is skewed towards the event featuring fewer situations, the more informative will the proposition be.

literature (Lin 1984).[35] The following set of data establish the core function of declarative-final *ne* (Lin 1984; Guo 2005; Constant 2014). The context in (106) involves a new belief on the part of the speaker and an acknowledgement of a previous false belief: At the time A utters the sentence, speaker B's belief state must be updated in a way that contradicts B's pre-utterance belief that A would have time today (*ne*'s prejacent *p*).

(106) A: I have to go now.

B: Zheme kuai? Wo yiwei ni jintian you shijian **ne**.
this fast I falsely.believe you today have time NE
'This fast! I thought you had time today. '

The empirical generalization appears to be that *ne* indicates a drastic difference between B's belief state at the utterance time and her previous belief state. The particle can attach to a prejacent that is being updated to the current belief state, or to a prejacent that represents the pre-utterance belief state, e.g. by collocating with the attitudinal verb *yiwei* 'falsely believe'. If a third party overhears the conversation, they obtain this prior-posterior shift signaled by the particle immediately. In other words, the third party listener can deduce what was and is the speaker's belief state because of the existence of the particle.

This generalization can be captured with an information-theoretic approach. The difference between B's prior and posterior belief states could be measured by Kullback-Leibler (KL) divergence (Baldi 2002), given a message m, the prior belief state of B $L(t)$, and the posterior belief state of B $L(t \mid m)$, as in (Eq-3).

(Eq-3) $$D_{KL}(L(t \mid m) \parallel L(t)) = H(L(t \mid m), L(t)) - H(L(t \mid m)).$$

This treatment is not dissimilar to the account of informativity used earlier: KL divergence is simply the difference between cross-entropy and the entropy of the posterior distribution, which is subtracted out to ensure that the KL divergence is zero when the two belief states are identical.

While the informativity of an utterance measures how much it brings a listener's belief state towards the speaker's, here we measure how much the speaker's belief state has changed before and after she obtained the information from the addressee or the context.

[35] *Ne* has elsewhere been shown to assume the function of a contrastive topic marker (when selecting for a noun phrase in the sentence-medial position) as well as a fragment question marker (Constant 2014).

Returning to (106), prior to A's utterance, the speaker B assigned a high probability to the event that A has time today. Again using slightly oversimplified assumptions, Speaker B believes that either A has time or A does not have time, i.e. a binary choice. Upon hearing A's utterance, the posterior belief state of B is flipped to the side where A does not have time, to which B consequently assigns a high probability. The drastic change of belief states of speaker B (i.e. the difference between low and high probability assignments) predicts a **high** KL divergence. In this way, it is possible to quantify the difference between the speaker B's prior and posterior belief states by $S(m) = -\log(L(\text{does not have time}))$, where L is the speaker's prior.

The Japanese sentence-final particle *no*

Japanese *no* indicates that the speaker signals that *no*'s prejacent is incompatible with what is in the pre-utterance belief state(s) of the listener, instead of the speaker herself, in contrast with the case of *ne* (Kuroda 1965; Cook 1990). By using *no*, the speaker thus signals that her proposed update of *no*'s prejacent to the common ground requires a drastic change to the listener's prior belief, as in (107).

(107) Speaker A saw a pack of butter on the table and complained that she doesn't like salted butter (Cook 1990).

B: Kore-ga oshio-o haitte nai batta na **no**.
this-SBJ salt-ACC add-PROG NEG butter PRT NO
'This is the butter without salt inside.'

Information theoretically, the difference between the listener's prior and posterior belief states could also be measured by KL divergence. In example (107), the context indicates a low-entropy prior belief state, where A believes with high probability that the butter is salted. For simplicity, I assume butter-saltedness to be a binary variable, with the prior belief distribution highly skewed in the direction of it being salted. Since the utterance m contradicts the listener's expectation, after the utterance the listener's posterior belief state is flipped towards a certain belief in unsalted butter. This drastic difference between prior and posterior belief states should be reflected by a high KL divergence. More explicitly, it is possible to quantify how "far" the listener's belief state has shifted upon hearing this utterance, based on $S(m) = -\log(L(\text{unsalted}))$, where L is the listener's prior.

4.5 Quantifying the prior

One difficulty with such proposals is their reliance on explicit probabilities for belief states, which are usually not available in naturalistic settings. However, contexts involving observations from known random processes can be constructed to ensure that rational actors will hold specific belief states. For instance, the current proposals could be tested using a ball-in-urn setting such as that used in Herbstritt & Franke (2019). Contexts could describe rational actors' partial observations of some of the balls, and their probabilistic beliefs about the unobserved balls could be quantified exactly.[36] Explicit probabilities from varying perspectives could be calculated for propositions about the colors of the balls, and these could be used to calculate KL divergences to determine the applicability of different sentence final particles in different utterances. For example, to test the applicability of the particle *ne* in an utterance describing the color of the balls in an urn (e.g. Most of the balls are red.), it is possible to explicitly compute a rational speaker's belief states before (i.e. prior) and after observing the color of a subset of the balls (i.e. posterior), and calculate the KL divergence between these belief states. In addition, while reliance on probabilities does make the current proposals more difficult to validate, it does not subtract from their utility. Once there is proper experimental validation, such a probabilistic formalism could even be used with Bayesian reasoning to glean insights into interlocutors' priors about more naturalistic settings based on their use of such particles.

4.6 Summary

The current chapter provided a new empirical generalization about the meaning contribution of the Mandarin sentence-final particle *de* from as an information maximizer perspective. Based on the cross-entropy model, I quantified the informativity associated with the prejacent that *de* attaches to. The plausibility of applying cross-entropy methods (as well as related Kullback-Leibler divergence-based methods) was further explored in the case of enriched prior knowledge and with other sentence-final particles. Hence, besides exhibiting its advantage in

[36] For example, in an experiment described by Herbstritt & Franke (2019), the number of red balls drawn from the urn was first provided, e.g. *you draw 6 balls and observe that 3 of them are red.* The participants were next asked the question of *how many red balls do you think there are in the urn in total?* Given the 11 possible answers (any number from 0 to 10), the participants were required to adjust the corresponding 11 sliders and the labels of which are ranged from *impossible* to *certain*. Henceforth, participants evaluated the likelihood represented by each probability adjective for its corresponding potential answer given the number of red balls that has been provided in the task.

capturing the notion of informativity that proves useful in understanding the meaning of the cleft *de* particle here, the current model also revealed a potential direction of understanding the subtle pragmatic meanings of sentence-final particles in general.

Such treatment using a Bayesian framework is theoretically desirable. As the distance between the prior and posterior belief states of the listener can be directly measured by interpretable units such as bits, if concrete numbers are given to the listener's prior and posterior probability. This allows us to predict the gradience in the felicity of particles like *de* when occurring with an utterance. In addition, the speaker's attitude can be intrinsically modeled as a hint to her prior belief state. With a given belief state, the speaker uses a specific particle to address the distance between the prior and posterior belief state, which is directly linked to her surprised attitude.

The discussion ends by noting that the probabilistic reasoning I have assumed is encoded in the meaning of the discourse particles. In doing so I deviate from the more traditional view where truth-conditional denotations are fed to a probabilistic/Bayesian pragmatics. The current approach thus is in line with recent developments towards a complex interface approach to meaning, encompassing the realm of probabilistic semantics/pragmatics (e.g. Champollion et al. 2019), as well as other facets such as speech act theory (e.g. Krifka 2017b).

Importantly, nevertheless, the discussion so far only covers one side of the story. Evidence abounds to indicate that a distinct, stand-alone sentence-final particle de_{EVID} is to be found in Mandarin, which has been subject to a number of analyses in the literature (e.g. Soh 2018) and has given rise to a significant amount of confounding due to its close proximity in position and meaning with the informativity maximizer de_{IMAX} particle. Suffice it to say that a full empirical picture of the *de* particles require that another syntactically/semantically precise characterization of this second use of de_{EVID} be also provided. In a nutshell, the next chapter is devoted to showing that de_{EVID} encodes an evidential meaning on top of an informativity meaning (de_{IMAX}), and the structural positions of the two *de*s should not be conflated. The evidence thus makes the case for postulating two distinct lexical entries for a pair of homophonous particles.

Chapter 5

De as an evidential operator outside of the clefts

In the previous chapter, we have seen that de_{IMAX} functions pragmatically as an information maximizer in cleft constructions. However, certain contexts in which *de* seems to be felicitous cannot be explained in terms of informativity. The current chapter concentrates on a stand-alone particle use of de_{EVID} that encodes a contrary-to-expectation evidential meaning. The sentence-final particle status is evidenced by the fact that in this specific use, de_{EVID} disallows an overtly realized right-attaching head and as such differs from the other constructions with *de* that come with a head that may be implicit or overtly realized. This specific use also warrants a detailed investigation in its own right, as it is found to be very productive but has received relatively little attention.[37]

The rest of this chapter is structured as follows. In section 5.1 the distribution of the stand-alone particle use of de_{EVID} is provided, in which a distinction is made against the de_{IMAX} particle in the *shi...de* construction. Section 5.2 clarifies that these two *de*s have different meanings and proposes a formal characterization of the evidential meaning of the de_{EVID} particle. It further follows from the semantic difference that the two particles do not occupy the same

[37] This chapter is based on the proposal in a co-authored paper that is under review.

structural position. Thus in Section 5.3, I lay out the respective syntactic projections for the two *de* particles based on their positions relative to other sentence-final particles. I then show in Section 5.4 that the stand-alone de_{EVID} particle is a low C-domain functional head, and by comparison the de_{IMAX} particle in the *shi...de* construction occupies a clause-medial position that is below TP subject-*wh* but above the object-*wh* position at the *v*P layer. The current proposal is compared with previous proposals in Section 5.5.

5.1 Distribution of the evidential particle de_{EVID}

The core observation in this chapter is that the de_{IMAX} particle that participates in the focus-marking *shi...de* construction does not extend to certain contexts, where another de_{EVID} expresses a contrary-to-expectation meaning. Its evidential status will be discussed after I present an (informal) introduction to its meaning contribution. The evidential *de* is often associated with an expectation arising from preexisting knowledge in its licensing context, which is not required by the de_{IMAX} in the *shi...de* cleft construction. These contexts motivate the case that the evidential de_{EVID} has a distinct meaning contribution.

When participating in the *shi...de* cleft construction, the de_{IMAX} particle is perfectly compatible with a context that features no pre-existing expectations. Consider the example in (108).

(108) A train is approaching the platform. The broadcast announces

Ben ci lieche shi kaiwang Gaoxiong fangxiang de. Qing qianwang Jiayi de
this CLF train COP head.to Gaoxiong direction DE please head.to Jiayi REL
chengke zai di'er zhantai shangche.
passenger LOC second platform board

'This train is heading for Gaoxiong. Passengers who are going to Jiayi please board from the second platform. '

The announcement does not assume a rich prior knowledge on the part of the hearer, for instance it does not require that the hearer has an idea as to where the train is heading for, or what stations are along the way. However, such knowledge is implied if the de_{IMAX} particle in clefts is replaced by the stand-alone particle de_{EVID} , illustrated in (109).

(109) A train is approaching the platform. The broadcast announces

??Ben ci lieche kaiwang Gaoxiong fangxiang de.
this CLF train head.to Gaoxiong direction DE
Intended: '(Actually,) this train is heading for Gaoxiong.'

Here with the presence of a stand-alone de_{EVID} particle, the reading is changed to one where the speaker expects the hearer to hold a certain prior belief that the train is heading for somewhere else (than Gaoxiong). (109) would make sense if the speaker tries to correct the hearer by telling her that this is not the case. I capture this intuition by postulating that the role of the stand-alone SFP de_{EVID} is to give rise to the inference that its prejacent is not compatible with the pre-utterance common ground. I will return to a detailed discussion of this formulation in section 5.2. The weirdness of the utterance in the particular context in (109) comes about, because a train station announcement normally does not assume any specific prior discourse with the passengers.

The utterance in (109) becomes acceptable if situated in a context that imposes a requirement of holding such knowledge. For example, it is fine in a context where the hearer wants to go to Taibei (the opposite direction to that of Gaoxiong). Suppose the hearer could not find the train information in time, so she hopped onto a random train and then asked the conductor if it was indeed the right train. After hearing her destination, the conductor could well reply with the utterance in (109), and quite naturally with the de_{EVID} particle appended to the sentence, as in (110).

(110) The conductor answered: 'Wrong direction.
Ben ci lieche kaiwang Gaoxiong fangxiang de! '
this CLF train head.to Gaoxiong direction DE
'Actually this train is heading for Gaoxiong.'

In such situation, the speaker knows that the hearer has the expectation that the train is going to Taipei (not Gaoxiong). This expectation is not compatible with what the speaker intends to convey with the prejacent. The evidential de_{EVID} particle is employed to signal a contrary-to-expectation reading. With this meaning, it is expected that de_{EVID} is not felicitous together with continuations such as 'I feel the same' or 'just as I expected'. This is indeed the case, as (111) shows.

(111) The passenger then replies:
?? 'Wo ye juede shi.'
I too feel true
Intended: 'I feel the same. '

De_{IMAX} , in contrast, does not encounter the same problem, as shown in (112).

(112) a. Mary was late and finally met John at the platform. She didn't exactly know where this train was going, and John told her

'Zhe tang lieche shi kaiwang Gaoxiong fangxiang de.'
this CLF train COP head.to Gaoxiong direction DE
'It is towards Gaoxiong direction that train is heading. '

b. Mary answers:

'Guoran xiang wo xiang de yiyang.'
just as I believe REL same
'Just as I expected. '

This is because de_{IMAX} does not assume prior expectation from the speaker, therefore it is compatible with continuations indicating that a prior expectation is met. Continuations of this class thus serve to diagnose between these two distinct *de* particles.

Other examples converge to show that the stand-alone de_{EVID} particle signals that the inferences obtained from its prejacent are not compatible with the established common ground. Consider another example in (113).

(113) Everyone knows that the host of a live show has been away in Gaoxiong for a while. The director of the show needs her now, but thinks she might not be back any time soon. A colleague reminds the director:

Ta cong Gaoxiong huilai de!
She from Gaoxiong back DE
'She is gonna come back from Gaoxiong.'

The colleague knows the director has an expectation that the host is not coming back, and by using de_{EVID} indicates that he is aware of the director's expectation. On the contrary, if a corresponding *shi...de* sentence is employed, as in example (114), the unexpected meaning is no longer conveyed.

(114) Same context as in (113):

??Ta shi [cong Gaoxiong]$_{\text{Foc}}$ huilai de.
She COP from Gaoxiong return DE
'It is from Gaoxiong that she is back.'

Given the focus-background partition associated with the cleft sentence, the sentence in (114) has the paraphrase 'Gaoxiong is the place that she came back from, not other places else.' This reading is not congruent with the QuD (the supposedly focal information encoded by the cleft is already part of the background within the QuD).

A similar case can be seen with the examples in (115).

(115) a. After the manager promoted Mary with reservations, she promised that she would not let the manager down:

Wo yiding haohao nuli de.
I definitely properly work.hard DE

'I will definitely work hard (you can count on me for that).'

b. Same context

??Wo shi yiding haohao nuli de.
I COP definitely properly work.hard DE
Intended: 'It is definitely working hard that I will do (you can count on me).'

The premise for Mary uttering the sentence in (115a) is that she hopes to eliminate the potential worry of her manager that she might not work hard. The alternative *shi...de* construction provided in (115b) sounds very unnatural, where the copula *shi* seems to be redundant in this context. One might be tempted to explain the observation by assuming the difference between the two *de*s merely comes down to the presence or absence of the copula *shi*. For example, if we assume that the copula has a second function as a focus adverb, it may introduce the change of interpretation in the above examples. However, in the next chapter (Chapter 6), I will argue that the copula does not contribute any meaning of that sort. For now, I will continue the discussion by solely focusing on *de*'s contribution.

In the above I have given several examples under the assumption that we are dealing with two *de*s with different meaning contributions. If it is indeed the case that we have two lexical realizations of *de*s, we should be able to find cases where they occur together. This prediction is borne out by the following corpus-attested utterances, as in (116) (source: Chinese Web 2017 (zhTenTen17) Simplified: 33113161).

(116) a. Yikaishi wo qishi'r jiu shi xiang rang ta lai da ge za'r de eryi de.
at.first I actually just COP want make her come do CLF errands DE ERYI DE
'At first, I just wanted her to come and do some odd jobs.'

b. Qiujier de fuqin zhi shi qidai gongjue de cizi,
Churchill POSS father only COP seven.generation duke POSS second.son,
meiyou zige jicheng bulunhaimu gong. Qiujier buguo shi zai
NEG qualifications inherit Blenheim palace. Churchill just COP LOC
nali chusheng he jiehun de eryi de.
there be.born and get.married DE ERYI DE
'The father of Winston Churchill was only the second son of the seventh generation Duke. He was not qualified to inherit the Blenheim Palace. Winston Churchill was simply born and got married there.'

We can further employ more distribution diagnostics. The sentence-final particle literature has used the co-occurrence patterns of an SFP and its collocating adverb as a diagnostic for identifying the position/height of the projection of said SFP (e.g. the collocation between *yijing* 'already' and the aspectual marker *le*, *jiu* 'just' and the scalar focus particle *eryi*, and *zhengzai*

'in the process of' and the aspectual marker *ne*, cf. Shyu 1995: 33, Cinque 1999: 89, Hole 2004: 50;70, Badan & del Gobbo 2015: 45, Hole 2017: 396). The investigation of speaker-oriented adverbs thus provides a useful probe into the syntactic position of de_{EVID} . In this regard, it is interesting to note that evidential adverbs such as *qishi* 'actually' co-occur with the particle de_{EVID} with a higher-than-chance rate in oral speech, which would be explained if such adverbs function as the specifier of the functional projection of de_{EVID} .[38] One of the examples where *qishi* 'actually' cooccurs with de_{EVID} is as in (117).

(117) Context: Classmates are discussing who to vote for in the upcoming school board election. Rumors spread that little Zhang is an extremely irresponsible person. The speaker weighs in with the following:

Dajia gaocuo le, qishi Xiaozhang banshi hen fuze de.
you.all mistaken ASP, actually little.zhang perform.duty very responsibly DE
'You are mistaken. Little Zhang actually is very responsible when it comes to performing her duties.'

With the absence of a contrary-to-expectation meaning, the de_{IMAX} in the *shi...de* cleft construction does not collocate well with the *qishi* 'actually' adverb, such as (118).

(118) Context: Classmates are discussing who to vote for in the upcoming school board election. One candidate, little Zhang, has not been discussed so far. The speaker weighs in with the following:

Dajia huoxu hai jide, (??qishi) xiaozhang banshi shi zui
you.all probably still remember, (actually) little.zhang perform.duty COP most
fuze de.
responsibly DE
'You might still remember this, but little Zhang is most responsible when it comes to performing her duties.'

Before proceeding, note that the above function of the de_{EVID} particle is involved in expressing a facet of evidentiality. The literature tends to agree that an evidential indicates that a speaker presents a certain degree of commitment to the proposition modified by the evidential (Murray 2017: 23).[39]. The speaker commitment can be seen explicitly by appending an epistemic/evidential expression in (119b) and (119c), compared with (119a).

[38] In Section 5.3.2, I expand on this co-occurrence pattern with support from my own corpus search.

[39] Evidential modifiers express the source of evidence, typically involving sensory experience, e.g. visual evidence *augenscheinlich* 'apparently', or auditorial evidence, e.g. *I hear*. Some may additionally be related to commitment of others, e.g. *reportedly* (Krifka 2017b). Other types that relate to inferences are also possible, e.g. *hané* 'I gather' in Cheyenne (Murray 2017) and *wohl* 'presumably' (Zimmermann 2008). An epistemic modal encodes the degree of confidence the speaker has in her statement. The two notions of epistemicity and evidentiality are thus closely related, as both pertain to the speaker dimension and it is common crosslinguistically to find languages that

(119) a. It is raining.

b. It is raining, I believe.

c. It is raining, presumably.

It is generally assumed that the speaker expresses her commitment whenever she performs an utterance like in (119a), even without an evidential expression indicating such commitment. Thus, a sentence becomes infelicitous if such commitment is denied, as shown in (120a). Interestingly, the judgment improves when the same propositional content embeds under an attitude verb *suppose*, as (120b) illustrated.

(120) a. ?? It is raining but I have no evidence that it is raining.

b. I suppose it's raining, but I have no evidence that it is raining.

Here the case in (120a) pertains to pragmatic oddness rather than semantic contradiction, as the weirdness of the utterance stems from the violation of a speech act norm sanctioned by social convention. However, in (120b), a subsequent denial of the speaker evidence does not bring about infelicity, given that by using *I suppose* to locate the raining event within a hypothetical situation the speaker no longer commits to the raining event belonging to the actual world.

A similar example of the pragmatic oddness arising from retracting speaker evidence and the amelioration effect under *suppose* embedding can be observed in (121).

(121) a. ?? It's raining but I don't believe it.

b. I suppose it's raining but I don't believe it.

Importantly, contrary to evidentials, epistemic modals are not influenced by *suppose* embeddings (Yalcin 2007). This is seen by the downright unacceptability in both (122a) and (122b), differing from the amelioration effect of *suppose* seen in (121b and 120b).

(122) a. # It is raining and it might not be raining.

b. # I suppose it is raining and it might not be raining.

---

employ epistemic modals to encode evidentials. Here I assume that the two categories should be teased apart, despite their conceptual proximity. As has been pointed out by various authors, the expression of evidential source is not equivalent to the expression of speaker confidence, and epistemic modals are but one of many factors that are involved in encoding evidentiality (De Haan 2005; 2009; Hacquard & Wellwood 2012; Krifka 2017a)

Turning to the de_{EVID} particle now, the following contrast in example (123) suggests that de_{EVID} , in conjunction with its agreeing speaker adverb *qishi* 'actually', also survives the *suppose* test, compatible with the behavior expected of an evidential.

(123) a. ?? Waimian xiayu le, dan (qishi) bingbu xiayu de.
outside rain ASP but (actually) NEG rain DE
Intended:'It's raining outside, but actually it is not raining.'

b. Rang women jiashe waimian xiayu le, dan (qishi) bingbu xiayu de.
Let we suppose outside rain ASP but (actually) NEG rain DE
'Let's suppose that it's raining, but actually it is not raining.'

The 'actually' meaning thus is in line with evidentials. Importantly, note that by comparison epistemic adverbs in Mandarin do not introduce an acceptable continuation in a *suppose*-embedding environment, as in (124).

(124) ?? Rang women jiashe waimian xiayu le, ye keneng bingbu xiayu.
Let we suppose outside rain ASP too probably NEG rain
Intended: 'Let's suppose that it's raining outside, and it probably is not raining.'

In the first proposition the speaker conveys a hypothetical situation where it is raining outside. In the second proposition, the speaker contradicts herself by posing a likelihood of it not raining outside. Unlike in evidentials, the two sets of possible worlds introduced by these two modals cannot be reconciled, and the sentence fails.

To sum up, in this section, we have observed that the de_{EVID} particle behaves differently from the de_{IMAX} particle in the *shi...de* construction. When used for an evidential meaning, de_{EVID} requires a pre-established common knowledge that is not compatible with its prejacent. Such knowledge can be held by the hearer prior to the utterance of the de_{EVID} -attached sentence. On the contrary, the *shi...de* construction has no such prerequisite. It may occur in contexts with no prior knowledge.

5.2 The evidential meaning of *de*

The previous section brought about the observation that there is a second lexical entry for de_{EVID} with its independent semantic contribution, different than de_{IMAX} . In what follows, I propose an analysis that formally characterizes the evidential meaning of de_{EVID} . I also show in the analysis that the evidential meaning cannot be targeted by negation, and provide an explanation of the distributional constraints that de_{EVID} is subject to in different sentence-type environments.

5.2.1 An analysis in terms of evidentiality

I propose that de_{EVID} encodes a contrary-to-expectation reading as its semantic core, the informal idea being that the default inferences that normally come along with the assertion of evidential *de*'s prejacent are blocked from update to the common ground. De_{EVID} then updates to the common ground the worlds that exclude those worlds supporting the default inferences.

Drawing upon Eckardt (2009), this contrast can be represented by introducing a partition of possible worlds into two sets, which are termed "NOM(p)" and "PHÄN(p)", characterized as follows.

(125) i. NOM(p) = those worlds where p (the prejacent of the de_{EVID} -operator) holds true.

ii. PHÄN(p) = conjunction of propositions $\{Q_1, Q_2, .., Q_n\}$ which are normally indicative of the worlds in NOM(p) (i.e. those worlds that are accessible from the p-worlds NOM(p)).

An indicative proposition Q_i relative to NOM(p) is one which, under normal circumstances, is likely to be true given the proposition p. The de_{EVID} -operator, when taking as input its prejacent p, encodes the following at the non-at-issue dimension:[40] The indicative worlds of p are not compatible with the pre-utterance common ground.[41] To see how the interaction of both meaning components derive the contrastive reading, consider the following examples in (126).

(126) a. Context: A promised to read B's paper but hasn't finished it yet. When B proposes to meet, A assumes B wants to discuss said paper, to which B responds:

[40] At the at-issue level, de_{EVID} denotes an identity function that outputs the proposition fed into it.

[41] Eckardt (2009) observes that the German particle *eigentlich*, when receiving stress, encodes a contrastive 'actually'-reading as illustrated by the example in (i).

(i) **Eigentlich** heiße ich Thomas. Aber jeder nennt mich Ede.
actually mean I Thomas but everyone calls me Ede
'My name is Thomas actually. But everybody calls me Ede.'

Eckardt proposes a similar, 'actually'-based analysis of *eigentlich* which anticipates the current proposal. However, Eckardt crucially relies on a focus accent falling on *eigentlich*, which triggers the meaning of incongruent indicative inferences of the prejacent as focus alternatives to the prejacent's literal meaning. I have diverged from Eckardt's analysis for the reason that Mandarin de_{EVID} and *qishi* are not stressed (indeed de_{EVID} is necessarily de-stressed). Furthermore, the multi-dimensional (non-at-issue) approach adopted in my analysis meshes well with the growing consensus that speaker-oriented items tend to target a separate dimension of meaning from what is asserted (see Simons et al. 2010 for detailed discussions).

Wo xiang gen ni taolun xin timu de.
I want.to with you discuss new topic DE
'(Actually/Despite available evidence,) I wanna discuss a new topic with you.'

b. Context: Classmates in a Beijing school were amazed by the fact that one of them, big Bai (a Chinese surname), could read the Japanese captions on a snack food package. Sensing the amazement, big Bai explained:
Wo zai jia jiang riyu de.
I LOC home speak Japanese DE
'(Actually/Despite available evidence,) I speak Japanese at home.'

Taking (126a) for instance,de_{EVID} prejacent p expresses that the speaker B wants to discuss a new topic with A. Assuming that a plausible inference Q_i that is accessible from the worlds in NOM(p) where p holds true would be that B does not have an ongoing old topic that awaits to be discussed with A when B proposes to meet. However, such Q_i is blocked since it is not compatible with the information already known in the common ground. Consequently, the conjunction of $\{Q_1, ...,Q_n\}$ (i.e. PHÄN(p)) is blocked as a whole, and the indicative worlds cannot be updated. In the same vein, in example (126b), a plausible indicative circumstance that normally comes along with de_{EVID} prejacent p that the speaker speaks Japanese at home is that the speaker may attend a Japanese school, or have a Japanese name, etc. The indicative inferences Q_i are blocked from being updated to the common ground, since they are falsified by the context. It is known that the speaker has a Chinese surname and attends school in Beijing. In sum, for both cases, de_{EVID} indicates the exclusion of the conjunction of the indicative worlds in PHÄN(p).

One may want to object to this reasoning and suggest that the contrary-to-expectation meaning might not be encoded by de_{EVID} , but rather supplied pragmatically from the context. De_{EVID} by itself could supply a distinct meaning, e.g. to assert the factuality of the statement as suggested in the literature (cf. Lü 1982; Li 2006; Huang & Liao 2013; Lin 2016; Wan 2016).[42] Meanwhile, what is being asserted would contradict the prior belief states of the hearer as are present in the immediate prior context. Confirming something not compatible with the contextual information would thus give rise to a contrary-to-expectation coloring.

One way to differentiate between the literal meaning contribution of de_{EVID} and the contextually provided pragmatic inference is to look into contexts that do not themselves contain information contradictory to the de_{EVID} -utterances situated in those contexts. One case in

[42] We will return to discuss more details of these proposals in section 5.5.

hand are out-of-the-blue utterances. A typical example that belongs to this category is the train broadcast type as was mentioned in (108), which is presented in a modified form in (127).

(127) Qing zhuyi! Ben-ci lieche zai xiayi zhan zhuanxiang de.
please pay.attention this-CLF train LOC next station turn.direction DE
'Attention! (Actually,) This train will turn around at the next station. '

Such utterance has no preceding discourse and hence no pre-existing biasing information. Importantly, a contrary-to-expectation reading ('the train will turn around instead of going forward') is still obtained when de_{EVID} is attached (and disappears in the absence of de_{EVID}). In other words, the reading here cannot be plausibly derived via pragmatic strengthening.

The case for the contrary-to-expectation reading being part of the literal meaning of de_{EVID} can also be made when a de_{EVID}-utterance is situated in a context that supports the prejacent of de_{EVID}. Consider the example in (128).

(128) A: Zhe zhou tianqi yinggai hao cha ba?
This week weather ought.to really bad Q
'The weather this week oughtta be really bad, right?'

B: Mingming dou siyuefen le, zheliangtian xia xue ($^{??}$de)!
obviously all April ASP, these.day fall snow DE
'It's already April, it's gonna snow these few days!'

A: Zhe hen zhengchang, Deguo siyuefen dou zheyang.
this very normal, Germany April all this.way
'This is quite normal. Aprils in Germany are always like this.'

Here the context (i.e. A's knowledge state) supports B's statement. Since no contextually provided contrary-to-expectation implicature is involved here, one should predict that B's answer be felicitous with de_{EVID} attached, if de_{EVID} encoded a confirmative meaning. The B-sentence is nevertheless very odd, which would be accounted for if de_{EVID} signals that the prejacent's indicative inferences are incompatible with the prior common ground.

5.2.2 Additional evidence for the evidential meaning of *de*

The current analysis locates de_{EVID} at the non-at-issue level of the sentence content, rather than as part of what is asserted. This treatment finds additional support in the failure of the encoded meaning of de_{EVID} to be targeted by negation, which serves as a yardstick diagnostic for non-at-issue-ness in the literature (Potts 2005). As (129) demonstrates, the negative reply cannot felicitously address the 'actually'-meaning contributed by de_{EVID}. If de_{EVID} made up part

of the at-issue (asserted) content, it should be able to take scope below sentential negation, contrary to fact.

(129) A: Songdaoxiaojie qu bangongshi de.
Miss.Songdao go.to office DE
'Actually, Miss Songdao will go to her office.'

B: Bu.
NEG
'No.'

(i) ✔ 'Miss Songdao will actually not go to her office.'

(ii) * 'It is not unexpected that Miss Songdao will go to her office.'

I further show that the semantic analysis accounts for de_{EVID} 's distributional constraints in different sentence type environments. First, I want to point out that de_{EVID} is generally speaking compatible with an interrogative environment. Examples (130a)-(130b) illustrate that de_{EVID} combines with question prejacents.

(130) a. Gou zenme xiu dao tonglei de?
dogs how smell RES kindred DE?
'How do dogs tell who are their own species by sniffing?'

b. Ta zenme cong wuzhou diaodao beijing gongzuo de?
he how from Wuzhou transfer.to Beijing work DE
'How did he actually transfer from Wuzhou to Beijing to work?' [Question]

Nevertheless, de_{EVID} is excluded from appearing in questions under a rhetorical question reading, such as (131).

(131) Shei xihuan shengbing (*de)?
who like being.sick DE
Intended: 'Who likes to be sick?'
(≈ 'No one would like to be sick.') [Rhetorical question]

Both of the above distributions follow from the previously sketched evidential semantics. Assuming a Hamblin-Karttunen interpretation of the question as denoting a set of propositions (set of sets of worlds) $\{p_i\}$, it follows that the indicative inferences can be computed by deriving from each NOM(p_i) the corresponding PHÄN(p_i) (i.e. the conjunction of propositions indicative of p_i). Suppose that *zenme* 'how' in (130b) ranges over the alternatives {manner A, manner B}. From de_{EVID}'s semantics I derive that certain indicative inferences based on the proposition that he transferred in manner A are excluded from the common ground, *and also* certain

indicative inferences based on the proposition that he transferred in manner B are excluded. This interpretation of conjoined indicative inferences is unproblematic on my analysis. This interpretation also accords with native intuition, according to which uttering a question with de_{EVID} attached to the end is used to convey the speaker's attitude that none of the alternative possible answers available to her are plausible based on what she already knew, hence she has no idea as to how to compute the true resolving answer.

I argue that rhetorical questions differ from information-seeking questions by expressing a negative assertion (Han 2002; Cheung 2009). In my mechanism, this negative assertion interpretation arises via a pragmatic implicature. The rhetorical question construction in (131) introduces Hamblin-style alternative propositions defined on a contextually determined set of individuals D. x is an individual, is a member of D and x likes to be sick. The context where a rhetorical question is uttered, however, is typically one where D contains no members. As a result of the null set D, the corresponding Hamblin set also contains no propositions. The question radical in (131) thus has an empty set as its denotation. The hearer computes this empty set from context, and accordingly infers that the context verifies the truthfulness of a negative statement. (131) thus receives the inference in (132).

(132) 'Who likes to be sick? (empty intersection set)' → 'No one likes to be sick.'

However, the null answer set in rhetorical questions gives rise to an interpretation problem in the presence of de_{EVID}. The indicative inferences of de_{EVID} are computed from the question radical's Hamblin alternatives, which are in turn based on the alternative individuals denoted by the *wh*-phrase. With a null individual set, it follows that the indicative worlds within PHÄN(q) (assuming q is the question radical) is empty. As a result, no incompatibility should arise between the indicative inferences PHÄN(q) and the pre-utterance common ground (I assume that an empty proposition is vacuously compatible with any proposition whatsoever), thereby violating the semantic requirement of de_{EVID}.

Aside from rhetorical questions, I further observe that de_{EVID} is ill-formed with imperatives, such as in (133).

(133) * Kai men de (ba)!
open door DE (IMP)
Intended: 'Open the door!' [Imperative]

I argue that another interpretation failure underlies the infelicity of (133). In imperative sentences, the sentence radical to which the force/speech act operator (e.g. command) attaches

does not denote a proposition anchored to parameters of the utterance context such as a temporal index. Rather, it represents a tenseless propositional primitive that does not receive a truth value evaluation (Belnap 1990; Mastop 2011). The sentence radical in (133) is not a description of a particular situation of door opening. It merely denotes an abstract, proposition-level concept such that the speaker commands the hearer to act in a certain way, by which a situation instantiating the concept takes place after the utterance. Only after the hearer brings about a change of the state of affairs does the proposition expressed by the imperative sentence radical become true (Van der Wurff 2007: 32). Since no situation of door opening has taken place during the utterance, there are also no indicative circumstances that follow from the opening of the door, hence there can be no exclusion from the common ground. Once again, the semantic requirement of de_{EVID} is violated.

In addition, if we look at the phenomena from a syntactic perspective, imperatives are structurally reduced, where the CP layer of the sentence is assumed to be truncated (e.g. cross-linguistic observations for subject-drop and minimal verb inflection, cf. Sadock & Zwicky 1985; König & Siemund 2007). Therefore one may motivate a purely structural explanation, according to which an imperative sentence does not host a high projection that evidential markers could sit in.

In sum, the previous section has provided a semantic analysis couched in Eckardt's (2009) terms for the sentence-final particle de_{EVID} that has an evidential contrary-to-expectation reading. De_{EVID} excludes the possible worlds that can normally be inferred by its prejacent and updates the rest of the possible worlds to the common ground. I have further shown that this meaning is tied to the particle de_{EVID} itself on a non-at-issue level. This is supported by the fact that de_{EVID} cannot be targeted by negation, and also by its incompatibility with rhetorical questions and imperatives. It departs from the meaning of de_{IMAX} in the *shi...de* construction, which has been discussed in the previous chapter, since the latter signals the most informative answer that the speaker is able to convey.

A natural consequence of the semantic difference between the two *de* particles is that they do not share a structural position as well. In the next section I turn to a syntactic discussion, in which I present a variety of syntactic behavioral differences that further justify postulating two separate lexical entries for *de*.

5.3 Syntax of de_{EVID}

My syntactic discussion rests on two assumptions. First, I adopt the 'Split-CP' hypothesis (e.g. Rizzi 1997), according to which what in earlier versions of the generative framework was assumed to be a unitary CP layer is decomposed into sequences of functional projections (Rizzi 1997; Cinque 1999; Rizzi 2001; Cinque 2006; Rizzi & Cinque 2016). Rizzi (1997; 2001) argues that the C-domain comprises an array of hierarchically organized functional heads. As an initial approximation, the projection reserved for sentence type and speech act is structurally higher than the projections associated with topic and focus information, which in turn precedes the canonical subject position (within FinP, where the head of FinP agrees in finiteness with the clause).

Building upon Rizzi's articulated structure, Cinque (1999) draws upon crosslinguistic evidence from adverbs, affixes and particles and expands the split CP with a fine-grained cartography of what in his account are I-level categories. However, Cinque's higher I-level categories (those above his tense node) are all speaker-oriented. I therefore classify them as belonging to the lower portion of C categories. Cinque also establishes the mapping among AdvPs and functional heads: He assumes that adverbs serve as specifiers and enter into agreement relations with functional heads (often instantiated as particles). For the purpose of the current discussion I only list a subset of Cinque's relevant cartographic components in (134). One of them hosts evidentials, another one epistemic modality, and this will become important later on.

(134) a. Speech act indicating operators
frankly

b. Evaluation
unfortunately, luckily

c. Evidential
allegedly

d. Epistemic modality
likely, probably

Second, I assume with Tang (1988) and a number of subsequent proposals (e.g. Lin 1992; Simpson 2014; Paul 2015) that functional projections in the Chinese C-domain are head-final (contrary to the head-initiality generally assumed for VoiceP and DP in Chinese syntax).

Specifically, SFPs are proposed to be functional heads of their respective projections, which are preceded by their complements. Tang (1988) offers a number of arguments in favor of a head-final configuration. First, he notes that certain SFPs in Chinese indicate sentence types and convey speech acts. These functions have standardly been associated with functional heads in the left periphery across languages. Therefore, assuming that Chinese SFPs are functional heads accords with the universally motivated function-structure mapping. Also, equivalents of many Chinese SFPs (such as the question particles *ma* and *ba*) are found in Japanese and Korean and have traditionally been treated as functional heads in these head-final languages. Hence analyzing Chinese SFPs as heads enables us to capture important crosslinguistic generalizations. Thirdly, East Asian SFPs correspond to a class of sentential adverbials, with both categories exhibiting hierarchical orders that are mirror images of each other. The correlation of these two linear sequences follows straightforwardly if a SFP and its respective sentential adverbial form a specifier-head relationship, and would be rather mysterious if SFPs were not functional heads but some ontologically distinct entity (see Cinque 1999: 42-43 for a similar argument).

My syntactic discussions build on several past works, which have investigated the relative orders of SFPs in Mandarin and Cantonese. I only briefly summarize the most pertinent discussions on Mandarin (Cantonese features a much larger inventory of more than 40 SFPs, most of which are not related or applicable to Mandarin). Li (2006) derives a comprehensive articulated C-domain hierarchy for Mandarin based on the core interpretations provided by each particle. Li characterizes *de* as occupying the lowest C-domain projection, FinP (citing Sybesma 2004, who only discussed the Cantonese corresponding particle *ge*). The details that motivate such low attachment, however, are not given. Furthermore, Li implicitly assumes that her proposed hierarchy translates into constraints on the linear sequencing of SFPs. With the proposed syntactic structure, certain combinations of particles can be ruled out automatically. For example, the co-occurrence of *ma* and *ba* (both posited in DegreeP) are excluded, as particles within the same functional projection are predicted to stand in complementary distribution. A prediction of the allowable linear sequencing is also in place, hence a combination with the order of *le* preceding *a* should be attested, to the exclusion of *a* preceding *le*. However, the combinatorial capabilities of individual SFPs are not explicitly mentioned.

Paul (2014) constructs a structured system of layers to accommodate a larger inventory of Mandarin SFPs within the split CP. Specifically, SFPs are argued to project functional

projections that reside in one of three layers: low CP, ForceP or AttitudeP, while each SFP is assigned an individual discourse function. Pan (2015; 2019), building upon Paul's (2015) approach, revises the Low C layer (by distinguishing between what he calls the exclusive focus projection OnlyP and what he calls the sentential aspect projection (S.)AspP) and provides a more fine-grained taxonomy of the discourse functions of particles. My current analysis will be based on a combination of Paul's system and Pan's modified C-domain. The details are given in Table 5.4.

Projections	Particles/Operators	Discourse function
AttitudeP (speaker's attitude)	*ei*, *bei*, *laizhe*$_2$, *ou*, *ya*, *ne*$_3$, *la*, *na*, *a* etc.	Speaker's attitude (including warning, astonishment, exaggeration) subjective opinion
iForceP (illocutionary force)	*ma*	Standard *yes-no* question
	ba$_1$	Weak imperative
	ba$_2$	Confirmation *yes-no* question
	OP-*wh* (null)	*WH*-question operator
	ne$_2$	Follow-up question
OnlyP	*eryi*	Sentential exclusive focus
AspP (sentential aspect)	*ne*$_1$	Progressive aspect
	laizhe$_1$	Recent past
	le	State changing

Table 5.4: Mandarin SFP projections according to Paul (2014) and Pan (2015).

Notably, neither of the two studies includes a discussion of *de* and its possible structural position within the articulated C domain. The goal of my analysis is thus to probe the structural position of *de*$_{\text{EVID}}$ by surveying its co-occurrence patterns with other SFPs within the range delineated by Li, Pan and Paul's previous work.

Another work of high relevance is the analysis in Erlewine (2017), which argues for a discourse-related clause-medial position between TP and *v*P that hosts SFPs such as *le* and *eryi*, evidenced by a series of diagnostics probing the scopal interaction between these SFPs and other operators. I additionally believe that this low discourse-related position could host the separate *de*$_{\text{IMAX}}$ particle in the *shi...de* construction, thereby capturing the structural differences between the two distinct lexical entries of *de*. I will return to this issue in section 5.4 after the evidential *de*'s position has been established.

While the structural treatments in the above studies form the basis of my upcoming analysis, I mention two potential issues (both based on Daniel Hole, p.c.), which lead to my analysis differing from some of their assumptions. I will move on to my own discussion afterwards.

First, Paul (2015) and Pan (2019) propose that sentence-final *le* is hosted by a functional projection at the AspP layer (this claim dates back to Zhu 1982). They assume that the AspP layer takes scope above TP, which I find problematic. Given Cinque's cross-linguistically motivated assumption (Cinque 1999: 87), the TP projection, which hosts purely deictic temporal expressions such as *now*, *then*, *soon* and *recently* (cf. Reichenbach 1956; Levinson 1983) should be located higher than AspP instead of below it.[43] As example (135) demonstrates, the purely deictic adverbs *zhihou* 'then' and *xianzai* 'now' in Mandarin must precede the aspectual adverbial *yijing* 'already', the latter being in a specifier-head agree relation with the purported AspP head *le*. The opposite order is degraded.

(135) a. Context: The speaker is trying to ask a customer to return her call tomorrow. "Call me tomorrow. Try it at 12'o clock.
Wo zhihou (kending) jiu yijing neng gei ni tigong gengduo xinxi le."
I then (certainly) JIU already can give you provide more information ASP
'I should then be able to provide you with details.'

b. Context: Paul has to go to jail over a petty crime. People in town are sorry for him, since his grades were good enough to apply for a local university.
Ruguo ta mei tou na ping jiu, ta xianzai yijing shangdaxue le.
if he NEG stole that bottle alcohol, he now already go.university ASP
'If he hadn't stolen that alcohol, he would have gone to university now. '

This lends support to Cinque's view that TP is hierarchically higher than AspP, and undermines Zhu's (inter alia) alternative ordering. I stick to Cinque's treatment and assume TP is above AspP in the following discussion.

Second, the treatment of *eryi* as equivalent to the sentential exclusive focus 'only' (Pan 2019) warrants further revision. As argued in Hole (2017), *jiu*/*cai* are scalarity markers that are intrinsically different from exclusives. As shown in (136a), these scalarity markers agree with the SFP *eryi*. Furthermore, in a context where the exclusion of alternatives is licensed,

[43] Only the sentence-final inchoative aspectual *le* is concerned for the current discussion. The other use of *le*, which marks perfective aspect (Sybesma 1997; Soh 2009), is not relevant to our discussion, since it does not appear at the sentence boundary, but has to be inserted in between verbs and their objects/complements and hence belongs to the V-domain (Sybesma 1997).

yet a scalar interpretation is ruled out, such as (136b), *eryi* becomes infelicitous. I hereafter assume that *jiu*/*cai* and *eryi* are hosted by the ScalarFocusP projection. Note that treating TP as above AspP also accords well with Erlewine's (2017) postulation that *le* and *eryi* occupy a TP-internal position.

(136) a. Wo jiu/cai chile wan chaodan eryi.
I JIU/CAI ate bowl scrambled.egg ERYI
'I only ate a bowl of scrambled egg./I ate as little as a bowl of scrambled egg.'

b. # Zhiyou hongse de wuti shi sanjiaoxing de eryi.
only red POSS object COP triangle NOM ERYI
Intended:'Only the red objects are triangular.'

Last but not least, for consistency reasons Cinque's (1999) articulated C-domain is adopted throughout this chapter. Aside from terminological differences such choice also enables us to pinpoint the position of de_{EVID} against a fine-grained array of functional heads expressing speaker-oriented categories.

In the next two subsections, I approach the syntactic position of de_{EVID} first by its interactions with other SFPs listed in Table 5.4. As a subset of these categories are delineated by well-defined adverbial specifiers in the Cinquean hierarchy, I then approach the position of de_{EVID} by comparing its agreeing adverbial specifier *qishi* 'actually' against adverbs from other categories given their SFP-heads.

5.3.1 Relative position of de_{EVID} with respect to other SFPs

In this subsection, I investigate the relative position of de_{EVID} in a bottom-up style, starting from its interaction with the lowest SFP *le*. Based on the results, I motivate the conclusion that de_{EVID} is structurally higher than the layers projecting aspectual particles as well as the projection of the focalizing *eryi*-particle, while lower than the layers for speech acts and speaker evaluation.

De$_{\text{EVID}}$ with state-changing *le*

I observe that de_{EVID} follows the aspectual/deictic sentence-final particle *le*. This is demonstrated in the following naturally occurring utterances in (137a)-(137b).

(137) a. Keshi women yijing shanglianghao zhejian shi'r le de ya!
but we already discuss.RES this.CLF thing ASP DE EXCLAM
'But we have already finished discussing this thing!'

b. Shiqu weiyi de qinren zhihou, yinggai bu hui zai you shenme keyi
lost sole POSS loved.one after, ought.to.be not will again have what can
shangxin dao ku chulai le de ba?
be.sad to cry out ASP DE IMP?
'After losing the only beloved one, there should not be anything that would make her so sad that she will cry out loud, right?'

(138) illustrates a contrast in acceptability: The utterance in (138a) with a *le* < de_{EVID} configuration is attested. Switching the order between the two SFPs as in (138b) leads to a degraded judgment.

(138) a. Xiaomin yinggai gele shuangyanpi le de ba?
Xiaomin should have.cut double.eyelid ASP DE IMP
'Xiaomin should have double-folded her eyelids already, shouldn't she?'

b. *Xiaomin yinggai gele shuangyanpi de le ba?
Xiaomin should have.cut double.eyelid DE ASP IMP

The above data yield the following linearization in (139):

(139) (TP/AspP) *le* < de_{EVID}

To probe the interaction among the evidential *de* and other particles, I next move to the layer of scalar focus projection (ScalarFocusP), which stays above the tense and aspectual layer and hosts its own SFP particle *eryi*.

De_{EVID} with the scalar focus particle *eryi*

The SFP *eryi*, as the head of ScalarFocusP, must precede *de*, cf. (140a)/(141a). Switching the order leads to degradation, cf. (140b)/(141b).

(140) a. Wo jiu limaoxingde wen ni yixia eryi de.
I JIU politely ask you once ERYI DE
'I am simply asking you about it for courtesy's sake. '

b. *Wo jiu limaoxingde wen ni yixia de eryi.
I JIU politely ask you once DE ERYI

(141) a. Ta mingtian dasuan qu hejiu le eryi de.
He tomorrow plan.to go drink.alcohol ASP ERYI DE
'Now he plans to go out just for drinks tomorrow. '

b. *Ta mingtian dasuan qu hejiu le de eryi.
He tomorrow plan.to go drink.alcohol ASP DE ERYI

Assuming ScalarFocusP is higher than TP/AspP, the fact that de_{EVID} sits higher than *eryi*'s projection yields the refined linearization in (142).

(142) (TP/AspP) *le* < (ScalarFocusP) *eryi* < de_{EVID}

De$_{\text{EVID}}$ with speech act particles and higher SFPs

I now proceed to structurally higher SFPs sitting at Mood$_{\text{speech act}}$, as well as other cartographic layers at even higher levels. I find that SFPs located at Mood$_{\text{speech act}}$ consistently follow *de*$_{\text{EVID}}$. The opposite orders between these particles and *de*$_{\text{EVID}}$ are not possible, as shown in the examples in (143).

(143) a. Ta zaijia jiang riyu de ma?
she at.home speak Japanese DE Q
'Does she speak Japanese at home?'

b. Ta jiujing zenme dasuan zuochulai zhedao ti de ne$_2$?
she frankly how plan.to figure.out this problem DE NE$_2$
'(So) Frankly, how does she plan to figure out the solution to this problem?'

c. Ta qishi yijing kuai chiwan le de ba$_2$?
he actually already almost eat.ASP ASP DE BA
'Hasn't he actually already almost finished it?'

d. Qishi ni mei kaolü de you duome zhouquan, ni zhishi buxiang
actually you NEG considerate DEG have much thoughtful, you only NEG.will
kaolü name duole eryi de ba$_2$?
considerate that much only DE BA
'Actually you weren't being that thoughtful, you just don't want to think too much, don't you? '

In (143a), we see that the yes-no question marker *ma* of the Mood$_{\text{speech act}}$ class must appear after *de*$_{\text{EVID}}$.[44] Similarly, the particle *ne*$_2$ marking follow-up questions (Paul 2015) must follow *de* (143b), as does the biased yes-no question marker *ba*$_2$ (143c)-(143d), which assumes the discourse function of requesting the confirmation of a previously established information in questions (Paul 2015). (143c)-(143d) additionally demonstrate that *le* and *eryi* may be inserted to the left of *de*$_{\text{EVID}}$, echoing my previous claims.

Another speech-act layer particle, the weak imperative-marking SFP *ba*$_1$ (Pan 2015), is incompatible with *de*$_{\text{EVID}}$, as in (144). I argue this follows from the independent property that *de*$_{\text{EVID}}$ occurs in selective sentence types and resists imperatives (see section 5.2.2 for a detailed discussion).

(144) * Kai men de ba$_1$!
open door DE IMP
Intended: 'Open the door!'

[44] I consider the particles surveyed here as belonging to the Mood$_{\text{speech act}}$ level since they are markers of clause type (Rizzi & Cinque 2016). *Ne*$_2$ additionally agrees with the Mood$_{\text{speech act}}$ level adverbial specifier *jiujing* 'frankly'.

As expected, SFPs that are located at higher CP layers than the speech act layer (AttitudeP according to Pan (2015)) must also follow de_{EVID} , as exemplified by (145).

(145) Context: a fruit stall owner talks to a customer.

Haochi de ya/a/ou!
Delicious DE EXCLAM
'It's delicious!'

The class of particles *ya*, *a*, *ou* are argued to be exclamative particles that take a CP complement and convey the speaker's intentions to attract the hearer's attention, exaggerate, remind or warn of something (Pan 2019). In such contexts, all three particles are invariably to the right of de_{EVID} , as (145) shows.

With $\text{Mood}_{\text{speech act}}$ and AttitudeP data incorporated, I arrive at the final linearization between de_{EVID} and other SFPs as functional heads in their corresponding projections in (146):

(146) (TP/AspP) *le* < (ScalarFocusP) *eryi* < de_{EVID} < ($\text{Mood}_{\text{speech act}}$) *ma, ne*$_2$, *ba*$_2$ < (AttitudeP) *ya*, *a*, *ou*

5.3.2 Additional evidence from specifier-head agreement

In this subsection, I draw upon evidence from C-domain adverbs to propose that de_{EVID} echos with its specifier at the $\text{Mood}_{\text{evidential}}$ level. Such probing method is based on cartographic approaches and the split CP hypothesis. The assumption is that particles, as heads, enter into agreement relations with adverbs as specifiers. In following with this assumption and the relatively well studied status of C-domain adverbs, the SFP literature has frequently employed the co-occurrence patterns of an SFP and its collocating adverb as diagnostics for identifying the projection of said SFP (e.g. the collocation between *yijing* 'already' and the aspectual marker *le*, *jiu* 'just' and the scalar focus particle *eryi*, and *zhengzai* 'in the process of' and the aspectual marker *ne*, cf. Shyu 1995: 33, Cinque 1999: 89, Hole 2004: 50;70, Badan & del Gobbo 2015: 45, Hole 2017: 396). The investigation of speaker-oriented adverbs thus provides a useful probe into the syntactic position ofde_{EVID}. My corpus search of SFP de_{EVID} suggests that de_{EVID} frequently co-occurs with the adverb *qishi*, which translates into English as *actually* or into German as *eigentlich*.[45] Note that the adverbial specifier and the particle head have minor differences in terms of their projective meaning. Importantly, adding a *qishi*-adverb to a

de_{EVID}-sentence does not alter the interpretation associated with the de_{EVID}-sentence, as shown in the paraphrase in (147).

(147) Ta qishi mingtian benlai xiang dache qu de.
he actually tomorrow originally want call.taxi go DE
'Actually, he initially planned to get there tomorrow by calling a cab.'

With the same spirit of adopting relative linear sequence pattern of those SFP heads, I provide examples in (148)-(150) to show a similar pattern of *qishi* against other adverbials that serve as specifiers of those SFP heads. Here the order of presentation of these examples parallels that of de_{EVID}'s relative orderings (i.e. from low to high). This is complemented by adding several adverbs that have no corresponding SFP heads in Mandarin but are covered in Cinque's (1999) universal adverb hierarchy, in order to pinpoint *qishi*'s syntactic position. The observations arrived at below help us to identify the position of de_{EVID} as a projection pertaining to evidentiality.

Example (148) shows that *qishi* is located higher than $\text{Mod}_{\text{scalarity}}$ and $\text{Asp}_{\text{completive}}$ due to the adverbial ordering. Additionally, it is not possible to have *kongpa* 'probably' follow the $\text{Mod}_{\text{scalarity}}$ specifier *jiu*/*cai* 'just'.

[45] Note that *qishi* is not the only collocating adverb with de_{EVID}. Importantly, nonetheless, the pattern in which the SFP de_{EVID} more often co-occurs with the adverb *qishi* than with other left peripheral adverbs is corroborated by a preliminary collocational analysis I have conducted on a self-constructed corpus (manually constructed using BootCaT (Baroni & Bernardini 2004), a language data mining software in which all corpus materials are mined from the colloquial register including blog posts and tabloid-style news sites bangumi.tv/real/blog/2.html). I compared the token frequency of the de_{EVID}+*qishi* collocate (i.e. cases where de_{EVID} and *qishi* co-occur within the same sentence) against the token frequencies of de_{EVID} collocating with 21 other adverbs that occupy the specifier position of a certain C-level and high I-level functional projection under Cinque's (1999) classification. My search yields altogether 74 instances of [*qishi...de*] collocates (out of a total of 2237 sentences with SFP de_{EVID}). By contrast, I find on average 7.14 instances of collocates involving *de* and one of the other adverbs surveyed. Among them, *keneng* 'probably' collocates with SFP de_{EVID} in 37 instances, whereas no other adverbs co-occur with de_{EVID} more than in 10 instances. I thus establish that de_{EVID} and *qishi* share a higher-than-chance frequency of association. However, it is clear that the above observation regarding the co-occurrence of *qishi* and de_{EVID} is based on a limited number of adverbs recognized in the Cinquean hierarchy. To establish a stronger interrelatedness of *qishi* and de_{EVID} , a larger size corpus study with a more targeted adverb list is required.

(148) a. *qishi* 'actually'> *yijing* 'already'

Ta zhihao xiaozhe shuo qishi yijing kuai shuizhao le.
he only smile.PROG speak actually already almost fall.asleep ASP

'He had to smile and say that (the baby) actually already almost falls asleep.'

b. *qishi* 'actually' > *jiu* 'only/merely/just'

Wo qishi jiu (*kongpa) limaoxingde wen ni yixia.
I actually JIU probably politely ask you once

'I am actually simply asking you about it for courtesy's sake. '

I further find that *qishi* is preferred to precede *kongpa* 'probably', as shown in (149).

(149) *qishi* 'actually' > *kongpa* 'probably'

Women zixu hen liaojie ta, qishi kongpa zhen bu shi namehuishi.
We convince very understand he, actually probably really NEG COP that.event

'We convinced ourselves that we understood him, actually this is probably not true.'

In contrast, the speech-act adverb *jiujing* 'frankly' and the evaluative adverb *xingkui* 'fortunately' preferably appear to the left of *qishi* as shown in (150).

(150) a. *jiujing* 'frankly' > *qishi* 'actually'

Guangdongren jingchang shuo yao baishan, name jiujing qishi
Cantonese.people often say want.to honor.deceased, so frankly actually
baishan you shenme hao shuo ne$_2$?
honor.deceased have what good say NE$_2$

'Cantonese people often talk about going to honor their deceased relatives. So honestly, what is there actually to talk about regarding honoring your deceased relatives?'

b. *xingkui* 'fortunately' > *qishi* 'actually'

Xingkui qishi bushi liugan, yaobu wo jiu bixu zhuyuan guancha
fortunately actually NEG flu, otherwise I JIU must hospitalize observation
le.
ASP

'Fortunately it's actually not flu, otherwise I would have to be hospitalized for observation.'

An important caveat for the above generalization is that (extended) C-domain speaker adverbs can be flexible in terms of their internal relative orderings. For instance, cases where the epistemic adverb *kongpa* 'probably' precedes *qishi* 'actually' are also attested in my corpus, for example (151).

(151) Xianshi de jiahuo kongpa qishi bu dongde langman.
Rational REL person probabaly actually NEG know romance
'Probably, a rational guy like him actually knows nothing about being romantic.'

Similarly, in English *actually* and the epistemic *probably* are attested to occur in either ordering, as in (152).

(152) a. The vice president of the university probably didn't actually take bribes for personal gains.
b. Actually, the vice president of the university probably didn't take bribes for personal gains.

Such linear order flexibility may be a result of focus movement of the speaker adverb with a lower base position across the adverb with a higher base position. The movement may well be triggered by semantic motivations.[46]

My findings of *qishi* 'actually' as being sandwiched among speaker-oriented adverbs and staying above hearer-oriented proposition-level adverbs such as scalar 'only' fit in nicely with Cinque's (1999) universal syntactic hierarchy of left-peripheral adverbs. Based on crosslinguistic patterns, Cinque identifies the articulated lower C-domain as comprising the utterance-modifying adverbs and speech act adverbs (e.g. *frankly*, *honestly*) as occupying the highest end, and lower than that, the class of evaluative adverbs (EvalP, e.g. *unfortunately*, *luckily*), the class of evidential adverbs (EvidP, e.g. *allegedly*, *reportedly*, *evidently*, *apparently*) and the class of epistemic adverbs (EpisP, e.g. *probably*), among others. Accordingly, I locate the SFP de_{EVID} within Cinque's EvidP projection. Table 5.5 provides a generalization of low CP/high IP projections with their corresponding adverbial specifiers and their heads.

Projections	Adv. Specifier	Particles/Head
$\text{Mood}_{\text{speech act}}$	*jiujing* 'frankly'	ne_2
$\text{Mood}_{\text{evaluative}}$	*xingkui* 'fortunately'	NA
$\text{Mood}_{\text{evidential}}$	***qishi*** 'actually'	$\boldsymbol{de}_{\textbf{evidential}}$
$\text{Mod}_{\text{epistemic}}$	*kongpa* 'probably'	NA
Scalar Focus	*jiu*, *cai* 'merely/just'	*eryi*
$\text{Asp}_{\text{completive}}$	*yijing* 'already'	*le*

Table 5.5: A hierarchy of low CP/high IP projections with adverbial specifiers and heads.

[46] As Krifka (2017b) proposes, epistemic adverbials add a probabilistic judgment towards the proposition and can serve to weaken the speaker's commitment, while evidential adverbials also function to hedge commitment through shifting responsibility to the source of knowledge. It may well be the case that either operator freely takes scope above the other during semantic derivation.

Based on the above patterns I have identified, I now incorporate the SFP de_{EVID} and the adverb *qishi* into the layered periphery as occupying the functional projection of $\text{Mood}_{\text{evidential}}$. Assuming a head-final analysis of the Mandarin C-domain functional projections (e.g. Simpson 2014), left-peripheral adverbs merge to the left of their scopes, whereas SFPs (as functional heads) merge to the right of their scopes. A partial hierarchy of the Mandarin C-domain is shown in Figure 5.8.

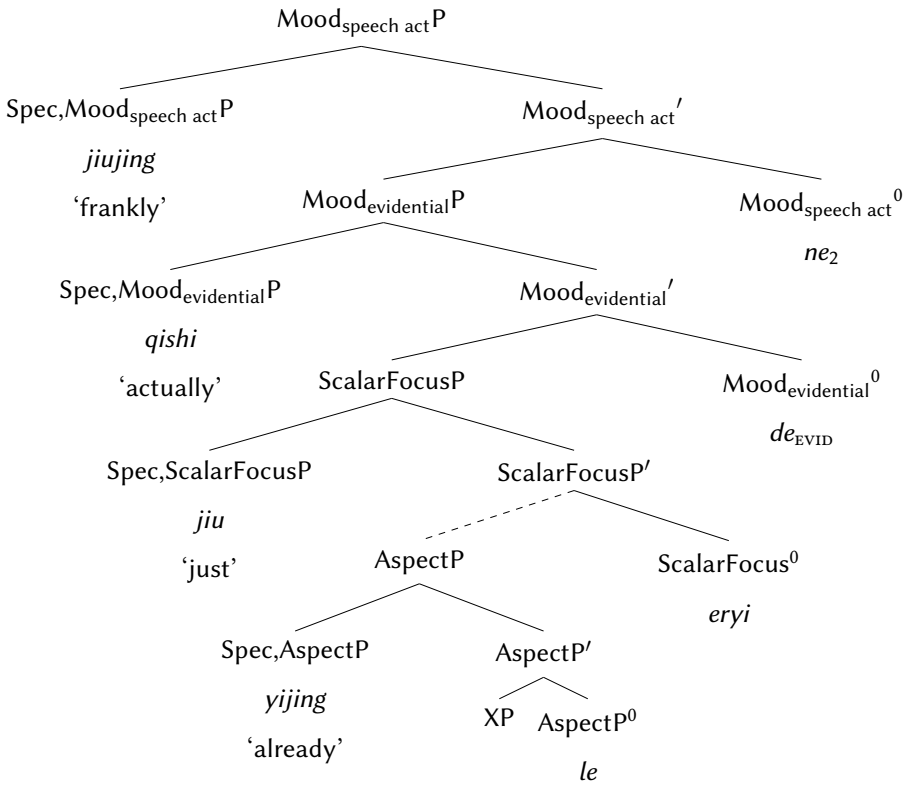


Figure 5.8: The expanded low C-domain structure in Mandarin with evidential *de*.

For the moment I leave out projections that are not overtly filled by SFPs in Mandarin, such as the epistemic modality projection involving *kongpa* 'probably', which finds no corresponding particle head.[47] Lower heads than AspectP are not shown.

[47] A potential candidate for the head of the epistemic modality projection is the modal verb *yinggai* 'should'. I will also leave it out of Table 5.5 due to the lack of clarity in relation to some aspects of its meaning and use. For example, more diagnostics are needed to distinguish its adverbial use and modal use, and to test the co-occurrence possibilities for its epistemic and deontic modal uses (Paul 2002; Huang 2009; Ren 2009).

5.4 A lower than T *de*-projection in the *shi...de* construction

As we have seen in the previous section, the evidential *de* is associated with a speaker-oriented C domain position, based on evidence from the relative positions with other sentence-final particles and the specifier-head agreement with the corresponding adverbs. In this section, I argue that evidence from syntactic distribution also supports the claim that the de_{IMAX}-particle appearing in the *shi...de* cleft construction should not be conflated with the evidential SFP de_{EVID}. The view is shored up by two observations showing that the two *de*-particles behave differently. Similar to the previous section, I start by probing the relative positions of de_{IMAX} with other sentence-final particles. I then adopt the *wh*-licensing test in Erlewine (2017), which reveals that the lower de_{IMAX} particle is sensitive to a subject-object asymmetry that is not found for the evidential *de*. The additional diagnostic in Soh (2018) is also resorted to, which only applies to the lower de_{IMAX} particle in the *shi...de* construction.

In the *shi...de* construction, de_{IMAX} precedes the aspectual SFP *le* and the scalar SFP *eryi* (as well as the structurally higher speech act particles). Corpus attested example (153) illustrates that de_{IMAX} precedes *le* (source: Chinese Web 2017 (zhTenTen17) Simplified: 33113161).

(153) a. Jianzhu gaodu dao le 600mi, zhengge shigong jiu shi women
architecture height reach PRF 600meter, entire construction JIU COP we
guoqu xiangxiang bu dao de le.
past imagine NEG RES DE LE
'When the height of the architecture reaches 600 meters, the entire construction would be beyond what we could have imagined in the past.'

b. Wo juede zhege benshen ye shi shuming, zhe ben shu shi 20 nian qian
I feel this.CLF itself also COP book.title, this CLF book COP 20 year ago
chuban de le.
publish DE LE
'I believe this is by itself also a book title, this book was published 20 years ago. '

Another example from the same corpus (154) illustrates that de_{IMAX} precedes *eryi*.[48]

(154) a. Gupiao he jijin dou shi you xianqian de shihou wanwan de eryi.
stock and bonds all COP exist extra.money REL time play DE ERYI
'Stocks and bonds are just stuff for fun for those who have some spare cash.'

b. (When chased by the media pressing for more information)
Gutianle huida ta zhi shi zai baozhishang kandao de eryi.
Louis.Koo answer he only COP LOC on.newspaper read.PRF DE ERYI
'Louis Koo answered that he only read (it) in the paper. '

The linearization of the de_{IMAX} in the *shi...de* construction as taking scope below the other SFP heads depicted rendered in (155). Also included here is the scope position of de_{EVID}. Recall from previous discussions that the evidential *de* stays above the particles *eryi* and *le*. There is thus empirical evidence for two different syntactic positions for the two *de*s, with a clause-medial position associated with the *shi...de* construction.

(155) $de_{\text{IMAX}} <$ (TP/AspP) *le* $<$ (ScalarFocusP) *eryi* $< de_{\text{EVID}}$

The examples that we have observed in Section 5.1, where the two separate *de*s occur together also support this linear order of them. These corpus attested utterances are repeated as in (156) (source: Chinese Web 2017 (zhTenTen17) Simplified: 33113161).

(156) a. Yikaishi wo qishi'r jiu shi xiang rang ta lai da ge za'r de eryi de.
at.first I actually just COP want make her come do CLF errands DE ERYI DE
'At first, I just wanted her to come and do some odd job.'

b. Qiujier de fuqin zhishi qidai gongjue de cizi, meiyou
Churchill POSS father only seven.generation duke POSS second.son, NEG
zige jicheng bulunhaimu gong. Qiujier buguo shi zai nali
qualification inherit Blenheim palace. Churchill just COP LOC there
chusheng he jiehun de eryi de.
be.born and get.married DE ERYI DE
'The father of Winston Churchill was only the second son of the seventh generation Duke. He was not qualified to inherit the Blenheim Palace. Winston Churchill was simply born and got married there.'

The behavioral differences can be further evidenced by Erlewine's (2017) *wh*-licensing test, designed to probe the syntactic position of sentence-final particles. *Wh*-words in Mandarin Chinese can give rise to an indefinite reading. Crucially, Erlewine (2017) points out that an indefinite interpretation is only possible when a *wh*-word is within the scope of certain licensors. As example (157a) shows, only an interrogative reading is available where *shenme*

[48] One might object by proposing to analyze such examples as involving nominalization, with a covert head noun. This possibility is nevertheless not supported by behaviors from conjunction tests: Conjoining the *de*-structure in (48) with a *bona fide* nominalization structure instantiated by *de* leads to strong degradation. We take this to argue against a potential nominalizer analysis.

(ii) ??Gupiao he jijin dou shi zui rongyi zhengqian de he wanwan de eryi.
stock and bonds all COP most easy earn.money NOM and play DE ERYI
Intended: 'Stocks and bonds are easiest to earn money and for having fun.'

'what' is not c-commanded by a licensor. An indefinite reading is available in (157b), when *shenme* is within the scope of negation.

(157) a. Ta xiang chi shenme
She want eat what
i 'What did she want to eat?'
ii ??'She wanted to eat something.'

b. Ta bu xiang chi shenme
She NEG want eat what
i 'What didn't she want to eat?'
ii She didn't want to eat anything (special).

Following Erlewine (2017), I now show that the licensing of *wh*-words by de_{IMAX} is subject to a subject-object asymmetry. As (158) shows, a *wh*-subject in the *shi...de* construction cannot receive an indefinite reading.

(158) Shei shi chi zhuzi de?
who COP eat bamboo DE
Reading 1: 'Who eats bamboo?'
*Reading 2: 'Someone eats bamboo.'

Meanwhile, in (159), the *wh*-word in the object position can receive an indefinite reading:

(159) Ta shi zai shitang kandao-le shenme de./?
he COP LOC dining.hall see-PRF what DE
Reading 1: 'It is at the dining hall that he saw something.'
Reading 2: 'What did he see at the dining hall?'

The above contrast shows that *de* licenses *wh*-indefinites in the object position, but not in the subject position. In line with the argument in Erlewine (2017), I take the subject-object asymmetry in *de*-licensing to indicate that the *de* particle in the *shi...de* construction is interpreted at a clause-medial position, which is below the TP subject *wh* position but is above the object *wh* position at the *v*P layer, schematized in (160).

(160) $[_{\text{TP}}$ (subject *wh*)...$[_{\text{SFP}}$ [...(object *wh*)...] de_{IMAX}]]

In contrast, the structurally higher de_{EVID} is able to license a subject *wh*-indefinite, illustrated in (161).

(161) Ni zheme shuo wo xiangqilai le. Zuotian qishi shenme dongxi shan le
you such say I recall PRF. yesterday actually what thing flicker PRF
yixia de.
one.time DE
'As you said so, now I recall. Yesterday, actually something flickered.'

The above contrast where the focus-marking de_{IMAX} particle in the *shi...de* construction resists subject *wh*-licensing and the evidential *de* particle allows for subject licensing is compatible with treating the former as occupying a clause-medial position and the latter as located at the C-layer.

Additional evidence for a clause-medial position comes from Soh (2018), who observed that de_{EVID} cannot co-occur with A-not-A questions where the sentence predicate or the non-epistemic preverbal modal auxiliary is reduplicated. Note incidentally that Soh (2018) does not distinguish a focus-marking *shi...de* construction and the stand-alone use of the evidential *de*. She assumes that the latter case involves a covert *shi*. My postulation of two distinct lexical entries for the *de*-particle thus differs from the analysis by Soh. However, Soh's distribution test in the A-not-A environment still makes a good case for identifying a low clause position for de_{IMAX} in the *shi...de* cleft.[49]

As Soh observes, a clause-medial de_{IMAX} cannot occur together with sentence predicates or with non-epistemic preverbal modals. The ill-formedness that arises from such co-occurrence is demonstrated in example (162).

(162) a. Ta hui-bu-hui shuo fayu (??de)?
he can-NEG-can speak French (DE)
'Can he speak French or not?'

b. Ta ke-bu-keyi anjingde zuo yizhengge xiawu (??de)?
he be.able.to-NEG-be.able.to quietly sit one.whole afternoon (DE)
'Can he quietly sit there for a full afternoon or not?'

Soh (2018) then points out that de_{IMAX} can co-occur with A-not-A questions that contain a reduplicated epistemic modality operator. An illustration is given in the acceptable example (163).

(163) (Ta) hui-bu-hui wanquan bu zhidao (de)?
(he) could-NEG-could completely not know (DE)
'Could it be that he completely doesn't know (or not)?'

Soh argues that a clausal medial position for de_{IMAX} promises to capture the above distribution. The solution proceeds as follows: First, it is unclear how de_{IMAX} is interpreted if it scopes out of an interrogative operator, given that de_{IMAX} targets propositions, and hence runs into a type mismatch when combining with a question radical with no truth values. Given this

[49] I will label the clause-medial *de* according to Soh as de_{IMAX} in the following paragraphs.

assumption, the only way de_{IMAX} receives a converging interpretation in interacting with a Q operator is to stay within the scope of said Q operator.

The reduplicated predicative form in the A-not-A question is assumed to carry a [+Q] feature that is base-generated and subsequently raises silently to the CP area (Huang 1991; Ernst 1994). Its scope is restricted to the first node immediately dominating the reduplicated (A-not-A) form (Ernst 1994; Soh & Gao 2006).

In the case of the reduplication applying to a verb or a non-epistemic modal marker, this leads to a derivation crash, as the first node immediately dominating the A-not-A form is assumed to be a $\text{Mod}_{\text{Non-epistemic}}$P node that is below the position of the dedicated functional projection headed by de_{IMAX} , posited to be above *v*P but below TP. Consequently, de_{IMAX} cannot be interpreted below the scope of the [+Q] feature in the A-not-A question.

According to Soh, in the case of the reduplication applying to an epistemic modal operator, no derivation crash arises, because epistemic modality operators are merged higher than TP (at head of $\text{Mod}_{\text{Epistemic}}$P). Since the first node immediately dominating the [+Q] feature will be $\text{Mod}_{\text{Epistemic}}$P, de_{IMAX} stays within the scope of the Q-operator and the interpretive condition is satisfied.[50]

5.5 Comparison with other proposals

In the above section I presented evidence in support of the argument that the de_{IMAX} particle in the *shi...de* construction has a distinct, TP-internal position that should not be conflated with the de_{EVID} particle in the $\text{Mood}_{\text{evidential}}$ position. This proposal has several merits over other proposals. I now turn to some earlier proposals and a comparison in this section. Note that the current section I will avoid the terminological seperation of de_{EVID} and de_{IMAX}, in light of the fact that previous authors did not make a systematic distinction of these two distinct lexical entries the way I do.

Soh (2018) provides a semantic characterization of the *de* particle as a sentence final particle, in which she argues that *de* marks 'private evidence' from discourse. By private evidence Soh refers to the speaker's belief that the status of evidence for the asserted proposition is private at the utterance time, with 'private' defined using the notion of accessibility. Consider (164).

[50] I want to stress that the incompatiblity of de_{IMAX} with sentence predicates and non-epistemic modals can be derived by postulating both a projection of *de* lower than TP and one above TP. In both cases, one arrives at a derivation crash.

(164) a. Private evidence: Evidence for a proposition that is accessible to the speaker and not the addressee

b. Accessibility: An individual has access to his own knowledge base and readily available evidence in the utterance context.

Soh's treatment of *de* as encoding an evidential source meaning resembles (and hence anticipates) my own treatment. Importantly, however, in Soh (2018), 'private' is defined such that the knowledge is accessible to the speaker and not to the hearer, without requiring that said knowledge should be unexpected for the hearer. In this sense, it should be possible that *de* attaches to an utterance the situation of which is expected by the hearer, as long as the speaker provides evidence that the hearer cannot know beforehand. This prediction differs from my analysis. For instance, in the scenario of (165), speaker B has private evidence that the hearer does not know (since only the speaker has checked the weather forecast), but the hearer expects the content of the utterance anyway (supposedly from experience).

(165) A: Zhezhou tianqi yinggai haocha ba?
This.week weather ought.to really.bad Q
'The weather this week oughtta be really bad, right?'

B: mingming dou siyuefen le, wo kan le xia wo shouji shang de
obviously all April ASP, I look.at ASP one.time my phone on POSS
tianqiyubao, zheliangtian xia xue (??de)!
weather.forecast these.day fall snow DE
'It's already April, (yet) I take a look at the weather forecast on my phone, and it's gonna snow these few days!'

A: Zhe hen zhengchang, Deguo siyuefen dou zheyang.
this very normal, Germany April all this.way
'This is quite normal. Aprils in Germany are always like this.'

If hearer's expectation does not matter in the case as long as the speaker has private evidence, (165B) is predicted to be felicitous, contrary to fact. Hence, (165) is compatible with my analysis but not with Soh's.

Lin (2016) proposes that *de* assumes the function of confirming the truthfulness of the proposition it combines with, receiving the paraphrase of 'it is the case that' (see also Lü 1982, Huang & Liao 2013, Wan 2016 and Li 2006). Additionally, *de* has been observed to be subject to a constraint against expressing future events. Lin (2016) argues that *de*'s prejacent necessarily anchors a non-future tense, which requires that an event/state has occurred or is ongoing at the time of utterance. Note that Lin's analysis differs from previous attempts to characterize *de*

as a past tense marker (Simpson & Wu 1999; 2002). For instance, Lin shows that the examples in (166) clearly encode non-past readings.

(166) a. Ta zhidao lu de.
he know way DE
'He knows the way.'

b. Zhe gongzuo hen shihe ni de.
this job very suitable you DE
'This job is very suitable for you. '

Lin argues that the *de*-sentences give rise to either a present or a past tense reading, depending on whether the propositions encode states or events, respectively. Lin notes that the examples in (166) with their present tense interpretations involve situations that are states. By contrast, sentences with non-stative, telic verbs are overwhelmingly past-tense-denoting because the default tense of events is the past tense. Compare (166) with (167).

(167) a. Ta zaoshang lai xuexiao de.
he morning come school DE
'He came to school in the morning.'

b. Wo gen Lisi jie de.
I from Lisi borrow DE
'I borrowed it from Lisi. '

Importantly, Lin claims that *de* cannot combine with a proposition denoting future tense (contrast 168a with 168b), unless an overt modalit/futurality operator is present, as in (168c).

(168) Examples provided by Lin (2016)

a. Wo mingtian tongzhi ni.
I tomorrow inform you
'I will inform you tomorrow.'

b. * Wo mingtian tongzhi ni de.
I tomorrow inform you DE

c. Wo mingtian hui tongzhi ni de.
I tomorrow will inform you DE

My own investigation into the non-futurity constraint reveals a more complex picture than is initially formulated. First, Lin's claim that *de* is incompatible with a future reading in non-modal contexts is too strong: While (168b) is ungrammatical, there are cases where a future reading, enforced by a temporal adverbial, is possible in the absence of modal operators, such as (169a)-(169b).

(169) a. Ni jide dai san o. Mingtian houtian dou xia dayu de.
you remember bring umbrella PRT tomorrow day.after.tomorrow all fall shower DE
'Remember to bring your umbrella. There is heavy rainfall tomorrow and the day after.'

b. Mingtian shi xiaoyunhui, bu shang ke de.
tomorrow COP school.games not have class DE
'Tomorrow is the school sports games day. There is no class.'

Second, the amelioration effect achieved by modal auxiliaries is not homogeneous. Rather, there is a cline of acceptability depending on the choice of particular modals: Modals encoding (inter)subjectivity (indicating the speaker's commitment towards the performance of a future action) like *hui* and *yao* receive the best judgment, while the objective futurity modal *jiang* receives degraded judgments, as shown in (170).

(170) a. Wo hui anshi tijiao lunwen de.
I will on.time submit paper DE
'I will submit the paper on time.'

b. ?? Wo jiang anshi tijiao lunwen de.
I will on.time submit paper DE
'I will submit the paper on time.'

According to Lin, *de*'s future reading constraint is expected under the confirmative analysis. This is because the truth value of a non-future proposition is not influenced by time. Propositions denoting future events, on the contrary, have their truth values altered by the unknown possibilities of the future. This, on the assumption that *de* expresses a confirmative meaning, would be ruled out: Since the speakers could only commit to the truth of events and states happening in the past or present, it follows that *de* is confined to non-future-denoting propositions.

Lin provides a further explanation for the fact that the modal *hui* improves a future-denoting sentence. Lin suggests that modals anchor the present world, and they achieve a future reference by means of the accessibility relation between the present world and future worlds. This way, sentences with *hui* can still be evaluated with respect to the present world.

Compared with the confirmative account, the contrary-to-expectation analysis does not assume that de_{EVID} is constrained in future contexts. A future-denoting sentence is predicted to be fine, as long as the speaker informs the hearer of a future event that contradicts with what the hearer is assuming regarding that future event at the moment of utterance. Certain future

contexts are unnatural, nevertheless, especially when the speaker is providing discourse-new information about a certain situation based on her own source. The use of de_{EVID} signals that not only does the new information stem from the speaker evidence, but also that the hearer already holds a belief about said situation prior to the speaker's utterance, and such belief is not compatible with what the speaker is going to convey. While contexts instantiating such convoluted speaker-hearer negotiation are hard to come by when the conveyed information is based on the speaker source, much more natural contexts can be come up with if the speaker's utterance is based on a third person source known to be accessible to both interlocutors. This explains the felicity of (169a)-(169b). In both cases, the speaker knows that the hearer acquires information from the same source as her (weather forecast or school calendar). Hence when the speaker receives new information from that external source, she may know what the hearer's belief states are if the latter has not received the updated information (e.g. the hearer who has not kept track of the weather forecast for the coming days would reasonably assume the weather condition to be similar to today).

Furthermore, under the evidential analysis, the distinction among the various modals can be accounted for in terms of the speaker's commitment levels. Subjective modals like *hui* and *yao* express the speaker's stance. The speaker uses de_{EVID} in committing herself when such commitment is previously in doubt/under negotiation, as shown in (171a). Modals like *jiang* are different, as in (171b).

(171) a. Context: A panicks that the group project will not be submitted on time. B assures her:

"Wo dou anpai hao le. Women hui/yao anshi tijiao lunwen de".
I all arrange good PRF we will on.time submit paper DE
'(Don't worry,) I have arranged everything. We will submit it on time.'

b. Context: A sasses her friend B about never having submitted anything on time. B answers angrily, "How could you humiliate me like this!

Wo dou fashi le zheci wo jiang anshi tijiao lunwen de".
I all swear PRF this.time I will on.time submit paper DE
'I have sworn already that I will submit the paper on time!'

Modals like *jiang* signal that the likelihood of a future event is sanctioned by social convention or other external circumstances irrespective of the speaker's own stance (Wu & Kuo 2010; Huang 2015), hence not typically under negotiation. Note that with proper contextualization showing that external obligations are unknown to the hearer, the non-subjective *jiang* can also more easily combine with the de_{EVID} particle.

5.6 Summary

The goal of this chapter was to motivate the case for disentangling the de_{IMAX} particle in the *shi...de* construction from a separate stand-alone de_{EVID} particle specifically employed in an evidential context. I proposed that the de_{EVID} particle updates the non-at-issue meaning according to which the available context prior to the utterance does not normally support the proposition de_{EVID} attaches to. From the semantic difference between the two *de*s, it follows that they do not share the same syntactic position/projection. This prediction was borne out in a distribution study, in which it was shown that the de_{EVID} is a high functional head at Cinque's articulated C-domain, whereas the de_{IMAX} particle in the *shi...de* construction is associated with a clause-medial, TP-internal position.

The above discussions established the differences of the two *de*s in the sentence-final particle position. A fully explicit account of *de* serves the purpose of enabling us to disentangle the ongoing puzzle of what role *de* contributes to in the cleft environment. The focus of the rest of this dissertation is now on the other central component in the clefts, namely the copula element *shi*. In the next chapter, I will revisit the intricate and hotly debated issue of how the copula factors into the structure and meaning of the Mandarin cleft.

Chapter 6

The syntax of Mandarin clefts

This chapter proposes a new biclausal syntax for Mandarin clefts. The proposal is shown to satisfy the following conditions: 1) it captures all three cleft types (with DP, PP and CP focus); 2) it observes the adjacency requirement; 3) it accounts for the weak exhaustive inference in the cleft (when compared with 'only'-like exclusives); 4) it explains the lack of object clefts in Mandarin.

I start by reviewing previous proposals of the cleft syntax, first from a focus-based, monoclausal perspective and then from a copula-based, biclausal perspective. Both approaches are evaluated according to their ability and inability to predict the above four conditions. The literature review is then followed by a proposal of my own syntax of the cleft structure that is in line with the copula-based approach. I will argue it enjoys empirical advantages over its predecessors. The question of why object clefts are often degraded in Mandarin will be discussed afterwards. The issue is resolved by resorting to a more general constraint governing *wh*-object preposing in Mandarin, together with an antitopicality constraint that applies to the copula *shi* (following von Prince 2012). This chapter ends with a pilot experiment testing the hypothesis of whether the source of the exhaustive inference of the cleft is related to the mention-all reading of its prior *wh*-question.

6.1 Focus-based monoclausal approaches of *shi* in Mandarin clefts

The focus-based approach to the cleft structure dates back to Jespersen (1937). These approaches argue that clefts are not a type of the copular clause, but rather a single CP structure, with the copula morpheme functioning as a focus-sensitive modifier directly encoding the exhaustive semantics associated with clefts. The approach presumes a polysemous position according to which the cleft copula is homophonous with the copula verb proper. Detailed analyses in many languages, e.g. Japanese, Hungarian, Italian, Uzbek and Wolof, have proposed that clefts are distinct from copular clauses and instantiate a monoclausal structure (cf. Kiss 1998; Hiraiwa & Ishihara 2002; Abels & Muriungi 2008; Hiraiwa & Ishihara 2012; Gribanova 2013; Klecha & Martinović 2015).

The focus-based approach has also been taken up by a plethora of accounts of Mandarin clefts (Teng 1979; Huang 1982; Chan 1990; Zhu 1996; Lee 2005; Shyu 2008; Yang 2011; Cheung 2009; Erlewine 2020, inter alia).[51]

Teng (1979) argues against treating *shi* in the cleft as a copula verb. The evidence Teng cites to support his claim is indirect. What Teng shows is that the sentence-final particle *de* in the *shi...de* cleft cannot be plausibly analyzed as a (clausal) nominalizer, as it fails to connect two NP arguments. Teng goes on to argue that the *shi...de* cleft cannot be derived from a copular clause structure if *de* does not receive a nominal status. We have seen from the discussions in Chapter 3 that this position is untenable. Teng further draws attention to the distributional difference between the *de* particle in clefts and in pseudoclefts, the latter construction being characterized by environments compatible with a nominalizer analysis of *de*. Such difference is illustrated in (172) (cf. Chapter 2 for more introduction of pseudoclefts in Mandarin).

(172) a. Shi zhangsan yao lai de (*ren).
COP zhangsan will come DE (person)
'It is Zhangsan who will come.'

b. Yao lai de (ren) shi zhangsan.
will come DE (person) COP zhangsan
'The person who will come is Zhangsan.'

The discrepancy of distribution further challenges the view of treating *shi...de* clefts as derivationally related to pseudoclefts.

[51] In addition, two previous works on the diachronic development of Chinese *shi*-clefts, Shi & Xu (2001) and Dong (2004), implicitly adopt a focus-based analysis in assuming that when the cleft use emerges, the morpheme *shi* develops into a new category as a focus marker.

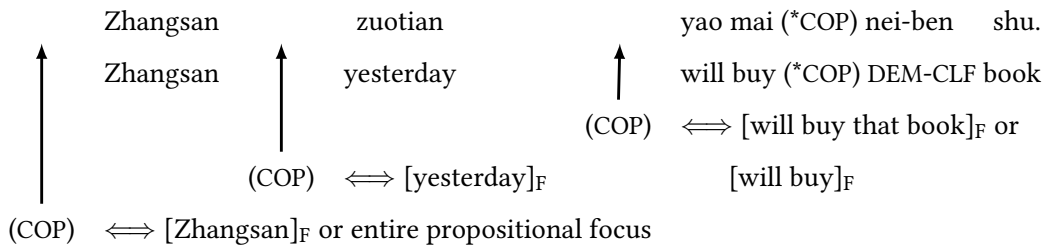
Similar to Teng (1979), Huang (1982) argues that the cleft construction in Mandarin is a simplex sentence with a single verbal predicate located in the cleft clause, instead of a complex sentence headed by a copula verb that takes an embedded clausal argument. In modifying the simplex verbal predicate, *shi* is analyzed as an adverb analogous to the English adverb *only*. Here a distinction is made between the adverb *only* (as in (173a)) and the constituent *only* (as in (173b)) in line with Rooth (1985; 1992), cf. my discussion in Chapter 1.

(173) a. David *only* drinks red wine. (adverb)

b. David drinks *only* red wine. (constituent)

An adverb-like focus marker, pace Rooth, resides in the left periphery, occupying a projection head within the C domain taken to be FP by Huang (1982), which is similar to Rizzi's FocP. As Huang (1982) observes, *shi* immediately adjoins to clefted subjects, predicates or entire clauses, but cannot attach to post-copular clefted objects, giving rise to the adjacency constraint as in example (174).

(174) *Shi* requires its focus to be the immediately following phrase.



Huang takes this to be evidence for the adverb status of *shi*: The above distribution is such that *shi* can appear before almost any phrase in the sentence without changing the word order, which is compatible with the behavior of an adverb being appended before the focused constituent.

According to Huang, the constraint against clefted objects, discussed in Chapter 2 and illustrated here in example (175), follows from the adverbial status of *shi*, as adverbs in Chinese independently precede the verb and cannot be postverbal (Li & Thompson 1981).

(175) * Xiaoli zuotian da-le shi Xiaowang.
Xiaoli yesterday beat-ASP COP Xiaowang
Intended: 'It was Xiaowang that Xiaoli beat yesterday.'

As additional evidence, Huang argues that *shi*'s focus adverb status finds further support in its similarity with the exclusive adverb *zhiyou* 'only': Both receive an exhaustive reading,

manifested by the pattern where a continuation sentence with the additive adverb *ye* 'also' gives rise to unacceptability (judgment by Huang), as shown in example (176).

(176) a. # Zhiyou Zhangsan yao lai, Lisi ye yao lai.
only Zhangsan will come, Lisi also will come
#'Only Zhangsan will come. Lisi, too, will come.'

b. # Shi Zhangsan yao lai, Lisi ye yao lai.
COP Zhangsan will come, Lisi also will come
'It is Zhangsan that will come. Lisi, too, will come.'

Moreover, in cleft sentences *shi* may enter into scopal relations with modals and negation in free order, which receives a straightforward explanation if *shi* is simply another quantificational adverb that is able to enter into varying scope relations. Finally, Huang observes that it is common for a verb to be used adverbially in Chinese (e.g. the directionals *lai* 'come'/*qu* 'go'/*dao* 'arrive' in serial verb constructions), therefore it shouldn't come as a surprise if *shi* is ambiguous between a copula verb and a focus adverb. To Huang the above body of evidence points to the plausibility of *shi* as a focus adverb.

Zhu (1996) concurs with Teng (1979) and Huang (1982) in rejecting the copular analysis of *shi*, and proposes that *shi* is syntactically an adverb that separates the focused constituent from the (explicitly or implicitly expressed) topic. Zhu is exceptional in that she claims there is no (truly syntactic) copular sentence in Chinese that would be comparable with copular sentences in other languages. She analyzes the *shi*-cleft as a *shi*-modified simplex sentence with a verbal predicate. Meanwhile, the pseudocleft is argued to be a *shi*-modified simplex sentence where the nonfocused verbal predicate is fronted before *shi*. In other words, there is no 'real' pseudocleft in Chinese, either. Zhu thus arrives at a unified focus adverb analysis of the morpheme *shi*.

More recent proponents of a focus-based analysis have resorted to a more refined characterization of *shi* to capture its tendency to stay close to the focus associate (Cheung 2009; Yang 2011; Erlewine 2020). Erlewine (2020) proposes that *shi* in clefts is a sentential focus particle, parallel to the Vietnamese sentential focus particle chỉ. The particle adjoins to the clausal spine, with the additional constraint in (177ii).

(177) (i) *Shi* is a focus-sensitive, sentence-level modifier adjoined at CP that must c-command its associate (focus) (based on Rooth 1985).

(ii) *Shi* is additionally subject to a low attachment constraint such that while c-commanding its focus associate, it occurs adjacent to the focus whenever possible.

The preference for low attachment has been independently proposed for German and Dutch exclusive focus operators (e.g. Jacobs 1983; Büring & Hartmann 2001). (177) captures the fact that if the focus associate is a preverbal adjunct or subject, *shi* adjoins just above it to c-command it but no higher, illustrated in (178a) and (178b) (repeated from Huang's observations above).

(178) a. Wo shi zuotian mai-le nei-ben shu.
I COP yesterday buy-PRF that-CLF book
'It is yesterday that I bought that book.'

b. Shi wo zuotian mai-le nei-ben shu.
COP I yesterday buy-PRF that-CLF book
'It is me that bought that book yesterday.'

In the case of (178a), the default position of an adjunct in Chinese syntax is between the subject and the VP. When *shi* is adjoined at the C-level and associates with an adjunct focus within its c-command domain, the low attachment constraint is predicted to come into effect, causing the subject to scramble/topicalize to a higher C-level position, so that the adjunct is positioned next to the copula morpheme with no 'intervening' element in between, i.e. [subject$_i$ [*shi* t_i adjunct$_{focus}$ VP]].

The low attachment analysis further predicts that if the focus associate is the verb phrase or a subpart of it, the lowest adjunction position for *shi* will be just above the verb phrase, and all pre-VP elements (subjects, adjuncts) will be scrambled across *shi*, so that *shi* will attach directly next to the VP focus. An illustration of the clefted verb or clefted VP reading is given in (179).

(179) Wo zuotian shi mai-le na ben shu.
I yesterday COP buy-PRF that CLF book
'It is [buying]$_F$ that I did to that book.' or
'It is [buying that book]$_F$ that I did yesterday.'

Furthermore, based on this analysis, when *shi* is in a pre-subject position, it either associates with the subject or with the entire clausal prejacent due to low attachment, enabling a unified underlying structure for clefts and propositional assertions, as in (180a) and (180b).

(180) a. # Shi Zhangsan yao lai, Lisi ye yao lai.
COP Zhangsan will come, Lisi also will come

[*shi* [[*Zhangsan*]$_{\text{focus}}$ *yaolai*]] [cleft]

b. # Shi Zhangsan yao lai, Lisi ye yao lai.
COP Zhangsan will come, Lisi also will come
[*shi* [*Zhangsan yaolai*]$_{\text{focus}}$] [propositional assertion]

In the above I have discussed what can be referred to as the focus adverb treatment within the monoclausal approach. In another strain of monoclausal analyses, *shi* can be seen as a (potentially verbal) dedicated functional head that attracts an exhaustively identified focus constituent via the checking of relevant syntactic features (following from Horvath 1995; Brody 1995; Horvath 2010).

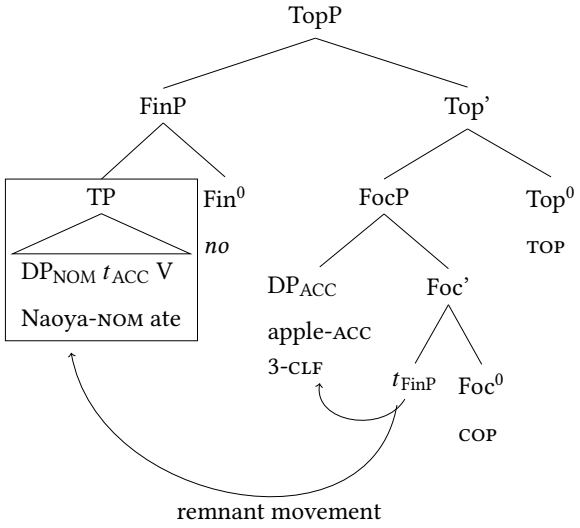
This solution, which assumes that the copula morpheme triggers focus movement, has been independently proposed for a wide range of languages, for example Kiss (1998) for Hungarian, Hiraiwa & Ishihara (2002; 2012) for Japanese, Gribanova (2013) for Uzbek. In East Asian languages, the most formally explicit proposal to date that is couched in such a framework is Hiraiwa & Ishihara's (2012) proposal on Japanese clefts, which is applicable to the Chinese cleft structure (*qua* word order differences). Specifically, Hiraiwa & Ishihara propose that cleft constructions originate from a single Rizzi-style articulated CP. From a base position, the focused phrase undergoes focus movement to the specifier of FocP, which is headed by the copula morpheme. A Japanese *da* 'be'-cleft is illustrated as in (181).

(181) [Naoya-ga e_i tabeta-no]-wa [ringo-o mit-tui]$_i$ da.
[Naoya-NOM e_i ate-C]-TOP apple-ACC 3-CLF COP
'It was three apples that Naoya ate.'

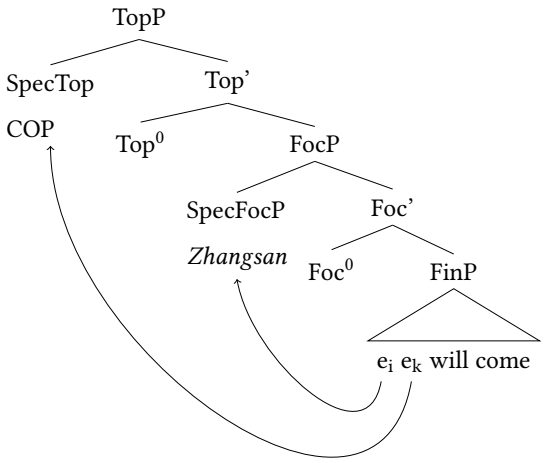
To derive the word order in (181), Hiraiwa & Ishihara resort to remnant movement that takes place after focus movement. They assume that the focused cleft phrase originates from FinP, which occupies the complement of Foc^0. After the cleft phrase moves to [Spec, FocP], what is left behind in FinP undergoes remnant movement to TopP, which is higher than FocP.[52] The full derivation of focus and remnant movement is schematized in (182a). (182b) provides a preliminary implementation of the Chinese cleft in (180a) along this line.

[52] This is keeping with some proposals that postulate that the copula in *it*-clefts resides in a topic projection, presumably as a topic marker that attracts the constituent to its left as a topic (Meinunger 1998; Hartmann & Veenstra 2013).

(182) a. [$_{TopP}$[*Naoya-ga* e$_i$ *tabeta*-no]$_k$ *-wa* [$_{FocP}$[*ringo-o* *mit-tui*]$_i$ [$_{Foc'}$[$_{FinP}$ e$_k$] *da*+Foc^0]]]
[Naoya-NOM ate-C] -TOP apple-ACC 3-CLF COP



b. [$_{TopP}$ *shi*$_k$ [$_{FocP}$ *Zhangsan*$_i$ [$_{Foc'}$ Foc^0 [$_{FinP}$ e$_k$ e$_i$ *yao lai*]]]]



The word order parametric differences between Japanese and Mandarin might be captured by assuming that remnant movement targets different constituents. In the case of verb-medial languages, if we follow standard assumptions that the focused cleft phrase similarly moves to [Spec, FocP], then a plausible derivation is to posit that the copula morpheme undergoes remnant movement to a projection structurally higher than FocP, as is the case in derivations of English clefts by Kiss (1998), Meinunger (1998) and Frascarelli & Ramaglia (2013), where the copula morpheme *be* moves to a position c-commanding FocP that hosts non-focal constituents.

In a separate treatment, Horvath (2010) proposes a quantificational exhaustive identification operator (henceforth EI-Op) with the semantic import of maximality. In line with Kiss (1998), Horvath assumes that EI-Op operates on a set of contextually or pragmatically given elements

for which the predicate phrase can potentially hold. It additionally identifies the exhaustive proper subset of these elements for which the predicate phrase actually holds (hence excludes its complement set). Two types of focus are assumed as in (183), depending on their relation with EI-Op.

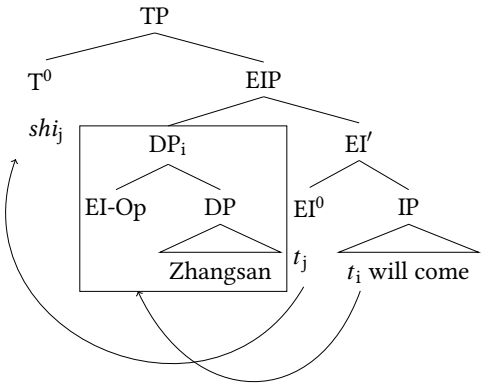
(183) (i) A focus sentence encodes (non-exhaustive/non-contrastive) information focus in the absence of a c-commanding EI operator.

(ii) When the focus associate is c-commanded by an EI operator, an exhaustive identificational/contrastive focus reading arises.

A sample derivation applyng the EI-Op mechanism to the *shi*-cleft is in example (184b).

(184) a. Shi Zhangsan yao lai.
COP zhangsan will come
'It is Zhangsan who will come. '

b.



The derivation involves the interaction between an EI-Op and a clausal functional head EI^0 that has an unvalued EI operator feature. EI^0 enters into an Agreement relation with the EI-Operator in its c-command domain. The EI feature is not a feature inherent to some lexical category, and cannot be assigned to constituents merged in the syntax. Rather it originates on a grammatical morpheme that belongs to the functional lexicon, in our case *shi* serves as a good candidate (one may postulate subsequent head movement to the C domain to capture the correct word order). EI-Op moves to the [Spec, EIP] position, triggered by the Agree relation. EI-Op can merge at the root of DP (and other phrasal constituents such as PP, VP and CP), and pied-pipes the phrase the outermost specifier of which it occurs in. The analysis is able to predict when the exhaustive inference arises (identificational focus undergoes movement, whereas informational focus undergoes no movement in the absence of EI-Op). It additionally

captures the insertion of *shi* in both term clefts and propositional assertions, given that nothing constrains the type of syntactic structure it may be merged into.

Semantics under a focus-based syntax

Semantically, there are mechanisms compatible with the above focus-marker syntax that capture the exhaustive reading of clefts. For example, Erlewine (2020) proposes that *shi* is a sentence modifier that lexically realizes Velleman et al.'s (2012) CLEFT operator (note that the CLEFT operator may be covert, so that it is not necessarily adopted for a focus-based approach). According to Velleman et al. (2012), CLEFT as well as the exclusive operator *only* projects a two-layered meaning that targets both the at-issue and the presuppositional dimension. The denotations of CLEFT and *only* à la Velleman et al. (2012) are presented in (185) (Here a modified version from Erlewine 2020 is adopted, the subscript S indexes the current context):

(185) CLEFT: = λw.λp: No true answer is strictly stronger than p at w.
There is a true answer at least as strong as p at w.
only: = λw.λp: There is a true answer at least as strong as p at w.
No true answer is strictly stronger than p at w.
Formally,
CLEFT: = λw.λp: $\forall$q [(q $>_S$ p) $\rightarrow$ $\neg$q(w)]. $\exists$q [q(w) $\wedge$ q $\geq_S$ p]
only: = λw.λp: $\exists$q [q(w) $\wedge$ q $\geq_S$ p]. $\forall$q [(q $>_S$ p) $\rightarrow$ $\neg$q(w)]

The idea in (185) is meant to capture the intuition that both CLEFT and *only* serve an inquiry-terminating function. Given a question under discussion *who will come*?, an answer in the form of *Only Zhangsan will come* and *It is Zhangsan that will come* both address the question completely so that this line of inquiry is terminated. According to Velleman et al, the meaning components of CLEFT and *only* are identical, the difference being that the mapping of *only*'s two layers of meaning to the two dimensions is the mirror image of CLEFT. The 'switch side' treatment is meant to capture Horn's (1981) observation that the exhaustive (inquiry-terminating) inference of *only* is derived from the at-issue dimension, whereas that of CLEFT is from the non-at-issue dimension. In the following I only focus on how the cleft interpretation is derived. Once again I illustrate with the Mandarin cleft from the example *Shi Zhangsan yao lai.* 'It is Zhangsan that will come', where I assume with Erlewine (2020) that *shi* is the CLEFT operator, the prejacent of which is p = $^\wedge$Zhangsan will come. Suppose the relevant

context S contains a QUD *who will come*? and a domain consisting of individuals {Zhangsan, Lisi, Wangwu}, we arrive at a set of propositions based on atomic individuals: {$^{\wedge}$Zhangsan will come, $^{\wedge}$Lisi will come, $^{\wedge}$Wangwu will come}. These propositions form a Boolean lattice based on the entailment relation, from which we have all the possible Hamblin answers. Using a, b, c to stand for Zhangsan, Lisi and Wangwu, respectively, and using K to refer to the extension of *will come*, the set of Hamblin answers are then represented as {$K(a)$, $K(b)$, $K(c)$, $K(a+b)$, $K(a+c)$, $K(b+c)$, $K(a+b+c)$}.

We rank the strength of propositions along the entailment scale, meaning that a proposition q is at least as strong as a proposition p iff q entails p, and q is strictly stronger than p iff q asymmetrically entails p. According to the denotation of CLEFT in (185), the formula between the colon and the period is treated as a presupposition. Thus, given p = $^{\wedge}$Zhangsan will come, CLEFT (p)(w) presupposes that no true answer is strictly stronger than $K(a)$ at w. This means that to satisfy the presupposition, $K(a+b)$, $K(a+c)$, $K(a+b+c)$ cannot be true at w, as they asymmetrically entail $K(a)$ and hence are strictly stronger than $K(a)$. Additionally, CLEFT (p)(w) asserts that there is one true answer that is at least as strong as $K(a)$ at w. This means that one of the following Hamblin answers $K(a)$, $K(a+b)$, $K(a+c)$, $K(a+b+c)$ must be true. Combining the presuppositional and the at-issue content, we can conclude that CLEFT(p)(w) is felicitous when $K(a)$ is true in w, while the stronger alternatives $K(a+b)$, $K(a+c)$, $K(a+b+c)$ are all false in w. Therefore, we arrive at an exhaustive interpretation, according to which Zhangsan is the sole individual who will come.

Aside from Velleman et al.'s (2012) semantics that is couched in the sentential modifier analysis of *shi*, an exhaustive semantics couched in the focus head analysis of *shi* can also be formulated, by analogy with the semantics of constituent *only* (see e.g. Rooth 1992; Wagner 2006). I will not dwell upon such treatment in this dissertation.

Problems with the focus-based approach

Taken together, the focus-based approach promises to capture three of the four (above-mentioned) properties associated with Mandarin *shi*-clefts. Table 6.6 lists the merits of the focus approach as well as its demerits.

Conditions	Satisfied
Cleft focus type (DP, PP, CP)	✓
Adjacency	✓
Weak exhaustive inference (contra *only*)	✓✗
No object clefts	✗

Table 6.6: Evaluating the focus-based approach.

A common issue for the proposals within the focus-based approach is the lack of clarity on how object clefts are ruled out. As is detailed in Chapter 2, the issue pertains to the observed infelicity when *shi* adjoins to a preposed object focus, illustrated in (186).

(186) Context: "Could you show us who, among those criminals in the room, you have never met before?"
??Shi sihao fanren wo mei jianguo.
COP four.number criminal I NEG meet.PRF
'It is criminal number four that I have never met before.'

Consider Erlewine (2020)'s 'as low as possible' constraint in (177). *Shi* is predicted to be able to adjoin to the clausal spine and stay adjacent to the object DP, contrary to fact.[53] Erlewine crucially draws a parallel between focus *shi* and the Vietnamese focus particle chỉ 'only', yet chỉ can attach immediately next to a shifted object DP, as the following illustrates (my own consultants, two speakers).

[53] Note incidentally that Erlewine's constraint does rule out the other infelicitous patterns associated with object clefts, namely the pattern associated with when *shi* is placed low, adjoining to an *in situ* object focus, as well as when *shi* is separate from an *in situ* object focus. Both are illustrated in (i).

(i) a. ?? Wo mei jianguo shi sihao fanren.
I NEG meet.PRF COP four.number criminal
'It is criminal number four that I have never met before.'

b. ?? Wo zuotian shi maile nei ben shu.
I yesterday COP buy-PRF that-CLF book
'It is that book that I bought yesterday. '

Erlewine (2020) claimed that focused object reading is possible given a cleft construction with *shi*. Importantly, however, the permissible structures that are under consideration always invite a corrective interpretation, instead of one of a plain *wh*-question. See Chapter 2 for a detailed discussion of the constraint against object clefts and apparent exceptions.

(187) Context: “Could you show us who, among those criminals in the room, you have never met before?”

Chỉ có ông số 4 tôi chưa baogiờ thấy.
only exist man CLF 4 I NEG never see
‘It is criminal number four that I have never met before.’

Furthermore, the focus-based approach assumes a uniform underlying structure for both term clefts and propositional assertions, which predicts that the LF structure that feeds into the level of interpretation should also be similar for the two types. It is nevertheless not clear how the exhaustive interpretation is derived in the case of propositional assertions. In the semantic account by Velleman et al. (2012), for example, it remains unspecified how the strength of propositions as defined by an entailment relation can apply to the alternatives in propositional assertions.

Besides the difficulty with object clefts and the exhaustive inference, the focus approach faces other problems. One problem that is raised in Haegeman et al. (2014) concerns the position of the focus phrase in *wh*-clefts. In the *it*-cleft, the focus phrase is assumed to undergo *wh*-movement to SpecFocP, and the string *it*+copula occupies the specifier of a dominating projection (either TopicP in Meinunger 1998 or GroundP in Frascarelli & Ramaglia 2013). However, in cases of a focused *wh*-constituent, the *wh*-focus ends up to the left of the string of *it*+copula, as in (188).

(188) a. What was it _____ that you saw?

b. When was it _____ that you met him for the first time?

This means that the *wh*-constituent has moved across the projection dominating FocP that hosts the *it*+copula string. To account for the site of such movement, one possibility is to make use of the IntP position within an enriched left periphery (Rizzi 2001), as shown in (189a). However, IntP is originally designated for the question morpheme in *yes-no* and *why*-questions. Generalizing all *wh*-movement to IntP would undo such distinction, thereby contaminating the integrity of the IntP projection.

(189) a. [$_{\text{ForceP}}$ [$_{\text{IntP}}$ What [$_{\text{IntP}}$ was] [$_{\text{GP}}$ [$_{\text{IP}}$ it ~~was~~] [$_{\text{FocP}}$ ~~what~~ [that you saw]]]]]?

b. [$_{\text{ForceP}}$ What [$_{\text{Force}}$ was [$_{\text{GP}}$ [$_{\text{IP}}$ it ~~was~~] [$_{\text{Foc}}$ ~~what~~ [that you saw]]]]]?

Alternatively, if ForceP itself is recruited as a landing site for *wh*-movement, as in the configuration (189b), it has the consequence that *wh*-fronting in root questions and focus fronting are no longer a unified phenomenon. Rather, some cases of root *wh*-fronting are hosted

by FocP, while the *wh*-constituent will have to move to a higher projection in other cases. However, the question arises as to if there is independent empirical evidence for assuming that *wh*-consituent in cleft root *wh*-interrogative, as in (188) (repeated here as in (190b)), occupies a distinct position from the regular non-clefted, root *wh*-interrogatives (SpecFocP), as in (190a).

(190) a. What did you see?

b. What was it that you saw?

Assuming so jeopardizes a similar treatment of the *it*-cleft and focus preposing (as in 191), which motivates the monoclausal treatment of clefts in terms of focus movement.

(191) a. It was the cat that Mary saw.

b. THE CAT Mary saw.

In sum, under the focus movement approach, the cleft focus undergoes *wh*-movement, which implies that a higher landing site must be invoked to host the *wh*-moved cleft focus. This conclusion partly undermines the economy argument that was an initial motivation for the focus movement analysis, namely the parallelism between the two examples in (191).

In addition, the evidence in Mandarin is compatible with focus *shi* patterning with verbs (e.g. Tang 1983), posing a challenge for the focus analyses that assign an adverbial category to *shi*, e.g. the low attachment constraint in Erlewine (2020). I will defer a discussion of the verbal evidence till the beginning of Section 6.3, prior to the introduction of my own proposal.

6.2 Copula-based biclausal approaches

I now turn to an overview of previous proposals within the biclausal approach. The theories reviewed here assume that *shi* is a copula verb proper that heads a copular clause structure, from which the properties associated with the cleft are derived.

According to an idea dating back to Jespersen (1928), the copula morpheme in the cleft is a copula verb which projects a special kind of copular clause. Some earlier accounts of Chinese clefts within the copular approach have specifically subscribed to the view that clefts are derived from pseudoclefts (Chao 1968; Yue-Hashimoto 1969; Li & Thompson 1977; Tang 1983; Zhan & Sun 2013). Although these accounts fall short of presenting a detailed formulation, the underlying assumption of clefts as concealed pseudoclefts resembles what has been proposed by a rich body of related literature for English *it*-clefts.

The standard pseudocleft analysis is based on Percus's (1997) account of the English *it*-cleft (see also Akmajian 1970; Bolinger 1972; Hedberg 2000; Han & Hedberg 2008). The account treats the *it*-cleft structure as derived from a specificational pseudocleft. This can be seen clearly by comparing (192a) with the specificational pseudocleft in (192b).

(192) a. [It]$_{\text{complement}}$ is [Zhangsan]$_{\text{specificational value}}$ [who will come]$_{\text{headless relative}}$.

b. [(The one) who will come]$_{\text{complement}}$ is [Zhangsan]$_{\text{specificational value}}$.

In (192a), the copula heads a clause with a logical subject and a pronominal predicative complement that co-refers with a right-dislocated headless relative (treated as adjunction to a right-peripheral clause position via A'-movement, cf. Büring & Hartmann 1997).[54] Similar to (192b), the complement provides a variable, and the subject specifies the value of that variable.[55]

Tang (1983) provides comprehensive distributional generalizations comparing cleft and pseudocleft constructions in Chinese. She argues for unifying the verbal status of *shi* in both constructions, given the properties listed in (193). I will revisit these properties when presenting my own proposal at the beginning of Section 6.3.

(193) a. It can be negated.

b. It can be used to form alternative questions.

c. It is modified by modal adverbs.

d. It serves as an answer to polar questions.

In addition, Tang further claims that the *de*-particle in the *shi...de* construction is a sentence-final discourse particle encoding an affirmative attitude towards the discourse, and hence should reside at the sentence level (S/CP). A similar treatment is given in Li & Li (1994), according to which the structure of the *shi*-cleft resembles the structure posited for the English *it*-cleft, except that the *shi*-cleft does not feature a dummy *it*-subject or an overtly realized relative pronoun.

[54] The standard assumption that is adopted here is that in a specificational copular clause, the pre-copula element is a predicative complement, and the post-copula element is an entity-denoting subject. See the discussion in Chapter 1.

[55] In a number of languages, the agreement morphology on the copula is subject to the person features of the nominal arguments on a par with pseudoclefts, providing explicit evidence that the cleft construction is derived from the latter (Percus 1997; Gribanova 2013; Hartmann & Veenstra 2013).

Ross (1983) proposes to unify the bare-*shi* cleft with the *shi...de* cleft under the same analysis. In both types, *shi* functions as a copula verb, which indicates an indirect equational relationship between its arguments in which the second clause is a situation that identifies the first. By indirect equational relation, Ross is having in mind an unspecified relation between the pre- and post-copular elements whose exact interpretation the listener is at liberty to specify (Yue-Hashimoto 1969). The author claims that *shi* has the same function when it is in a run-of-the-mill copular sentence as in (194) and in a cleft construction as in (195).

(194) Renjia shi fengnian.
other-people COP bumper-year
'For those people it was a bumper year.'
(Literally: 'Those people are bumper years. '
Speaker's specification: "The nature of the relationship (between the other people and the year) is unspecified, and is left to the listener to determine,") (Yue-Hashimoto 1969: 86)

(195) Ta shi qunian lai meiguo (de).
He COP last.year come America DE
'It was last year that he came to America. '

Ross assumes that the cleft constructions in (195) is paraphrased as 'He is in the situation of having come to America last year (underlining indicates contrastive stress).' Here *he* is identified in a general way by the situation of having come to America last year, rather than the nominalized reading of 'He is the person who came to America last year. '

Based on her proposal, term clefts as in (195) and propositional assertions as in (196) share the same underlying structure and are both semantically underpinned by the indirect equational relation. (196) is paraphrased by Ross as 'He is in a situation of having played a joke on you. '

(196) Ta shi gen ni kai wanxiao (de).
He COP with you play joke DE
'It is the case that he is playing a joke on you.' (Chao 1968: 296)

Unfortunately, the indirect equational relation lacks a precise definition, seemingly leaving much to pragmatics without a mechanism mapping pragmatics to structure.

Cheng (2008) treats *shi*-clefts as distinct from (and not derived from) pseudoclefts. The account has the additional merit specifying the role of the copula (underspecified in most pseudocleft-based analyses). Based on the framework developed in Stowell (1981) and Moro (1997), Cheng (2008) proposes that the copula projects a small clause establishing a predication

relation between the subject and the predicate. A syntactic analysis based on the *shi*-cleft is given in (197).

(197) a. Shi Zhangsan yao lai.
COP Zhangsan will come
'It is Zhangsan that will come.'

b. *shi* [$_{SC}$ [$_{subject}$ [$_{CP}$ *Zhangsan yao lai*]] [$_{predicate}$ *pro*]]

c. *pro*$_i$ *shi* [$_{SC}$ [$_{subject}$ [$_{CP}$ *Zhangsan yao lai*]] [$_{predicate}$ t_i]]

As (197b) illustrates, *shi* selects for a small clause, with a CP residing in the small clause subject position, and a *pro* element residing in the predicate position. The *pro* predicate raises further to the left of the copula, creating an inverse predication structure as in (197c), similar to what has been proposed for English and Italian by Moro (1997) and den Dikken (2006).[56]

Hole (2011) similarly treats *shi* in cleft constructions as a copula. *Shi* is proposed to merge right above the C*-head where *de* is located. *De* additionally triggers focus movement, during which the focus phrase moves to [Spec, C*P] to check the syntactic feature carried by *de*, resulting in a subsequent lambda-binding process. Compositionally, *de* denotes an event-type operator that, when combining with its focus associate, projects a definite-like uniqueness and familiarity presupposition yet does not lead to a definite reference at the at-issue level. Thus, given a cleft answer, the exhaustive inference can be derived by *de* checking if the focused term refers to the only maximal participant of the maximal event denoted by the predicate in the current context. Moreover, the copula here selects elements within the C* category as its complement. With the cleft phrase located in the specifier position of C*, the adjacency requirement is fulfilled. Furthermore, it is proposed that topics and frame-setters precede the copula *shi* (i.e. the copula *shi* provides a partition between a topic and a comment). Finally, while Hole addresses the acceptable object clefts under the configuration of V *de* O, the infelicity associated with object clefts of the V O *de* type is left out of discussion.

von Prince (2012) postulates a lexeme *shi* in Chinese clefts that is related to the copula proper *shi*. It imposes a delineation between topic and comment, by enforcing the information-structural requirement that the post-*shi* part falls within the comment. *Shi* further introduces a contrastive reading to the comment, with free focus assignment. This means constituents

[56] In den Dikken's (2006) more elaborate characterization of the copula as a relator, the copula is base-generated in the small clause, before subsequently undergoing raising, motivated by its role as a linker that circumvents the locality constraint otherwise incurred during the long-distance raising of the *pro*-predicate.

(DPs, PPs, VPs and full clauses) have to contrast with contextually retrievable alternatives, thereby deriving the exhaustivity interpretation of the cleft via the lexical constraint on *shi*.

Problems with the current copula-based analyses

In Table 6.7, the copula-based approach is evaluated against the same criteria introduced in Section 6.2.

Conditions	Satisfied or not
Cleft types (DP, PP, CP)	✓
Adjacency	✓
Weak exhaustive inference (compared with 'only'-exclusives)	✓✗
No object clefts	✗

Table 6.7: Evaluating the copula-based approach.

One of the challenges for the copular approach as it stands is the lack of a fully explicit mechanism that derives cleft exhaustivity. The accounts in Cheng (2008) and Hole (2011) both seek to tie the exhaustive reading to the *de*-particle, a direction that appears undesirable given the experiment results in Chapter 3. Though the formally precise account in von Prince (2012) postulates a contrastivity requirement imposed by *shi* when introducing focus, the solution relies on introducing an *ad hoc* lexical entry of *shi*. It would clearly be more desirable to derive the contrastivity interpretation as an inherent property of the copula verb *per se*. Moreover, we still do not have a mechanism that is general enough to apply to term clefts and propositional assertions alike. In addition, as with focus-based accounts, copula-based analyses are mostly silent about the infelicity of object clefts in relation to other cleft types. The challenges that the copular approach still faces as shown in Table 6.7 urge us to find a new solution that unifies the present issues above. In the next section, I provide my analysis targeting these unsolved issues.

6.3 My proposal

On the basis of a comparison of the two camps of proposals, I now propose my analysis for a unifying account of the two types of cleft constructions. For a reminder, the objective of this account (and any successful treatments of Chinese cleft structures) is to arrive at an adequate solution for the following four issues simultaneously: 1) it captures different cleft types (DP, PP, CP); 2) it derives the pattern of linear adjacency between the copula and the cleft phrase; 3) it captures the empirical finding that clefts receive an exhaustive focus reading, while simultaneously capturing the observation that the exhaustive reading is rather weak when compared with 'only'-exclusives; 4) it explains the fact that object clefts are disfavored in Mandarin.

As a preview, my account is in line with the copula-based approach. Building on frameworks of copular structures (Stowell 1981; Mikkelsen 2002; 2005; den Dikken 2006; 2013), I treat the *shi*-cleft (narrow term cleft as well as broad propositional assertion) as essentially a specificational copular clause (Bolinger 1972; Moro 1997; Percus 1997; Heycock & Kroch 2002; Mikkelsen 2002; 2005; Han & Hedberg 2008; den Dikken 2013). As is the case with other specificational structures, the copula projects a small clause with a constituent encoding a specificational value (that comes for free with specificational structures), which resides in the subject position of the small clause (Moro 1997). I further assume with Moro (1997) that an unpronounced *pro* element functions as the predicate of the small clause.

Given a term cleft, DP/PP focus triggered by the unvalued Focused feature ([*u*Foc]) moves to the specifier CP to check the [FOC], establishing the Agree relation with C^0 (Sheil 2016). Given a propositional assertion, focus feature checking is done locally (e.g. Abels 2003).

My analysis directly descends from the small clause-based proposal in Cheng (2008). Importantly, however, it differs from Cheng (2008) in a number of important aspects. The first and foremost difference lies in that I present a formally explicit, fleshed out account that captures the role and semantics of the de_{IMAX} particle, according to which *de* is not related to the exhaustification semantics of the cleft structure. In addition, my current proposal provides a number of necessary motivations pertaining to the specifics of the posited small clause structure in Mandarin, such as the argument that *shi* receives a copula verb analysis as opposed to an alternative focus marker analysis, as well as the language-specific evidence for inverted predication in Mandarin pivotal to the entire copular-based approach. A further difference lies in that Cheng assumes that the focus under canonical predication is triggered by phonological

prominence. While phonological prominence indeed enforces a focus interpretation, a contrastive focus reading can also arise in broad cleft environments (CP or VP focus where no constituents have a clear prominence status). In other words, phonological prominence is a necessary but non-sufficient condition in triggering focus. Given focus is predicted via stress in Cheng (2008), the tendency for the linear adjacency between the focus and the copula is left without discussion. Contrary to Cheng, my proposal enables a unified derivation for term clefts and propositional assertions alike: In my proposal, the checking of the Focus feature is done via Agree, which does not rely on the movement operation. Such deviance leads to an important difference in prediction regarding the behaviors of CP focus (i.e. propositional assertions). Under Cheng's proposal, CP focus is predicted to encode non-exhaustive focus by way of it not involving movement. Contra Cheng's prediction, I have shown that focus in propositional assertions is actually exhaustive (e.g. it fails the standard additive continuation test). Under my proposal, Agree can be maintained without resorting to movement (crucially through Antilocality). This way, a unified exhaustive account of cleft types (DP, PP, CP, etc.) is arrived at. Another issue with Cheng (2008) is the absence of an explanation for the infelicity associated with object preposing in non-corrective contexts (see Chapter 2 for details). An explanation of the ban against object clefts is provided in the current proposal.

I will first visit the assumptions central to my proposal before elaborating the syntactic details. In the following, I present arguments for a verbal status of the cleft *shi* (Section 6.3.1), and afterwards discuss motivations for inverse predication in the clause structure and for the *pro*-predicate (Section 6.3.2). I then provide a derivation of the specificational copula clause that assumes a fixed, post-copula focus position. The specificational structure thus established is next adapted to underlie the cleft structure in Mandarin (Section 6.3.3 and Section 6.3.4).

6.3.1 The verbal status of the copula *shi* in clefts

My copular analysis of the cleft structure rests on the assumption that the copula *shi* is a copula verb proper, countering claims in the focus-based approaches that often assign an adverbial status to *shi*. I will start my analysis by presenting two pieces of evidence in support of a proper copula verb analysis of *shi* in clefts. I show that *shi* behaves like verbs in A-not-A questions, and additionally can be modified by VP-level quantificational adverbs.

In a Mandarin A-not-A question (a non-biased polar question), the predicate undergoes reduplication, as in (198) (Chao 1968).

(198) a. Ta xihuan bu xihuan zhe-jian shi?
he like NEG like this-CLF matter?
'Does he like this matter or not?'

b. Ta kaixin bu kaixin?
he happy NEG happy?
'Is he happy or not?'

An A-not-A question is also formed with a canonical copula verb that selects for a nominal complement, as illustrated in (199).

(199) Ta shi-bu-shi xuesheng?
he COP-NEG-COP student
'Is he a student or not?'

Non-predicative elements, on the other hand, are barred from undergoing reduplication (Chao 1968). Sometimes reduplication is formed directly on the nominal part, yet in this case the nominals must be coerced into a predicate, suggesting that the reduplication process always looks for a predicative element, as shown by the contrast between Reading 1 and Reading 2 in example (200).

(200) Zhege ren zhangsan-bu-zhangsan?
this.CLF person Zhangsan-NEG-Zhangsan
Reading 1: 'Is this person Zhangsan-ish or not?'
(Unavailable) Reading 2: 'Is this person Zhangsan or not?'

As (201) shows, an A-not-A question can also be formed on the copula *shi* that introduces a cleft construction.

(201) a. Context: I want to know the history of the process of applying for residence permit.
Lilai, ban hukou shi-bu-shi zai danwei chuli?
all.time apply.for residence.permit COP-NEG-COP LOC employer process
'Is it at the employers' that applications for residence permit are processed all this time?'

b. Context: I need to find the headmaster during his break.
Yibanlaishuo, xiaozhang shi-bu-shi zai shitang chifan?
normally headmaster COP-NEG-COP LOC dining.hall have.meal
'Normally, does the headmaster have meal at the dining hall or not? '

(202a) and (202b) further show that the cleft *shi* is modified by VP-level modifiers. Here we opt to illustrate with adverbs of quantification such as *quan(bu)* 'whole' and *dou* 'all', since non-quantificational adverbs have the option of being interpreted alternatively as frame-setting topics.

(202) a. Context: Where should I submit my applications for a residence permit?
Lilai, ban hukou quan shi zai danwei chuli.
all.time apply.for residence.permit all COP LOC employer process
'It is always at (the corresponding) employers' that applications for residence permit are processed all this time. '

b. Context: Where should I go to color print my papers?
Yiban caise dayin dou shi zai louxia bangongshi dayin.
normally color print all COP LOC downstairs office print
'Normally, it's always at the office downstairs where one makes color prints. '

Inserting the negation word *bu* is also possible, as in (203a) and (203b).

(203) a. Ban hukou conglai dou bu shi zai danwei chuli.
apply.for residence.permit never all NEG COP LOC employer process
'It is never at (the corresponding) employers' that applications for residence permit are processed. '

b. Yibanlaishuo, caida wenjian dou bu shi zai louxia bangongshi dayin.
normally color.print document all NEG COP LOC downstairs office print
'Normally, it's not at the office downstairs where one makes color prints. '

The evidence thus indicates that the copula in clefts behaves on par with other verbal elements. It undergoes reduplication in the A-not-A question as is typical of a predicative element, and as with other verbs, can be modified by negation and adverbs of quantification. Such behaviors would be mysterious if one follows an adverb analysis of *shi* in clefts.

6.3.2 A 'flexible' small clause structure

I now proceed to propose a small clause structure projected by the copula verb proper. Before going into the details of the copular structure, it is important to point out that the underlying assumption in my syntax deviates from one of the established notions in the theory of clause structure in that in partitioning the clause into a predicate and its subject, the subject position is not occupied by a noun phrase. Rather, a noun phrase takes up the predicate position. This amounts to abandoning the alignment between the most prominent position in the clause structure and the subject of predication. As Moro (1997) argues, doing so is independently motivated, as it is shown to be crucial in explaining a number of discrete syntactic phenomena that defy a solution under the standard clause configuration.

I will briefly illustrate with two arguments for doing away with tying the most prominent clausal position to the subject. First, Moro (1997) observes that specificational copular clauses

differ from run-of-the-mill copular sentences with regards the subject-object asymmetry. In canonical (predicational) copular clauses, extraction from within the subject noun phrase is disallowed, whereas extraction from within the noun phrase at the object position is free. The asymmetry follows from the Left Branch condition, a locality condition that dictates that extraction from a constituent in a left-branch position is generally banned (Ross 1969; Bošković 2005). Assuming a clause structure where the subject of the clause (but not the object) resides in a left branch position, the asymmetry is accounted for.

Importantly, however, specificational copular clauses do not follow the same pattern: As the contrast between (204a) and (204b) serves to illustrate, even noun phrases from the object position fail to undergo extraction under a specificational context. This indicates that a subject-object division alone does not suffice to capture the extraction restriction in specificational copular clauses.

(204) a. Which riot$_{i}$ do you think that a picture of the wall was the cause of t_{i}?

b. *Which wall$_{i}$ do you think that the cause of the riot was a picture of t_{i}?

Moro proposes to account for the exceptional ban against object extraction in the specificational context by postulating that the noun phrase immediately dominated by the clause node is a predicate. In other words, what appears to be the subject of predication in (204b) is argued to initially merge at the predicate position. The word order is derived via the raising of the predicative noun phrase, creating an inverse predication structure, as in (205).

(205) *Which wall$_{i}$...[the cause of the riot$_{k}$ [$_{CP}$ was [$_{subject}$ a picture of t_{i}] [$_{predicate}$ t_{k}]]?

With the predicate raised, the postverbal (post-copula) nominal phrase is also in a left branch position. The Left Branch Condition now applies and rules out the structure.

Moro shows that a similar assumption promises to account for the deviant syntactic behaviors of semi-copulas such as *seem*. Note that as a general rule, post-verbal clausal objects with an expletive *it*-subject as in (206a) are able to alternate with expletive-less constructions as in (206b), with the clausal objects raising to occupy the subject position.

(206) a. It is announced [that the king will visit].

b. [That the king will visit] is announced.

Semi-copulas such as *seem* fail to assimilate to this generalization: With *seem* as the main verb, raising of a clausal object is not possible, as (207) illustrates. An *it*-expletive must be in the subject position.

(207) a. It seems [that John left].

b. *[That John left] seems.

To make sense of the above puzzle with semi-copulas, Moro argues that *seem* patterns with the copula in selecting for a small clause complement. The most prominent position dominated by the small clause node is again a predicate. In this case, a pronominal predicate is base-generated. At the same time, the subject position of said small clause is occupied by the CP argument. The structure Moro postulates is given in (208).

(208) *seems* [$_{SC}$ [$_{subject}$ [$_{CP}$ *that John left*]] [$_{predicate}$ *it*]]

The pronominal predicate within the small clause next raises, giving rise to the unproblematic inverse predication structure as in (207a). Crucially, Moro argues that the proposed structure makes it impossible for *it* to be replaced by the CP subject within the small clause: Raising the CP subject is out of the question, as the replacement of *it* by CP would obliterate the chain of the pro-predicative element. Here Moro resorts to the principle of Full Interpretation, requiring only legitimate objects to appear at a given level (Chomsky & Lasnik 1993). Thus, raising may apply only to elements that are visible at the appropriate level. Elements that are not visible cannot raise at LF alone and must therefore raise in the overt syntax. We can simply regard the absence of canonical counterparts to sentences like *it's that John left* or *it seems that John left* as the result of the principle of Full Interpretation. According to the principle, if the propredicative element *it* does not raise overtly, it would not be visible at all at LF, and the corresponding structure will simply be rejected as incomplete by the computational system. The contrast between (207a) and (207b) thus boils down to the difference in their ability to satisfy the chain interpretation requirement.

The central underpinning argument in Moro (1997) is that the above phenomena can all be explained once we abandon a widely adopted assumption in the theory of clause structure. Namely, the noun phrase immediately dominated by the clausal node necessarily corresponds to the subject of predication. The crucial step will then be to allow a predicative noun phrase to occupy the most prominent position in clause structure, which is generally occupied by the subject of the predication. Compared to the standard 'rigid' structure, the only surviving requirement that applies to this 'flexible' structure is that the most prominent position should be occupied by a DP. Thus, the syntax of clauses appears to be simpler than is usually assumed: It does not require that the most prominent noun phrase be the subject of predication; rather,

it simply requires that a noun phrase be in such a position. We have already seen that this simple modification allows for a neat and unified explanation of extraction from objects in specificational copular structures and in the constraint against alternation in semi-copular structures. In the following I will subscribe to Moro's 'flexible' structure in applying the small clause-based approach to the cleft structure as an underlyingly specificational structure.

6.3.3 Evidence for a *pro*-predicate

Aside from its theoretical attractiveness, the assumption that the pronominal element within specificational copular clauses is a predicate is also compatible with a plethora of agreement and anaphor-based evidence coming from typologically distinct languages (Moro 1997; Adger & Ramchand 2003; den Dikken 2006; Cheng & Downing 2013; den Dikken 2013).

There are diagnostics supporting the distinction between the pronominalization of the subject in specificational and predicational copular clauses in non-*pro* drop languages. The contrasts can be observed in tag questions, and left-dislocation structures with resumption (e.g. Mikkelsen 2005) as in examples (209) and (210).

(209) a. The best baker is Beverly, isn't it?

b. The best baker is from Germany, isn't she/he/*it?

(210) a. The best baker, that/it is Beverly.

b. The best baker, she/he/*it/*that is from Germany.

The subjects in the (a)-specificational copular sentences are referred back to with the neuter pronoun *it* or with the demonstrative *that*, but the subjects in the (b)-predicational copular clauses are referred back to with the non-neuter pronouns *she* or *he*. This shows the antecedent in specificational clauses does not share the same semantic type as that of the predicational clause (Mikkelsen 2005). Mikkelsen argues that the pronoun *(s)he* is referential and can be anaphoric to another individual-denoting DP, whereas *it* and *that* are in fact property anaphors (type $\langle et \rangle$).[57]

[57] Additional evidence for the property-denoting anaphor *it*/*that* (noted by other authors) is listed in (i) and (ii).

(i) They said that Sheild was beautiful and she is **that**. [Ross 1969:357]

(ii) John is president of the club. **It** is a prestigious position. [Doron 1988:299]

In addition, the two types of clauses display a difference in judgments with question-answer pairs. In (211), *it/that* are again property anaphors, corresponding to *the best baker*. They do not have the right type to be used as an expression referring back (hence the infelicity in (212)).

(211) Q: Who do you think the best baker is?

A1: It/That's Beverly (who is the best baker).

A2: The best backer is Beverly.

(212) Q: Where do you think the best baker is?

A1: He/She's in the kitchen.

A2: #It/#That's in the kitchen (where is the best baker).

A similar argument for treating the pronoun element in inverse copular structures as a predicate has also been made for Irish (den Dikken 2006) and Scottish Gaelic (Adger & Ramchand 2003). An illustration from Scottish Gaelic is provided in (213).

(213) a. 'S e Calum an tidsear.
COP 3SG.ACC Calum the teacher
'Calum is the teacher.'

b. Is tidsear Calum.
COP teacher Calum
'Calum is a teacher.'

c. *Is an tidsear Calum.
COP the teacher Calum

In Scottish Gaelic, a pronoun argument may appear in an inverse copular clause, as shown in (213a), in which case it is argued that the pronoun originates as the predicate of the small clause and subsequently raises together with the copula to the left of the subject. This is evidenced by the fact that the pronoun is positionally equivalent to a lexical predicate in a pronoun-less inverted copular clause, both residing in the immediately post-copula position, as in (213b). Furthermore, the pronoun surfaces exactly when a nominal argument cannot function as a predicate (by receiving a definite interpretation), as shown in (213c).

The body of evidence above does not find an exact Mandarin counterpart due to the fact that pronominal elements in Mandarin copular sentences are generally believed to be unpronounced. It is worth pointing out that there is language-internal evidence for the existence of null pronominal elements in Mandarin despite their covert nature (Takahashi 2008, Miyagawa 2017): A *pro* argument is independently needed to explain (i) the lack of

a sloppy reading for grammatical subjects; (ii) the pattern of blocking in anaphor binding. For example, the example (214) (Takahashi 2008) shows that the preverbal null argument in Chinese does not allow for a sloppy reading (must receive a strict reading).

(214) Zhangsan yiwei [ziji de haizi xihuan Yingwen]; Lisi yiwei [e xihuan fawen].
Zhangsan think self DE child like English Lisi think e like French
'Zhangsan$_i$ thought that [self$_i$'s child]$_k$ liked English; Lisi$_j$ thought e$_k$ liked French.'

Based on this observation, Takahashi (2008, 2013) suggests that Chinese has ϕ-feature subject agreement (The ϕ-feature agreement obviously is covert since we do not find any phonological/morphological manifestation of it): *Pro* receives ϕ-feature agreement from its local T by staying in [Spec,TP], and it can only take the closest subject as its antecedent.

6.3.4 Evidence for an inverted predicate

I next show that there is independent motivation for predicate inversion, which is a crucial part in the Moro-style small clause structure. The examples in (215) are in conformity with a standard test of inverse predication in specification (Moro 1997; den Dikken 2006; 2013). In (215a), the specificational copular clause embedded under the propositional attitude verb 'consider' must contain a copula. In contrast, a predicational copular clause allows for the copula to be omitted, see (215b).

(215) a. Meiti te pian'ai ta, hai zhen dang nü zhujue
media too.much preferentially.treat her, even really consider female protagonist
*(shi) ta le.
(COP) her PRT
'The media has been treating her way too preferentially, turns out they really consider the female protagonist *(to be) her.'

b. Meiti te pian'ai ta, hai zhen dang ta (shi) nü
media too.much preferentially.treat her, even really consider her (COP) female
zhujue le.
protagonist PRT
'The media has been treating her way too preferentially, turns out they really consider her (to be) the female protagonist.'

Following den Dikken's (2006) analysis, the non-omissibility of the copula in (215a) is explained in conjunction with predicate inversion: The predicative noun phrase, *nüzhujue* 'the heroine', is raised from within the small clause to a small-clause-external A position. All else being equal, such A-movement would cross the c-commanding small clause subject (*ta* 'her') and lead to a minimality violation. No violation will arise, however, if the small clause head

(i.e. the copula) undergoes movement to a higher functional head and, in doing so, creates a landing site for the raised predicate *qua* the specifier of the higher functional projection. den Dikken argues that the newly created specifier position now stands in a minimal domain with the small clause subject, to the effect that raising the predicate to said specifier position across the subject will conform to the locality constraint. Given that the moved copula functions to make available its specifier as a landing site, the obligatoriness of the copula testifies to the inversion of the predicate.

Now the literature has also assumed that the following question-answer pair in (216) has an underlying specificational structure, with a phonetically unrealized *pro*-predicate (Cheng 2008).[58]

(216) a. Shi shei?
COP who
'Who is it?'

b. Shi Xiaohua.
COP Xiaohua
'It is Xiao Hua.'

My constructed example (217) shows that the structure of (216) parallels (215a) in terms of the obligatoriness of the copula, compatible with a raising analysis of the *pro*-predicate.

(217) Nü zhujue shi Xiaohua. Zhen dang *(shi) Xiaolian la?
female protagonist COP Xiaohua really consider (COP) Xiaolian PRT
'The heroine is Xiao Hua. Did (you guys) just really consider (it) to be Xiao Lian?'

In sum, the above discussion provides evidence that specificational sentences in Chinese involve inverse predication, and further that the *pro*-element can be treated as an inverted predicate. Such evidence may be drawn upon to shore up the analysis that the *pro*-predicate in the cleft raises to the pre-copular slot, while the subject position of the SC is filled by a CP.

6.3.5 Capturing specificational copula clauses via topic movement

To get the word order right, the above analysis assumes that the copula raises to the left of its CP argument encoding the specificational value. According to Mikkelsen (2005), the predicate

[58] The sentences in (216) are interpreted in parallel with canonical specificational copular clauses: The post-copular constituent encodes a narrow, identificational/exhaustive focus (Kenesei's 2006 specification via exclusion). The interpretation evidence leads Cheng (2008) to propose that (216) instantiates a run-of-the-mill specificational structure, where the predicate is a *pro* element (see also Huang 1982 and Takahashi 1994 for independent evidence for an empty pronominal element in Chinese).

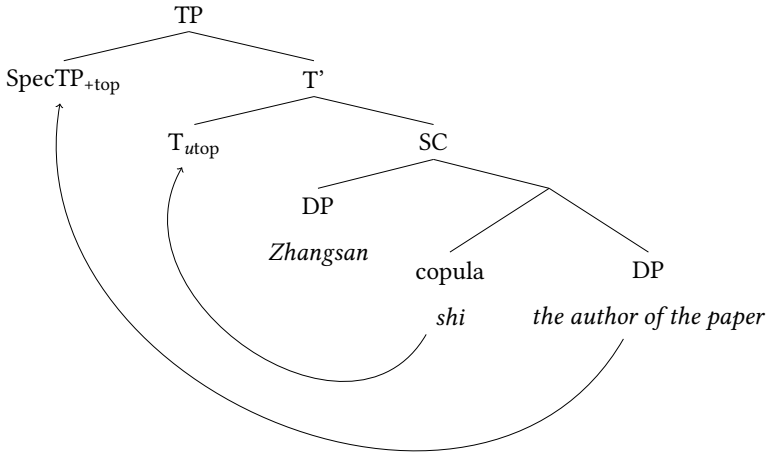
selected for by the copula undergoes raising in specificational copular clauses, and specifically it bears an interpretable topic feature [top] and raises to a position that hosts a topical constituent (i.e. [Spec, TP]). The raising of the predicative grammatical subject in a specificational copular clause, Mikkelsen argues, is attributed to the grammaticization of a preference for grammatical subjects to be topics. Importantly, the copula is argued to subsequently move to the T head (left-adjoins to T) so as to satisy the feature checking requirements: The T head bears an uninterpretable topic feature [*u*top] and agrees with the the specifier of TP.

An implementation on specificational copular clause is provided in example (218). In this case, T bears [*u*top], and DP_{pred} bears [top], hence the raising of DP_{pred}.

(218) a. Specificational

Wenzhang de zuozhe shi Zhangsan
paper POSS author COP Zhangsan
'The author of the paper is Zhangsan. '

b.



In den Dikken (2006)'s characterization of the copula as a relator, the copula is also base-generated in the small clause before subsequently undergoing raising. Differing from the treatment in Mikkelsen, den Dikken argues that the raising of the copula is motivated by its role as a linker that circumvents the locality constraint otherwise incurred during the long-distance raising of the *pro*-predicate.

6.3.6 Capturing focus behavior and adjacency

Following a plethora of authors, I assume that the focus-marking behavior of clefts and propositional assertions both follow from the assumption that specificational copular sentences have a fixed, post-copula focus position (Higgins 1979; Mikkelsen 2005). According to Mikkelsen (2005), specificational copula clauses have a **fixed** focus position, which is right after the copula (needed to address the QuD) (See also Higgins (1979), Heycock & Kroch (2002), Mikkelsen (2005)). This is demonstrated by the examples from (219) to (221).

(219) Complement focus is felicitous.

Q: Who is the mayor?

A: The mayor is $[\text{John}]_{\text{F}}$.

(220) Subject focus is infelicitous.

Q: Who/What is John?

A: # $[\text{The mayor}]_{\text{F}}$ is John.

(221) Contrastive focus on subject DP is infelicious (capital letters indicate contrastive phrases).

Q: Is the mayor Sam?

A: # No, the FIRE CHIEF is Sam.

A: No, the mayor is $[\text{JOHN}]_{\text{F}}$.

This differs from predicational copula clauses, which have a flexible focus structure, as in (222) to (224).

(222) Complement focus

Q: Who is John?

A: John is the mayor.

(223) Subject focus

Q: Who is the mayor?

A: John is the mayor.

(224) Contrastive focus on complement or subject

Q: Is Sam the mayor?

A1: No, Sam is the FIRE CHIEF.

A2: No, JOHN is the mayor.

The above focus placement requirement can be captured as a linearity constraint, as in (225).

(225) Focus marking in specificational sentences falls on the immediately post-copular constituent.

The observation about a fixed focus position is crucial in deriving the post-copula focus assignment for both narrow term clefts and broad propositional assertions. In both cases, the above constraint imposes a requirement on focus feature checking such that, during linearization, the focus-marked phrase is spelled out immediately following the copula. This constraint can be linked to the syntactic feature-sharing process of Agree. Following Pesetsky & Torrego (2007) and Preminger (2014), Agree unites separate feature occurrences from the goal and the probe into a single shared formal object. Several additional requirements are proposed for Agree to take place. A Locality constraint ensures that the Agree process cannot be maintained if the goal is in a different clause than the probe. In addition, the probe must c-command the goal, and the target goal is the closest to the probe that carries the target feature which the probe is looking for.

Importantly, in the proposal by Sheil (2016), Agree is directly invoked to derive the narrow focus reading. She proposes that the constraint of focus-marking introduces a Focus Phrase into the derivation. Specifically, in her proposal, the focus head projects its own functional category minimally dominating it and the focus-marked phrase as its sister. The Focus Phrase (henceforth FocP) acts as a syntactic mediator between semantico-pragmatic focus-marking and morpho-syntactic processes such as movement. FocP hence is identified as entering in an Agree relation with a structurally higher functional head at the clause edge. This means that the Focus head bears a [FOC] feature which matches (Focus value) that of another constituent that needs the same feature but does not have it independently (Polinsky 2016). In other words, by bearing the **interpretable** [FOC] feature, the focus head is then probed by a higher head bearing the uninterpretable focus feature.

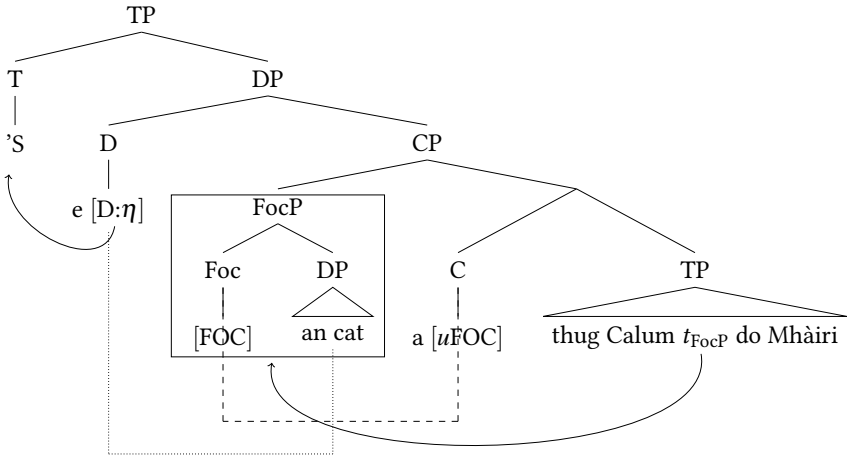
Sheil assumes that the C head (C^0) fulfills this role, bearing an uninterpretable instance of the interpretable focus feature. C^0 therefore probes an interpretable focus feature. When doing so, the first node it encounters bearing this feature is FocP projected by the focus head. As a result, C^0 Agrees with FocP and attracts the entire FocP into the CP projection (the specifier of

CP). Finally, because the focus-marked phrase is contained within FocP, the focus phrase is fronted to the left periphery along with everything else inside FocP.[59]

A demonstration with the Scottish Gaelic clefts with a narrow focus reading following Sheil's proposal is presented in example (226).

(226) a. 'S e an cat a thug Calum do Mhàiri
COP 3MSG the cat C.REL give.PAST Calum to Mary
'It's the cat that Calum gave to Mary. '

b.

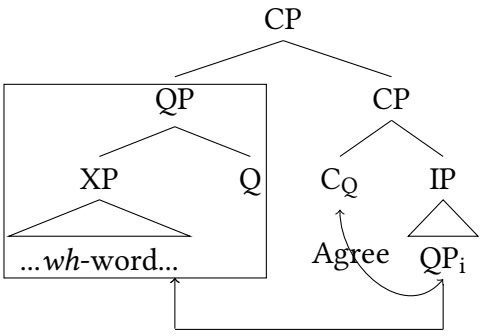


On the other hand, Sheil allows that broad focus alternatively stays *in situ* (within TP), in which case she assumes a sufficiently local relation with the C head (necessary for agreement) is still obtained, drawing crucially on the mechanism of anti-locality in Abels (2003). I provide more details on the implementation of the idea of anti-locality in the next section.

The basic idea of a functional mediator between the head in C and a moving phrase comes from Cable (2010), who is concerned with pied-piping in *wh*-questions (cf. also Drubig 1996 for movement of the focus phrase possibly with pied-piping). In particular, it is theoretically troubling that a phrase larger than the *wh*-phrase can move to [Spec, CP] in *wh*-questions, if the only relevant phrase is the *wh*-phrase. Cable's main claim is that *wh*-dependencies are mediated by a Question Phrase (QP), which selects for the *wh*-phrase, and the entire QP moves to [Spec, CP]. A configuration showing the movement of an entire QP to the C domain is illustrated in example (227) (Cable 2010: 567).

[59] It should be noted that the focus functional mediator analysis here is not to be conflated with the treatment where the probe-goal Agree is satisfied within the FocP projection. In the latter case, the focus-marked phrase bears the [FOC] feature and agrees with its sister, the focus head, which bears the uninterpretable focus feature, so that feature checking is done within the focus projection itself.

(227)



Sheil (2016: 102) argues that an extension of Cable's mechanism would capture the fact that focus movement in languages often involves pied-piping (what actually undergoes movement is a larger constituent within which the focus-marked phrase is contained), exactly as in the case with pied-piped *wh*-phrases.

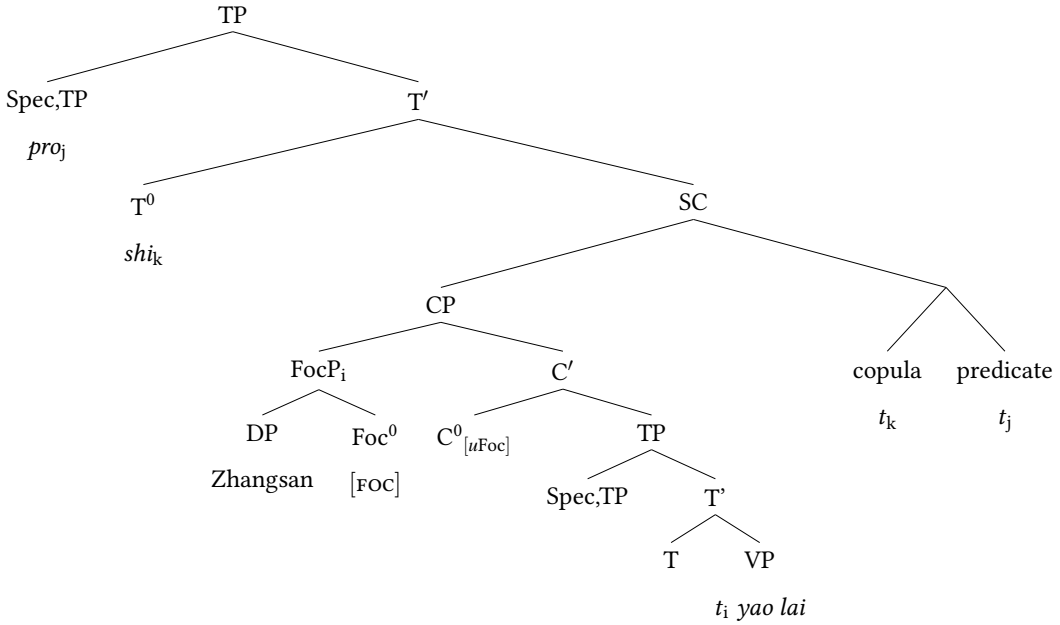
6.4 Unifying term clefts and propositional assertions

In the previous subsections, independent pieces of evidence have been presented to support the assumptions that 1) the copula *shi* that introduces the cleft construction has a verbal status; 2) an unpronounced *pro*-predicate occupies a pre-copula slot; 3) both the *pro*-predicate and the CP subject are base-generated in a post-copula position. Combining these assumptions with the requirement that specificational structures have a fixed focus position that triggers a feature-checking process, we are able to arrive at a full derivation of the Mandarin term cleft structure.

To be more specific, consider the term cleft in example (228) for illustration. The copula *shi* selects for a small clause complement. The DP focus *Zhangsan* is first merged at a lower TP position. Since the specificational copular structure requires a fixed focus position next to the copula *shi*, C^0 bears a [*u*Foc] that needs to be checked. The DP focus hence moves to the specifier of CP to establish Agree with C^0. The *pro*-predicate next raises to fill in the specifier of the TP position, giving rise to the inverse predication structure.

(228) a. Shi $[\text{Zhangsan}]_{\text{Foc}}$ yao lai.
COP Zhangsan will come
'It is Zhangsan who will come. '

b.



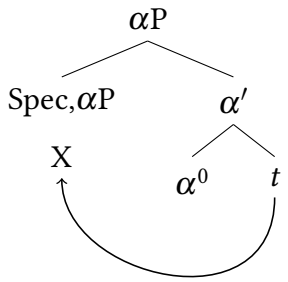
Though the proposed structure resembles Sheil's in (226), it is tailored to capture the idiosyncrasies of Mandarin clefts. Scottish Gaelic clefts are evoked by an augment functioning as a D head that projects a relative clause with an explicit, uninterpretable feature-bearing relativizer. The process differs from that of Mandarin clefts in that unlike an augment, Mandarin clefts feature an unpronounced *pro*-predicate and do not have an overt relativizer. In addition, following Cheng (2008), the copula in Mandarin selects for a small clause instead of a full CP complement.

I will now show that the propositional assertion can be derived in a way similar to the term cleft, with one additional condition constraining movement that is 'too close'. In what follows I lay out the groundwork for the antilocality constraint and then provide a syntax for propositional assertions.

6.4.1 Antilocality and CP focus

The linearity constraint associating focus marking with the post-copula position in specificational structures also captures the focus assignment pattern in propositional assertions. Here I resort to a form of CP stranding, where full CP focus in propositional assertions could be checked locally rather than via movement. This result is obtained by positing a Last Resort condition over movement. Consider the following configuration in (229).

(229) *



Under Abels's (2003) definition of closeness, the specifier of α^0 is **not closer** to α^0 than the complement of α^0 is, and vice versa. The relationship between the α head and its complement is thus as local as the relationship between the head and its specifier. In other words, in the current configuration in (229), if a feature needs to be checked, it has to be checked locally, since the complement is close enough to its head and moving X to [Spec, αP] does not create a new feature satisfaction relation with the head. The remnant movement (movement from the position adjoined to the complement of X to SpecXP) is hence ruled out via Economy because it is considered to be superfluous.

More generally, it has been proposed that when an element X is already located in the minimal domain (or maximal projection for our purpose) of a head it cannot move to another position in the minimal domain of the same head (Bošković 1997; 2005; Arregi & Murphy 2021), which is the case with the movement we are interested in, given that movement is a last resort operation driven by the need to create a local configuration between two elements, characterized as in (230).

(230) Antilocality:
Movement must cross at least one maximal projection: *XP_i. . . [α . . . t_i],
unless α is a maximal projection.

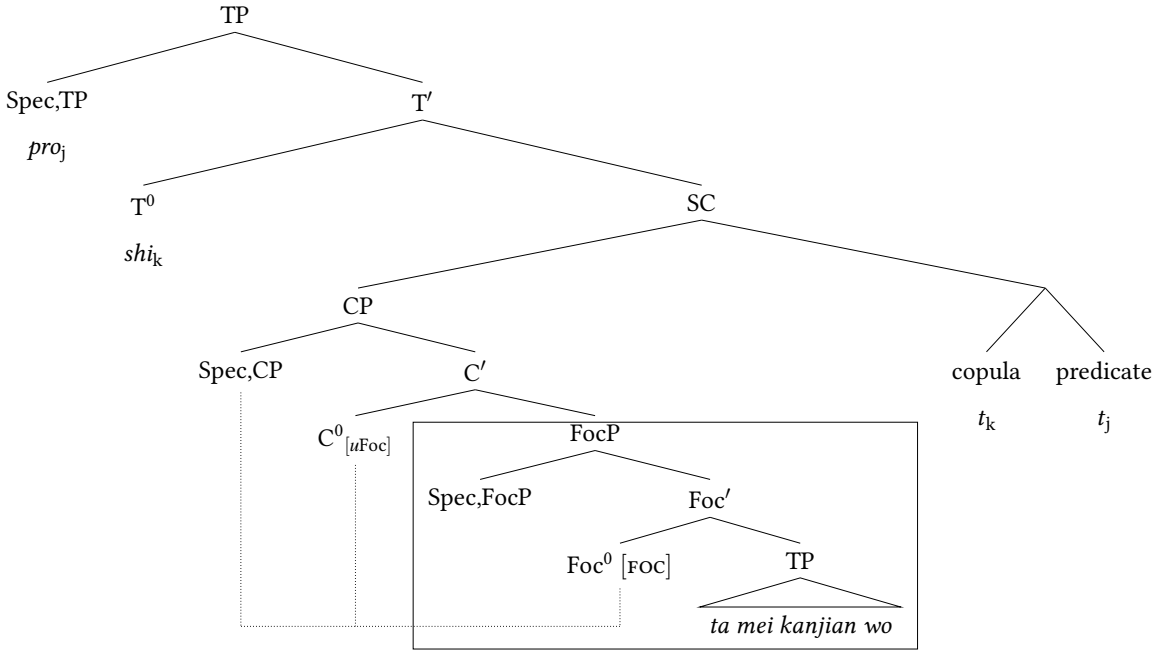
The overarching idea in this recent line of approaches has been that syntactic movement is subject to a constraint preventing it from applying over too short a distance, in conjunction with the well-known locality constraint preventing it from covering too great a distance (see also Takahashi 1994, Murasugi & Saito 1995, Bošković 1997, Grohmann 2003, among others for proposals along this line; see Grohmann 2003 for an overview). The constraint is formulated in a general way (in which extremely 'short' movements are ruled out based on a ban against

superfluous steps), so apart from movement to specifiers, it has also been applied to the clausal domain (Grohmann 2003).[60]

Consider now the propositional assertion in example (231).

(231) a. Shi ta mei kanjian wo.
COP he NEG see I
'It is the case that [he did not see me].'

b.



The movement of the target complement 'he did not see me' will be blocked because of anti-locality, and the focus feature will be checked locally. For the case of term clefts, since the moved phrase is located in the complement of the TP, it moves across more than one maximal projection to check the target feature. Note that, based on the closeness definition, [Spec, CP] is closer to C^0 than the position of DP when it is merged. This way, feature checking cannot take place with the DP focus staying *in situ*, and movement creates an immediate satisfaction of a previously unsatisfiable feature, hence movement is triggered as a last resort.

[60] See in addition a recent antilocality-based account of parasitic gaps in ditransitives by Arregi & Murphy (2021), and an antilocality constraint on movement from within phasal edges in Zyman (2021).

Summary

In this subsection, I proposed two syntactic derivations tailored to capturing Mandarin term clefts as well as propositional assertions. The proposals crucially make use of Agree (i.e. a feature-checking process) and the notion of Antilocality. As with members of the biclausal approach, the central assumption is that *shi* is a proper copular verb. My proposal specifically posits that *shi* selects for a small clause complement, and adopting a 'loosening' of the clause structure rule aligning the subject of predication to a noun phrase (in line with Moro 1997), a CP subject is posited for the small clause argument of *shi*. An unpronounced *pro* functions as the predicate of the small clause. We further assume with standard analyses of specificational clauses that the cleft *shi* has a fixed focus position. The bare-*shi* cleft thus can be recognized as a subtype of specificational copular clauses. Within the CP subject, the C-head with an uninterpretable Focus feature triggers a cleft term (DP or PP) to move to its specifier position. The copula and *pro* both undergo raising. If the cleft term is the entire CP, movement is ruled out via a principle of Economy, due to its closeness to its target position. Thus, the Agreement relation occurs locally. As such, this syntactic treatment captures both term clefts (DP, PP) and propositional assertions (CP) under the same framework.

At this point, it makes sense to evaluate the current theory against the four criteria from above. To elaborate, resorting to the fixed focus position under a specificational copular syntax guarantees the adjacency between the copula and the focus phrase. The two Agree mechanisms come together to capture all focus types (PPs, DPs, CPs). By assimilating all clefts to the interpretation of specification (via exclusion), the weak exhaustive inference is derived for free. The remaining problem to be resolved pertains to the constraint against object clefts in Mandarin, an issue I turn to next.

Conditions	Satisfied or not
Cleft types (DP, PP, CP)	✓
Adjacency	✓
Weak exhaustive inference (compared with *only*)	✓
No object clefts	??

Table 6.8: Evaluating my current proposal.

In addition, the pre-copula slot may be occupied by (frame-setting) topical constituents,[61] derived via either movement or base generation depending on the framework (Xu & Langendoen 1985; Xu 1986; 2006; Li 1990; Takahashi 1994).[62] The topic is assumed to be sentence-initial, as *pro* resides in the specifier of the phrase which the copula heads.

(232) a. Zhangsan shi mingtian yao lai.
Zhangsan COP tomorrow will come
'As for Zhangsan, it is tomorrow that (he) will come.'

b. *Zhangsan*$_k$ *pro*$_i$ *shi* [$_{SC}$ [$_{CP}$ t$_k$ *mingtian yaolai*] [*pro*$_i$]]

6.5 The curious case of object clefts

Unlike the cleft construction featuring a fronted subject or adjunct focus, object clefts are often degraded in Mandarin. Example (233) exemplifies a contrast between an object and a subject cleft. Such asymmetry constitutes a puzzle to be addressed within the current proposal.

(233) a. ?? Shi Zhangsan ni zhao-guo.
COP Zhangsan you look.for-EXP
Intended: 'It was Zhangsan that you have looked for.'

b. Shi Zhangsan zhao-guo ni.
COP who look.for-EXP you
'It was Zhangsan that has looked for you.'

---

[61] It has been widely observed that topicalization in Chinese is not sensitive to the subject island constraint (Huang 1982; Xu & Langendoen 1985; Xu 1986; Li 1990; Lin 2005; Xu 2006). Examples like (i) sound very natural to most speakers.

(i) Zhei-ge ren de mingzi, [ni mei ting-guo] hen zhengchang.
DEM-CLF person POSS name you have.not hear-EXP MOD normal
'That you haven't heard of this guy's name is quite normal.'

Similar claims about the absence of subject islands have been made in other East Asian languages like Japanese (Ross 1967; Kuno 1973; Takahashi 1994). In general, there appears to be wider cross-linguistic variation in terms of subject island effects compared with other strong island constraints (See Stepanov 2007 and Chaves & Dery 2019 for a crosslinguistic review, and see Sprouse et al. 2016 for an experimental study showing Italian lacks subject island effects). The above empirical evidence thus offers us a context as to why many works of Chinese clefts consider it tenable to relate the sentence-initial topic to a position inside the subject of the small clause.

[62] See Li (1990), Takahashi (1994), Stepanov (2007) and Jin (2015) for analyses that movement from subjects follow a different mechanism from those in other strong island contexts. See Xu & Langendoen (1985), Xu (1986), Cheng (1973), *inter alia*, for proposals that topicalization across subjects involves base generation, with both the topic and an empty pronoun generated in their surface positions and linked via a semantic binding mechanism that is insensitive to locality constraints.

I further draw attention to the fact that the Question under Discussion (QuD) corresponding to an object cleft answer is by itself degraded. Again, no similar QuD degradation is attested for a corresponding subject cleft answer. Example (234a) is a problematic cleft question with a preposed *wh*-object. The corresponding *wh*-subject cleft question in (234b) is unproblematic. In addition, *in situ* object clefts with *shi* are acceptable, as in (234c). I defer a discussion of *in situ* object clefts to later, after I will have accounted for the contrast between (234a) and (234b).

(234) a. ?? Shi shei ni zhao-guo?
COP who you look.for-EXP
'Who was it that you have looked for?'

b. Shi shei zhao-guo ni?
COP who look.for-EXP you
'Who was it that has looked for you?'

c. Shi ni zhao-guo shei?
COP you look.for-EXP who
'It is you that has looked for whom? '

Instead of claiming the problem comes from the copula *shi*, the current proposal redirects the problem to a more general constraint governing *wh*-object preposing in Mandarin. We start by pointing out the interpretative difference between *wh*-object preposing and in-situ object in environments without the copula *shi*, as in (235a) and (235b).[63]

(235) a. Ni yiqian jian-guo shei?
You before meet-EXP who
'Whom have you met before?' (in situ *wh*-object)

b. Shei ni yiqian jian-guo?
Who you before meet-EXP
'Whom of them have you met before?' (*wh*-object preposing)

Example (235a) receives an *unrestricted* reading, where the individuals denoted by *shei* 'who' are chosen from the whole universe. Example (235b) gives rise to a reading where the felicitous answer has to be chosen from a contextually determined, enumerable set of individuals. This contrast driven by object preposing is also observed with other *wh*-words, such as *shenme* 'what', as in example (236).

(236) a. Ni pingshi ai chi shenme?
You normally love eat what
'What (kind of) food do you usually love to eat?' (in situ *wh*-object)

[63] The default strategy of question formation in Mandarin resorts to *wh*-in-situ. Yet Mandarin is not a strict in situ language (unlike e.g. Thai) (Wu 1999; Smyth 2005).

b. Shenme ni pingshi ai chi?
What you normally love eat
'What (kind of) food (from there) do you usually love to eat?'
(*wh*-object preposing)

Example (236a) may be answered with an unlimited set of (kinds of) food. On the contrary, the answer set is contextually bound for example (236b): The questioner might point at a food stall while posing the question or the kinds of food already existed in the prior discourse (i.e. the interlocutors were talking about food previously).

The above contrast can also be drawn upon to explain the fact that example (237a) is subject to the weak island constraint, whereas example (237b) escapes the island effect.[64]

(237) a. ?? Ni mei du-guo shenme shu?
You have.not read-EXP what book
Intended: 'What book have you not read?' (in situ *wh*-object)

b. Shenme shu ni mei du-guo?
What book you have.not read-EXP
'What book (here) have you not read?' (*wh*-object preposing)

We assume the weak (negative) island infelicity in example (237a) has a semantic explanation: When uttered out-of-the-blue, the range of books that one has not read is infinite and fails to be structured into an enumerable, conversationally meaningful set, hence the low acceptability. In contrast, if object preposing comes with domain restriction, then the lack of island effect in example (237b) can be explained straightforwardly, as the negated predicate now acts upon a delineated set of books.

That the above contrast boils down to the structure of the domain of alternatives is further evidenced by the fact that, with overt domain restriction, the negative island effect is eliminated in both in situ *wh*-object and *wh*-object preposing environments, as in (238).

(238) a. Ni mei du-guo zheli de shenme shu?
you have.not read-EXP here POSS what book
'What (kind of) books here have you not read?' (in situ *wh*-object)

b. Zheli de shenme shu ni mei du-guo?
here POSS what book you have.not read-EXP
'What (kind of) books here have you not read?' (*wh*-object preposing)

[64] The weak island constraint prevents *wh*-scoping across environments such as negation and presupposition triggers (Rizzi 1990; Szabolcsi & Zwart 1993; Abrusán 2011). It is observed that not all *wh*-items are equally island-sensitive, with arguments like *what*/*who* inducing a less robust island violation than *wh*-adjuncts, which are subject to variation.

Crucially, we take the above behavior as evidence to the effect that *wh*-preposing ('*wh*-topicalization' following the term by Grohmann (1998) and Wu (1999)) is to be distinguished from *wh*-movement and *wh*-in-situ.

As has been observed by Wu (1999), preposed *wh*-questions are only felicitous when the domain of which both the speaker and the listener have knowledge has been pre-established, in contrast to *in situ* questions which do not have to fulfill such condition. The reading distinction between *wh*-preposing and *wh*-in-situ is formulated as follows by Wu (cf. Hamblin 1973; Karttunen 1977; Groenendijk & Stokhof 1982).

(239) a. { P | ∃ x ∈ E & P= ^(Zhangsan bought x) & true (P)}

b. { P | ∃ x ∈ {y: y in discourse-salient set} & P= ^(Zhangsan bought x) & true (P)}

Further supporting evidence comes from patterns of scope asymmetry and the weak crossover effect (WCO). As Wu (1999) demonstrates, preposed *wh*-objects only receive the individual reading: In (240b), *everyone* cannot scope out *what*, in contrast to the reading for the *wh*-in-situ object in (240a), where both the distributive and the individual reading are available.

(240) a. Meigeren dou maile shenme?
everyone all buy-PRF what
Reading 1: For every x, for which y, x bought y

Reading 2: For which y, for every x, x bought y

b. Shenme meigeren dou maile?
what everyone all buy-PRF
Reading 1: (unavailable) For every x, for which y, x bought y

Reading 2: For which y, for every x, x bought y

The fact that Reading 1 is not available in (240b) suggests that *wh*-preposing is distinct from *wh*-movement, as the latter allows quantifier scoping over the object *wh*. A similar asymmetry is found when the quantifier is fronted as a result of topicalization, as shown in (241). Meanwhile, both readings are obtained in a canonical order without topicalization, listed in (242).

(241) Two of these books everyone has read.

Reading 1 (unavailable): For every x, x is a person, there are two y, y is a book, x reads y.

Reading 2: There are two ys, y is a book, for every x, x is a person, x reads y.

(242) Everyone has read two of these books.

Reading 1: For every x, x is a person, there are two y, y is a book, x reads y.

Reading 2: There are two ys, y is a book, for every x, x is a person, x reads y.

A second distinction between *wh*-movement and *wh*-preposing is attested in weak crossover configuration (WCO), in which pronouns cannot be interpreted as co-construing with certain kinds of displaced or quantified antecedents under a certain syntactic configuration (Safir 2017). As example (243) demonstrates, *wh*-movement exhibits the garden-variety WCO effect, here 'his' and 'he' cannot be interpreted as bound variables by the *Q*-operator.

(243) a. *Who$_i$ [$_{TP}$ does [$_{DP}$ his$_i$ boss] [$_{VP}$ dislike t_i]] ? [*Q_i > pronoun$_i$ > t_i]

b. *Who$_i$ [$_{TP}$ does the girl [$_{CP}$ that he$_i$ likes] miss t_i]?

The effect disappears when movement is triggered by topicalization, which is argued to be the case because the extracted element (in this case, the topic) is not a 'true quantifier phrase' (Lasnik & Stowell 1991). Rather, it is argued to attract a null referring operator (NO) in [Spec, CP], which as a local A′-binder of the trace is not the sort that induces WCO (Safir 2017). In English, both configurations as in (244) involve the topicalization of *John*, and as a result induces no WCO.

(244) a. [$_{Top}$ John$_i$, [$_{CP}$ NO$_i$ [$_{TP}$ [$_{DP}$ his$_i$ boss] [$_{VP}$ dislikes t_i]]]].

b. [$_{Top}$ John$_i$, [$_{CP}$ NO$_i$ [$_{TP}$ [the girl [$_{CP}$ that he$_i$ likes] misses t_i]]]].

Consequently, no WCO is expected if object *wh*-preposing is indeed a topicalizing process. This hypothesis is borne out, as shown in (245).

(245) a. Shei$_i$ ta$_i$ de muqin hen xihuan t_i?
who he POSS mother very like
'Who does his mother like?'

b. Shei$_i$ ta$_i$ xihuan de guniang hen xiangnian t_i?
who he like POSS girl very miss
'Who does the girl that he likes miss?'

On the other hand, *wh*-in-situ does induce the weak crossover effect, since the *wh*-DP is a variable bound by a covert quantificational operator in [Spec,CP], as in (246).

(246) a. *Ta$_i$ de muqin hen xihuan shei$_i$? [*Q_i > pronoun$_i$ > variable 'who'$_i$]
he REL mother very like who
Intended reading: 'Who$_i$ does his$_i$ mother like t$_i$?'

LF: [$_{CP}$ *wh*$_{covert\ op}$ [$_{TP}$ [$_{DP}$ his$_i$ mother] very [$_{VP}$ like [$_{DP}$ who$_i$]]]

b. *Ta xihuan de guniang hen xiangnian shei?
he like REL girl very miss who
Intended reading: 'Who$_i$ does the girl that he$_i$ likes miss t$_i$?'

LF: [$_{CP}$ *wh*$_{covert\ op}$ [$_{TP}$ [$_{DP}$ he$_i$ like REL girl] very [$_{VP}$ miss [$_{DP}$ who$_i$]]]

One additional piece of supporting evidence comes from superiority effects in multiple *wh*-questions, where a multiple *wh*-sentence is only grammatical when the trace of the moved *wh*-operator c-commands the *in situ wh*-word. Thus, (247a) does not trigger the superiority effect, in contrast to (247b).

(247) a. Who$_i$ t_i bought what?

b. *What$_i$ did who buy t_i?

Interestingly, the superiority effect is not found in Mandarin. Both configurations in (248) are grammatical.

(248) a. Shei mai-le shenme?
who buy-PRF what
'Who bought what?'

b. Shenme$_i$ shei mai-le t_i?
what who buy-PRF
'What did who buy?' (ungrammatical in English)

Again the pattern would be accounted for if *wh*-preposing does not involve *wh*-movement. As for interpretations, (248a) yields a pair-list reading as well as an individual reading, whereas the *wh*-preposed structure as in (248b) only gives rise to an individual reading. Since only a singleton set of values taken from the domain-restricted set can be assigned to the fronted *wh*-phrase, no pairing relation can be established, thus no pair-list reading can be obtained.

Following Pesetsky (1987; 1995), Wu assumes that D-linking does not involve *wh*-feature checking, rather the D-linking conditioned movement is driven by information structure purposes. The fronted *wh*-phrase topicalizes to the specifier of TopP and checks the [Topic] feature.

Since *wh*-topicalization is not a garden-variety of *wh*-movement, it is able to escape *wh*-islands. The contrast is shown by (249a) and (249b). (249c) presents a parallel example in which a topicalized phrase in English is able to circumvent the island effect.

(249) a. *What does John wonder whether Bill has bought?

b. Shenme dongxi$_i$ Zhangsan xiang zhidao Lisi maimeimai t_i?
what thing Zhangsan want know Lisi buy-not-buy
'What did Zhangsan want to know whether Lisi bought? '

c. That book$_i$ John wonders whether Bill has bought t_i.

Based on the above evidence, I will assume now that *wh*-preposing serves as a discourse strategy that, semantically speaking, requires the range of felicitous answer to be limited to a contextually salient set. In situ *wh*-objects place no such requirement, and an unrestricted reading arises by default. The strategy of object preposing thus amounts to an act of a discourse move, i.e. topicalization, where the preposed *wh*-object can thus be recognized as a topic, as its answer is chosen from a domain restricted set.

We next assume that the question-answer pair in the cleft construction is constrained by Question-Answer Congruence (Rooth 1985; 1992; Roberts 1996; Sheil 2016; Erlewine 2016; Erlewine & New 2021). Specifically, given a bipartite structure of the form *pro shi* $[XP]_{\text{focus}}$ $[(YP)]_{\text{background}}$, *pro* hence evokes an iQuD of the form [*shi wh q?*].[65] This means that given the cleft answer as in example (250), the QuD (251) is evoked.

(250) ?? Shi [Zhangsan] wo zhao-guo.
COP Zhangsan I look.for-EXP
'It was Zhangsan that you have looked for.'

(251) ?? Shi [shei] ni zhao-guo?
COP who you look.for-EXP
'Who was it that you have looked for?'

The preposed *wh*-object *shei* 'who' needs to be interpreted as a topicalized constituent settling for a contextually determined set of alternatives. However, unlike a plain *wh*-preposing case, here the topicalized 'who' is located after the copula *shi* that introduces a specificational copular structure, and as such it violates the independently motivated discourse requirement stating that the post-*shi* part of a specificational copular clause must correspond to the comment part of a topic-comment predication (von Prince 2012), reiterated as in (252).

(252) Pre-*shi* constituents must be topics. Topical constituents must c-command *shi*.

Specifically, in the *wh*-object preposing case, with a *wh*-object in the configuration [*shi wh q?*], two requirements are posed simultaneously. Firstly, topicalization restricts the domain

[65] Here I follow my previously proposed cleft syntax in assuming *pro* to raise over the copula.

as a result of object preposing. In addition, a separate antitopicality constraint from *shi* needs to be satisfied, where topics cannot be located after *shi*. In other words, the antitopicality constraint precludes discourse-grounding topicalized elements from appearing in a post-*shi* position.

Contrary to *wh*-objects, *wh*-subjects (as well as post-subject *wh*-adjuncts) do not undergo preposing: They stay in theirexternal merged position, without being topicalized. Thus subject clefts/adjunct clefts do not violate the antitopicality constraint, compared with *wh*-objects as shown in example (253).

(253) Shi shei zhao-guo ni?
COP who look.for-EXP you
'Who was it that had looked for you?'

A remaining issue is the possibility of *in situ* object clefts in Mandarin. I suggest that given object preposing is problematic in Mandarin clefts, *in situ* object clefts step in as a last resort strategy (the reading where the object is under focus is facilitated by a stress falling on the object phrase).

(254) a. Shi wo zhaoguo [zhangsan]$_F$ (mei zhaoguo bieren)
COP I look.for-EXP Zhangsan NEG look.for-EXP others
'It is Zhangsan that I have looked for (but I didn't look for others). '

b. Zhangsan shi zai deguo xue [yuyanxue]$_F$ (bushi wulixue).
Zhangsan COP LOC Germany study linguistics NEG physics
'It is linguistics that Zhangsan studied in Germany (not physics). '

This subsection redirected the problem with object clefts to a more general constraint that governs *wh*-objects in Mandarin. I draw attention to a discourse strategy whereby *wh*-object preposing requires the range of felicitous answer be limited in a contextually salient set. The preposed object can further be recognized as a topic. The case where the copula precedes a preposed object functioning as a topic thus violates an independent constraint (von Prince 2012). Namely, topical constituents must c-command *shi*. *In situ* object clefts serve as a last resort strategy, facilitated with an additional stress on object. *Wh*-subjects do not violate the antitopicality constraint for not being topicalized.

6.6 Deriving cleft exhaustivity

In section 6.4, I have proposed to subsume the cleft under a specificational clause. By not postulating an exhaustive component within the proposed syntax, I operate by the assumption

that the exhaustive inference associated with clefts follows from the semantics of identification that is general to all specificational copular structures (Kenesei 1984; Cheng 2008; den Dikken 2013; Pollard & Yasavul 2014). While the previous literature has yet to provide a fleshed out account along this line (e.g. no specification of how the process of identification is conducted and what the lexical source is for this identification), I would like to briefly introduce the relatively recent analysis in Pollard & Yasavul (2014) as it promises to be a good fit for the copular-based syntax developed here. A formally precise account that computes the exhaustive inference out of a specificational copular structure would warrant a separate work.

6.6.1 Specifying cleft answers from the *wh*-questions

The gist of Pollard & Yasavul's (2014) proposal lies in the assumption that the specifying of a value for a variable in the specificational structure must crucially make reference to a maximal individual that is salient from a prior question under discussion. Following Barros (2014), with a *wh*-question as the immediate Question under Discussion (iQuD), a cleft answer takes on a bipartite structure, comprising (aside from *pro* and the copula) a *wh*-restriction corresponding to the cleft focus and a nuclear scope corresponding to the backgrounded property due to question-answer congruence.[66]

According to Pollard & Yasavul (2014), during the 'specifying' process a value is assigned from the potential answers generated by the prior *wh*-question to the entity referred to by the post-copula element. Given the *wh*-question *who killed the janitor*, a set of potential answers is generated, such as in example (255).

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[66] The background property is optional, to be overtly expressed depending on the iQuD. If the iQuD is the same as the *wh*-question, the cleft answer may optionally take on a truncated form (as in the B′-answer in i). On the other hand, if the iQuD addresses a sub-issue of the *wh*-question, the backgrounded property is needed to disambiguate what the specified value represents (as in B″). Hence, in this case, a truncated cleft answer is not desirable.

i. A: Who killed the janitor?
   B: It was John and Mary who killed the janitor.
   B′: It was John and Mary.
   B″: It was John and Mary who *used a knife* to kill the janitor.

(255) $\left\{\begin{array}{l}\text{Mary killed the janitor}\\ \text{John killed the janitor}\\ \text{Mary and John killed the janitor}\\ \ldots\\ \varnothing\end{array}\right\}$

(255) can be generalized into (256), and the open proposition containing the variable x in (256) can be rewritten into (257).

(256) $\left\{\begin{array}{l}\underline{\quad x \quad} \text{ killed the janitor}\\ \varnothing\end{array}\right\}$

(257)

$$P(x) = (x \in \{\text{set of alternatives in (255), i.e. Mary, John, Mary and John...}\}) \wedge \text{killed}(x, \text{the janitor})$$

Now, the *pro* element postulated for the cleft structure takes on an anaphoric function, referring back to this variable x. At the same time, it is further assumed that the alternative answer set (255) of the *wh*-question makes salient a maximal individual (the plural individual *John and Mary* in this case, as all the other atomic individuals are part of it). Pollard & Yasuvul propose that in the cleft answer the speaker identifies the focus value with this maximal individual, which is then fed to the post-copula element that values the variable. The specificational copula is only participating in the valuing process by serving a predicativizing function (Mikkelsen 2005, 2007). Such specifying process guarantees that the cleft answer gives rise to an exhaustive inference. As Pollard & Yasuvul stress, less strong answers are possible in the absence of an underlying specificational structure, such as in a canonical focus answer (there is no *pro* that anaphorically refers back to a salient maximal plurality). In such case, any elements within the open alternative set generated by the *wh*-question will do. Thus, more elements can be added, i.e. *John and Mary killed the janitor. Bill too, killed the janitor.* No exhaustive reading arises as a result.

A central part of Pollard & Yasavul's (2014) claim is that when a *wh*-question asks for an exhaustive answer, a cleft answer identifies the maximal plurality of individuals with the property encoded in the nuclear scope of the *wh*-question. In this sense, the exhaustive inference associated with the cleft follows from the exhaustive reading coming from the question itself. A prediction following from this assumption would be that when the *wh*-question receives a mention-some (hence non-exhaustive) reading, the questioner does not

settle upon a particular individual, but leaves it to the answerer to pick one. As a consequence, no salient, uniquely identifiable referent could serve as the antecedent for the pronominal element (e.g. *pro*) in the cleft answer, leading to the consequence that the cleft serves as a non-valid answer. Given that this prediction has not been tested in a lab-controlled way in the literature, I will end this chapter with a pilot survey based on Mandarin data. In the following I first establish some background on the distinction between mention-all and mention-some readings before reporting my survey.

6.6.2 Mention-some or mention-all?

It is independently known that a *wh*-question can have at least two readings. Thus, the utterance in (258a) is most naturally interpreted as a request for information about *all* the participants that Alice invited to her birthday party (hereafter the mention-all reading) . On the contrary, in (258b), the natural interpretation is to pick out the easiest way to help the speaker get to the train station (hereafter the mention-some reading) (Ciardelli et al. 2018).

(258) a. Who did Alice invite to her birthday party last night?

b. How do I get to the train station?

Wh-questions on themselves do not specify which reading they give rise to. It has been observed that certain factors can influence the particular interpretation a *wh*-question receives. These include *wh*-category, modality, as well as the goal of the questioner, which need to be taken into account in an experimental design. First, it has been observed that all else being equal, some *wh*-questions are biased towards a mention-all reading, whereas some others favor a mention-some reading when uttered out of the blue (e.g. Ginzburg 1995; Asher & Lascarides 1998). Such observation was taken up for a corpus investigation recently in Moyer & Degen (2021), which finds a clear mention-some bias for 'how'-, 'why'- and 'when'-questions as well as a preference for a mention-all reading associated with 'what'-questions. Meanwhile, there was no evidence pointing to 'who'-questions and 'where'-questions biased towards a mention-some or a mention-all reading.

Second, modal verbs such as *can* have been shown to give rise to grammaticized non-exhaustivity (Xiang & Cremers 2016; Moyer & Syrett 2019). The mention-some reading is stronger when *can* is inserted compared to a non-modal context, as shown in (259). Furthermore, modals are able to override the bias associated with a 'what'-question by weakening the mention-all reading it typically receives, as shown in (260).

(259) a. How do I get to the train station?

b. How can I get to the train station?

(260) (Imagine that we are watching a cooking show.)

a. What ingredients go into chili con carne?

b. What ingredients can go into chili con carne?

Thirdly, it has been pointed out that the interpretation that a given *wh*-question receives is subject to the identity of the questioner (van Rooij 2004). Observe the contrast between the context of (261) and that of (262).

(261) Mary is a tourist who is looking for her morning coffee. She goes to the front desk of her hotel and asks:

"Where do I find coffee?"

(262) Mary is a professional food journalist who devotes herself to coffee culture. She has just moved into a town famous for its coffee shops. She spreads out a map, and asks herself:

"Where do I find coffee?"

While the *wh*-question is held constant, example (261) prefers a mention-some reading, whereas example (262) favors a mention-all reading.

In the current pilot study, I settled with 'who'/'where'-questions due to their unbiased property (Moyer & Degen 2021), which makes it possible to see clearly the impact contextual manipulation has on the particular interpretations obtained. In addition, I leave out modal verbs entirely to avoid the observed weakening/strengthening effect. Instead, I manipulate the goal of the questioner by changing the context of the stimuli, hence allowing me to introduce contrasting interpretations for the same *wh*-question. Specifically, in keeping with the above assumption, the particular interpretation received by *wh*-questions should depend on whether the questioner's goal involves knowing all or some of the answers.

6.6.3 A description of the pilot study

The pilot study consisted of two parts. The first part sought to confirm whether participants were able to obtain the desired interpretation in terms of question exhaustivity. Specifically, each *wh*-question was situated in a context designed to facilitate a mention-some or a mention-

all reading. For example, in the following question stimulus, the context favors a mention-some interpretation.

(263) Context: You go to the swimming pool to swim but realize that you forgot to bring your swimsuit, so you decide to buy a new one nearby. You ask a passerby:

Q: Nar mai yongyi?
Where sell swimsuit
'Where are swimsuits sold?'

In such case, the participant was then asked how likely it is that the questioner wants to know some of the places where she finds swimsuits as opposed to all of the places where she finds swimsuits. This likelihood data was collected by asking the participant to interact with a slider. The purpose was then to test whether stimuli questions were indeed biased along the direction as specified by the context description (mention-some vs. mention-all interpretation).

The second part looked into the acceptability of cleft answers to a prior *wh*-question. Given the question in (263), the cleft answer is as follows:

(264) A: Shi A chaoshi.
COP A supermarket
'It's Supermarket A.'

The goal was to investigate if a cleft answer was construed as a more natural answer given a mention-all reading of a *wh*-question, as opposed to a mention-some reading. A Likert scale was employed to collect the naturalness of a cleft sentence as an answer to a *wh*-question under contextual manipulation. Canonical focus answers were included as controls. In total, 10 pairs of target sentences were first presented auditorily, together with 10 pairs of contexts. The first question that elicited the participant's interpretation of its exhaustivity was next displayed. Thereafter the second question appeared, which elicited the naturalness ratings of its cleft answer. A detailed description of this experiment is in Appendix C.

In the remainder of this section I will provide the major findings of the pilot experiment, while leaving the details to the Appendix. Table 6.9 presents the mean values calculated from the answer sliders and Likert ratings for both cleft and canonical focus answers.

The results from the question sliders showed that participants are sensitive to contextual setting: Given a context that biases the questioner to a mention-some goal, participants tended to interpret the question with a mention-some reading, and a mention-all-inducing context also tended to lead to the intended mention-all reading. The finding confirms previous

Context condition for questions & answers	Means of question slider	Answer conditions	Likert-scale rating
Mention-all	94.7	cleft	4.78
Mention-some	12.8	cleft	3.4
Mention-all	93.9	canonical focus	7
Mention-some	4.07	canonical focus	7

Table 6.9: Mean values of question slider rating across the context conditions of mention-all and mention-some and mean values of corresponding Likert scale ratings across answer conditions (cleft and canonical focus answer). The question slider ratings range from 0 to 100. The Likert ratings range from 1 to 7 .

observations that the preferred interpretations of Mandarin speakers are reliably predicted by the specific context that controls for the goal of the questioner. Under a corresponding mention-all and mention-some context, cleft answers were rated significantly different from canonical focus answers. In addition, the judgments for clefts in mention-all contexts was significantly different from those in mention-some contexts. When provided with a mention-some context, participants tended to interpret the question where the questioner wants to know 'some of the places that Mary finds coffee' instead of 'all of the places'. Similar results in the mention-all context also yielded intended interpretations.

Second, the results also revealed that participants were likely to perceive a cleft answer with a mention-all reading when the contexts of its *wh*-question was controlled to have a mention-all reading. The likelihood of such interpretation was significantly different when the context was switched to mention-some. In other words, when a mention-some context of a *wh*-question was given, with a cleft answer, the participant tended to lower the likelihood of interpreting the cleft answer as a mention-all reading. Within the category of mention-all/some contexts, a significant difference obtained when comparing the mean values of cleft answers, with a statistically significant degradation in acceptability for cleft answers in mention-some contexts compared against mention-all contexts. No similar effect showed up with canonical focus sentences when used as answers to *wh*-questions.

In sum, results from the pilot survey offer initial evidence that cleft constructions are more readily acceptable under a context where a maximal individual can be anchored from context with a non-biased *wh*-question: Participants found cleft answers to be more natural under a

mention-all context. Though this by itself is no conclusive evidence that cleft answers receive their exhaustive inference from *wh*-questions, the connection identified here does point to the possibility that the exhaustive inference of clefts follows from a more general condition of question-answer congruence rather than from an exhaustive component within the cleft structure itself. Note that the above findings from the pilot survey only represent a preliminary first step, due to its very small sample size and the lack of a rigid experimental design (short of a Latin Square design, etc.). A full experimental investigation will be left to future research.

Summary

In this chapter, I reviewed cleft syntax from both a focus-based monoclausal approach and a copula-based biclausal approach. Taken into account their merits and demerits, I proposed a new syntactic analysis for Mandarin cleft structures. In a nutshell, I treated the *shi*-cleft as a specificational copula clause (Bolinger 1972; Moro 1997; Percus 1997; Heycock & Kroch 2002; Mikkelsen 2002; 2005; Han & Hedberg 2008; den Dikken 2013), which projects a small clause with a constituent encoding a specificational value (Mikkelsen 2002; 2005). This constituent resides in the subject position of the small clause and an unpronounced *pro* element functions as the predicate of the small clause (Moro 1997). To derive the term cleft, an unvalued focus feature on DP/PP triggers movement to the specifier of CP for feature checking with its valued counterpart, establishing Agree with C^0 (Sheil 2016). To derive the propositional assertion, such feature valuation can be done locally (e.g. Abels 2003). An unified derivation for term clefts and propositional assertions can nonetheless be provided. Pace Cheng (2008), albeit implemented differently, this proposal did not assign an exhaustifier status to the *de*-particle. Additionally, I treated phonological prominence as a necessary but non-sufficient condition in triggering focus. In general, this analysis enjoys several empirical advantages over its predecessors. It predicts 1) different clefted phrases (including DP, PP and CP); 2) the adjacency effect, whereby the clefted phrase always appears to the right of the copula; 3) a weaker exhaustive inference (compared with 'only'); 4) object clefts are degraded following from an independent antitopicality constraint on the copula (von Prince 2012). I ended the discussion by providing observations suggesting that the weak exhaustive effect of cleft constructions might be derived from the interpretation of prior *wh*-questions (e.g. Pollard & Yasavul 2014). A pilot experiment study lent preliminary support to this hypothesis: cleft sentences in the

immediate context of a *wh*-question with mention-some reading were judged to be significantly more degraded than ones under mention-all *wh*-question contexts.

Chapter 7

Conclusion

7.1 Dissertation summary

This dissertation provides a new understanding of the difference between the *shi...de* cleft and the bare-*shi* cleft from both a syntactic and a semantic perspective. To understand the difference between the two constructions, I started off by testing if the *de* particle in *shi...de* clefts introduces a semantic contribution with regard to the exhaustive inference generated by the cleft sentences. My experimental results revealed that the presence of the *de* particle does not lead to a stronger exhaustive inference of the *shi...de* cleft when compared with the bare *shi*-cleft. I subsequently approached the meaning contribution of the *de* particle in clefts (termed as de_{IMAX}) by resorting to a non-at-issue speaker meaning couched in basic information theory models, with empirical evidence for such a meaning contribution from a pilot experimental study. I next provided a new analysis of another meaning of the *de* particle as an evidential marker (termed as de_{EVID}), which applies to environments outside of cleft constructions. A novel syntactic analysis was proposed in the end that unifies the bare-*shi* cleft and the *shi...de* cleft, built upon existing frameworks of copular structures in relation to small clauses (Stowell 1981; Mikkelsen 2002; 2005; den Dikken 2006; 2013).

Under this analysis, I assumed that the copula *shi* in both clefts functions as the head of a small clause, with its complement being an unpronounced pronominal predicate *pro* (Cheng 2008). An elaborate system based on Agree in line with Abels (2003) and Sheil (2016) was adopted to capture the possibility of having both different kinds of term focus (DPs and adjuncts) and broad, CP focus and also to capture their adjacency requirements. The source of the weak cleft exhaustivity was shown to be an epiphenomenon that follows from the focus reading of a specificational copular structure, under which the cleft structure in Mandarin was argued to be subsumed. In the specifying process, the speaker identifies the focus value with a salient maximal plural individual from context, guaranteeing that the answer as encoded by the cleft sentence is complete and hence gives rise to an exhaustive reading. Finally, the constraint against object clefts in Mandarin, where object focus does not felicitously occur after *shi*, was explained by invoking an independent anti-topical condition associated with *shi*: Topical constituents must c-command *shi*. *In situ* object clefts henceforth step in as a last resort strategy.

7.2 Implications and contributions

Discussions that deal with each facet of the cleft construction have featured in the literature in many different frameworks and under many different perspectives. I hope I have made clear in the preceding section where the link between these discussions is, and have driven home the general point of the present study. In the next few subsections, I will list the major contributions within the individual components of the present proposal. I end this dissertation by raising some issues that remain to be addressed in the future.

7.2.1 Focus syntax

The focus syntax in my proposal crucially builds on several assumptions. Significant debates persist regarding each of these assumptions, with notable counterarguments that (if valid) would undermine the current proposal significantly. With evidence targeted to Mandarin, the combination of these core assumptions was solidly situated for the novel proposal in Chapter 6.

My first assumption was that *shi* is a copula verb proper. It is under heated debate whether the copula *shi* has a homophone that functions as a focus adverb in cleft constructions (Huang 1982; Erlewine 2016). The present study revisited behavioral tests that provide evidence for the copular status of *shi* in the cleft construction.

Second, I operated under the assumption that small clauses are not necessarily 'small' in the sense that their subjects are not restricted to DPs (following the insight from Moro 1997). I drew attention to the argument for loosening a prevailing assumption about clause structure, namely that a clausal subject has to be a DP. A small clause as proposed by Moro (1997) has a more flexible structure. In the structure *It seems that John left*, for instance, Moro's analysis has it that the subject of the small clause is a CP, and the pronominal *it*-predicate (predicate of the small clause) raises to the most prominent position in the clause structure. Hence the requirement that the subject of the predication is a DP is abandoned, with the surviving requirement simply restricting the *most prominent* position within the clause structure to a DP. With this simpler requirement in place, a DP is not the only term that can be the subject of a predication projection.

I further assumed that a *pro*-predicate occupies the pre-copula slot in Mandarin. Specifically, the *pro*-predicate and the CP subject are base-generated in a post-copula position, and the *pro* undergoes predicate inversion. I showed that predication inversion in the specificational copular clause in Mandarin is supported by locality-based tests.

None of these assumptions are novel to this work. However, the integration of these assumptions into a coherent theoretical proposal and the Mandarin-specific evidence provided served as the foundation of a novel feature-checking Agree mechanism that correctly captures the behavioral characteristics in the Mandarin cleft structure.

7.2.2 Understanding *de*

As yet, there is no agreement on the status of *de* in the cleft, e.g. whether it belongs to one of the better understood adnominal uses (nominalizer, relativizer or possessive marker), or whether it has a distinct meaning contribution, and if so, what that contribution is exactly. In the literature, an important earlier insight is provided in Soh (2018), which proposes that *de* functions as a particle signaling that the speaker provides private evidence on the source of the at-issue content of its prejacent. However, it remains unclear how her proposal relates to the cleft construction. Against this context, the present dissertation made a renewed attempt to investigate in detail the fine-grained meaning of *de*. By directly contrasting the meanings of the bare-*shi* cleft and the *shi...de* cleft under a controlled environment, I concluded that, unlike what the literature has proposed, *de* in *shi...de* clefts is not an exhaustifier. Through the process of implementing a cross-entropy- and Rational Speech Act (RSA)-based model, I proposed

that de_{IMAX} encodes a pragmatic meaning. Given an utterance that provides information about a specific world corresponding to the proposition containing de_{IMAX} , de_{IMAX} signals that this proposition has the maximal informativity compared with its contrasting alternatives. I additionally argued for a non-at-issue meaning of de_{EVID} outside of the cleft construction, which encodes a contrary-to-expectation meaning. These results should bring new insights to the field by by encouraging new researches into the speaker dimension meaning of *de*.

7.2.3 Methods

In this dissertation, a variety of formal and experimental methods were employed to approach a discrete set of research questions. Formal experiment methods were used for establishing empirical patterns, and were crucially drawn upon to test a number of core hypotheses and underpinning claims. In total, three acceptability judgment tasks (two full-sized studies in Chapter 3, one pilot study in Chapter 4) and a self-paced reading task were conducted throughout the time in which this dissertation was written. Additionally, a self-constructed corpus of blog posts was applied to the data collection in Chapter 5, with which it was observed that *de* has a larger-than-chance collocation with its specifier *qishi* 'actually'.

Another major methodological choice was the application of probability-based methods, including those of cross-entropy and Kullback-Leibler-divergence, to formalizing the pragmatic contribution of de_{IMAX} in Chapter 4. Such methods proved critical in capturing the interlocutors' presumptions about their beliefs, the interaction between their utterances, the actions they may prefer and their existing belief states (Frank & Goodman 2012; Goodman & Stuhlmüller 2013). A probability-based method promises to anchor variables that are based on the speaker/listener's prior-posterior differences to a rule-based model. It stands as a powerful extension to truth-condition frameworks in addressing potential difficulties with certain meanings that are gradient (e.g. the quantifier *most* or epistemic adverbs such as *possibly*, which encode various uncertainties) (Herbstritt & Franke 2019; van Tiel et al. 2021). By applying probabilistic modeling to characterizing speaker-oriented meaning, the RSA-based approach here joins the multilayered, ever increasing trend of non-entailment-based semantic analyses.

7.3 Remaining issues

Finally, it goes without saying that many future studies are urgently needed. For example, it would be important to look into crosslinguistic variation (alluded to in the previous chapters)

in terms of the exhaustive reading of the focus constructions. It has been observed that the exhaustive reading of the counterparts of the Mandarin cleft constructions is language sensitive. The clefts in English, German, French and Mandarin behave differently, both in whether an exhaustive inference is obtained or not, and (in the case that it is obtained) in how strong the inference is (the extent to which they lend themselves to cancellation/violation) (Destruel et al. 2015; Destruel & DeVeaugh-Geiss 2018). Furthermore, languages also differ in the exhaustive reading associated with broad focus (see Sheil 2016 for an initial discussion–much work is needed here, as very little understanding of the broad focus reading is available at present). In this regard, another issue that needs to be addressed in future research is whether the exhaustivity of clefts is presuppositional by nature or whether it follows from a pragmatic effect. As far as I know, no studies have systematically compared cleft exhaustivity violation with the violation triggered by presuppositions, e.g. those projected by factive, iterative and aspectual verbs. More experiments are needed before we can exclude the possibility that the violation of a cleft exhaustive reading involves a presupposition violation so as to draw the conclusion that it is indeed a pragmatic phenomenon.

Furthermore, the data uncovered in the cleft exhaustivity experiments raise questions regarding the discrepancy in results between online and offline experiments (mainly SPR experiments, but the difference also extends to ERP and other online paradigms, see Drenhaus et al. 2011). It remains to be addressed what to make of the discrepancy where the plain focus receives significantly higher acceptability ratings in offline tasks than the two cleft types but does not differ significantly from the latter two in terms of reading time in online tasks. The pattern is particularly interesting, as it is known to be replicated across languages (Destruel et al. 2015). A full-fledged explanation of this discrepancy also promises to offer more insights on the source and the exact formulation of the exhaustive reading in the cleft constructions.

Finally, this dissertation operated under the assumption that the bare *shi*-cleft largely parallels the *shi...de* cleft when it comes to distribution. While the parallelism is known to hold in many cases, I did find instances where one cleft type is applied less felicitously even when the other is fully acceptable, as the following contrast illustrates.

(265) a. ??Shi tongguo lianxi (lai) tigao xiezuo.
COP through practice (come) improve writing
'It is via practice that writing is improved.'

b. Shi tongguo lianxi (lai) tigao xiezuo de.
COP through practice (come) improve writing DE

'It is via practice that writing is improved.'

Interestingly, a more general distinction potentially lies within the categorial status of the cleft pivot. As the following examples illustrate, a *shi...de wh*-cleft is very much preferred over a bare *shi* version in the case where the pivot is a *how*-adjunct. As the structures in (265) are construed as a cleft answer to the prior *wh*-question in (266a), the contrast in acceptability in (265) may well be similarly accounted for.

(266) a. Ta shi ruhe tigao xiezuo *(de)?
he COP how improve writing DE
'How does he improve his writing?'

b. Nimen xuexiao shi zenme baoxiao *(de)?
you.PL school COP how reimbursement (DE)
'How does your school reimburse? '

Differing from *ruhe*/*zenme* 'how', *wh*-DPs in Mandarin as well as *wh*-adjuncts that select for an argument, e.g. *shenme shihou* 'when', *zai nar* 'where', do not appear to strongly favor the insertion of *de*, allowing for both types of cleft. This is reminiscent of the well-known argument-adjunct asymmetry in Mandarin island effects (cf. Huang 1982; Tsai 1994; Jin 2016). However, at present, a possible connection remains unclear to me, and must be left to future work.

That said, I hope this dissertation can be a meaningful first step towards integrating the full range of available methodologies into a more general theory of cleft structures and their interpretation.

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Appendix A

Experimental stimuli for Chapter 3

(1) Context: Where does the professor have his meal?

a. Jiaoshou shi [zai shitang]$_{Foc}$ chifan de.
professor COP LOC dining.hall have.meal DE
'It is at the dining hall that the professor has his meal.' [*de*-cleft]

b. Jiaoshou shi [zai shitang]$_{Foc}$ chifan.
professor COP LOC dining.hall have.meal
'It is at the dining hall that the professor has his meal.' [bare *shi*-cleft]

c. Jiaoshou zhi [zai shitang]$_{Foc}$ chifan.
professor only LOC dining.hall have.meal.
'Only at the dining hall does the professor have his meal.' ['only'-exclusive]

d. Jiaoshou [zai shitang]$_{Foc}$ chifan.
professor LOC dining.hall have.meal.
'The professor has his meal at the dining hall.' [plain focus]

e. Jiaoshou ye zai kafeidian chifan.
professor too LOC café have.meal.
'The professor has his meal at the cafe, too.' ['too'-continuation]

(2) Context: Where does the class president learn German?

a. Banzhang shi zai buxiban xue deyu de.
class.president COP LOC tutoring.center learn German DE
'It is at the tutoring center that the class president learns German.'

b. Banzhang shi zai buxiban xue deyu.
class.president COP LOC tutoring.center learn German
'It is at the tutoring center that the class president learns German.'

c. Banzhang zhi zai buxiban xue deyu.
class.president only LOC tutoring.center learn German
'Only at the tutoring center does the class president learn German.'

d. Banzhang zai buxiban xue deyu.
class.president LOC tutoring.center learn German
'The class president learns German at the tutoring center.'

e. Banzhang ye zai yuyan xuexiao xue deyu.
class.president too LOC language school learn German
'The class president learns German at the language school, too.'

(3) Context: Where does the professor collect research data?

a. Jiaoshou shi zai shiyanshi shouji lunwen shuju de.
professor COP LOC laboratory collect paper data DE
'It is at the lab that the professor collects data for his paper.'

b. Jiaoshou shi zai shiyanshi shouji lunwen shuju.
professor COP LOC laboratory collect paper data
'It is at the lab that the professor collects data for his paper.'

c. Jiaoshou zhi zai shiyanshi shouji lunwen shuju.
professor only LOC laboratory collect paper data
'Only at the lab does the professor collect data for his paper.'

d. Jiaoshou zai shiyanshi shouji lunwen shuju.
professor LOC laboratory collect paper data
'The professor collects data for his paper at the lab.'

e. Jiaoshou ye zai kaochadi shouji lunwen shuju.
professor too LOC field collect paper data
'The professor collects data for his paper in the field, too.'

(4) Context: Where do students hold German events?

a. Xueshengmen shi zai jiaoyuzhan juban deyu huodong de.
Students COP LOC education.exhibit hold German event DE
'It is at the education exhibit that the students hold German-related activities.'

b. Xueshengmen shi zai jiaoyuzhan juban deyu huodong.
Students COP LOC education.exhibit hold German event
'It is at the education exhibit that the students hold German-related activities.'

c. Xueshengmen zhi zai jiaoyuzhan juban deyu huodong.
Students only LOC education.exhibit hold German event
'Only at the education exhibit do the students hold German-related activities.'

d. Xueshengmen zai jiaoyuzhan juban deyu huodong.
Students LOC education.exhibit hold German event
'The students hold German-related activities at the education exhibit.'

e. Xueshengmen ye zai dushuhui juban deyu huodong.
Students too LOC reading.meeting hold German event
'The students hold German-related activities at the reading group, too.'

(5) Context: Where does the chef cook?

a. Zhuchu shi zai chuishiban zhangshao de.
chef COP LOC cookhouse.squad cook DE
'It is at the culinary team that the chef does his cooking.'

b. Zhuchu shi zai chuishiban zhangshao.
chef COP LOC cookhouse.squad cook
'It is at the culinary team that the chef does his cooking.'

c. Zhuchu zhi zai chuishiban zhangshao.
chef only LOC cookhouse.squad cook
'Only at the culinary team does the chef do his cooking.'

d. Zhuchu zai chuishiban zhangshao.
chef LOC cookhouse.squad cook
'The chef does his cooking at the culinary team.'

e. Zhuchu ye zai fandian zhangshao.
chef too LOC hotel cook
'The chef does his cooking at the hotel, too.'

(6) Context: Where does the secretary buy envelopes?

a. Mishu shi zai jiejiao youju mai xinfeng de.
secretary COP LOC street.corner post.office buy envelope DE
'It is at the corner post office that the secretary buys envelopes.'

b. Mishu shi zai jiejiao youju mai xinfeng.
secretary COP LOC street.corner post.office buy envelope
'It is at the corner post office that the secretary buys envelopes.'

c. Mishu zhi zai jiejiao youju mai xinfeng.
secretary only LOC street.corner post.office buy envelope
'Only at the corner post office does the secretary buy envelopes.'

d. Mishu zai jiejiao youju mai xinfeng.
secretary LOC street.corner post.office buy envelope
'The secretary buys envelopes at the corner post office.'

e. Mishu ye zai baokanting mai xinfeng.
secretary too LOC news.stand buy envelope
'The secretary buys envelopes at the news stand, too.'

(7) Context: Where do the graduates prepare for the post-graduate entrance examination?

a. Biyeshengmen shi zai tushuguan fuxi kaoyan
graduates COP LOC library review post-graduate.entrance.examination
de.
DE
'It is at the library that the college graduates prepare for the graduate school entrance exam.'

b. Biyeshengmen shi zai tushuguan fuxi kaoyan.
graduates COP LOC library review post-graduate.entrance.examination
'It is at the library that the college graduates prepare for the graduate school entrance exam.'

c. Biyeshengmen zhi zai tushuguan fuxi kaoyan.
graduates only LOC library review post-graduate.entrance.examination
'Only at the library do the college graduates prepare for the graduate school entrance exam.'

d. Biyeshengmen zai tushuguan fuxi kaoyan.
graduates LOC library review post-graduate.entrance.examination
'The college graduates prepare for the graduate school entrance exam at the library.'

e. Biyeshengmen ye zai jiaoxuelou fuxi
graduates too LOC teaching.building review
kaoyan.
post-graduate.entrance.examination
'The college graduates prepare for the graduate school entrance exam at the teaching building, too.'

(8) Context: Where does the head of the department browse German materials?

a. Xizhuren shi zai tushuguan liulan deyu cailiao de.
deparment.head COP LOC library browse German material DE
'It is in the library that the department head browses German materials.'

b. Xizhuren shi zai tushuguan liulan deyu cailiao.
deparment.head COP LOC library browse German material
'It is in the library that the department head browses German materials.'

c. Xizhuren zhi zai tushuguan liulan deyu cailiao.
deparment.head only LOC library browse German material
'Only in the library does the department head browse German materials.'

d. Xizhuren zai tushuguan liulan deyu cailiao.
deparment.head LOC library browse German material
'The department head browses German materials in the library.'

e. Xizhuren ye zai shudian liulan deyu cailiao.
deparment.head too LOC bookstore browse German material
'The department head browses German materials in the bookstore, too.'

(9) Context: Where does the boss drink coffee?

a. Laoban shi zai yuangong shitang he kafei de.
Boss COP LOC staff dining.hall drink coffee DE
'It is at the staff cafeteria that the boss drinks coffee.'

b. Laoban shi zai yuangong shitang he kafei.
Boss COP LOC staff dining.hall drink coffee
'It is at the staff cafeteria that the boss drinks coffee.'

c. Laoban zhi zai yuangong shitang he kafei.
Boss only LOC staff dining.hall drink coffee
'Only at the staff cafeteria does the boss drink coffee.'

d. Laoban zai yuangong shitang he kafei.
Boss LOC staff dining.hall drink coffee
'The boss drinks coffee at the staff cafeteria.'

e. Laoban ye zai yidali canting he kafei.
Boss too LOC Italian restaurant drink coffee
'The boss drinks coffee at the Italian restaurant, too.'

(10) Context: Where do the children do rollerblading?

a. Xiaopengyoumen shi zai gongyuan huahanbing de.
children COP LOC park rollerblading DE
'It is in the park that the kids do rollerblade skating.'

b. Xiaopengyoumen shi zai gongyuan huahanbing.
children COP LOC park rollerblading
'It is in the park that the kids do rollerblade skating.'

c. Xiaopengyoumen zhi zai gongyuan huahanbing.
children only LOC park rollerblading
'Only in the park do the kids do rollerblade skating.'

d. Xiaopengyoumen zai gongyuan huahanbing.
children LOC park rollerblading
'The kids do rollerblade skating in the park.'

e. Xiaopengyoumen ye zai xuexiao huahanbing.
children too LOC school rollerblading
'The kids do rollerblade skating at school, too.'

(11) Context: Where does the piano teacher practice piano?

a. Gangqin laoshi shi zai qinfang lianqin de.
piano teacher COP LOC piano.room practice.piano DE
'It is in the piano room that the piano teacher practices.'

b. Gangqin laoshi shi zai qinfang lianqin.
piano teacher COP LOC piano.room practice.piano
'It is in the piano room that the piano teacher practices.'

c. Gangqin laoshi zhi zai qinfang lianqin.
piano teacher only LOC piano.room practice.piano
'Only in the piano room does the piano teacher practice.'

d. Gangqin laoshi zai qinfang lianqin.
piano teacher LOC piano.room practice.piano
'The piano teacher practices in the piano room.'

e. Gangqin laoshi ye zai yinyuejiaoshi lianqin.
piano teacher too LOC music.classroom practice.piano
'The piano teacher practices in the music classroom, too.'

(12) Context: Where does the dorm president top up phone credits?

a. Sushezhang shi zai kefuzhongxin chonghuafei de.
dorm.president COP LOC customer.center top.up.phone.credit DE
'It is at the customer service center that the dorm supervisor tops up his phone credits.'

b. Sushezhang shi zai kefuzhongxin chonghuafei.
dorm.president COP LOC customer.center top.up.phone.credit
'It is at the customer service center that the dorm supervisor tops up his phone credits.'

c. Sushezhang zhi zai kefuzhongxin chonghuafei.
dorm.president only LOC customer.center top.up.phone.credit
'Only at the customer service center does the dorm supervisor top up his phone credits.'

d. Sushezhang zai kefuzhongxin chonghuafei.
dorm.president LOC customer.center top.up.phone.credit
'The dorm supervisor tops up his phone credits at the customer service center.'

e. Sushezhang ye zai wangba chonghuafei.
dorm.president too LOC internet.café top.up.phone.credit
'The dorm supervisor tops up his phone credits at the internet cafe, too.'

(13) Context: Where does mom pay electricity bills?

a. Mama shi zai yingyeting jiao dianfei de.
mom COP LOC service.center pay electricity.bill DE
'It is at the service center that mom pays her electricity bills.'

b. Mama shi zai yingyeting jiao dianfei.
mom COP LOC service.center pay electricity.bill
'It is at the service center that mom pays her electricity bills.'

c. Mama zhi zai yingyeting jiao dianfei.
mom only LOC service.center pay electricity.bill
'Only at the service center does mom pay her electricity bills.'

d. Mama zai yingyeting jiao dianfei.
mom LOC service.center pay electricity.bill

'Mom pays her electricity bills at the customer center.'

e. Mama ye zai yinhang jiao dianfei.
mom too LOC bank pay electricity.bill
'Mom pays her electricity bills at the bank, too.'

(14) Context: Where does the director of teaching go running?

a. Jiaodao zhuren shi zai caochang paobu de.
teaching director COP LOC sports.field run DE
'It is on the playing field that the superintendent jogs.'

b. Jiaodao zhuren shi zai caochang paobu.
teaching director COP LOC sports.field run
'It is on the playing field that the superintendent jogs.'

c. Jiaodao zhuren zhi zai caochang paobu.
teaching director only LOC sports.field run
'Only on the playing field does the superintendent jog.'

d. Jiaodao zhuren zai caochang paobu.
teaching director LOC sports.field run
'The superintendent jogs on the playing field.'

e. Jiaodao zhuren ye zai tiyuguan paobu.
teaching director too LOC gym run
'The superintendent jogs in the gym, too.'

(15) Context: Where does the Chinese teacher grade homework?

a. Yuwen laoshi shi zai bangongshi pigai zuoye de.
Chinese teacher COP LOC office grade homework DE
'It is in the office that the Chinese teacher grades homework.'

b. Yuwen laoshi shi zai bangongshi pigai zuoye.
Chinese teacher COP LOC office grade homework
'It is in the office that the Chinese teacher grades homework.'

c. Yuwen laoshi zhi zai bangongshi pigai zuoye.
Chinese teacher only LOC office grade homework
'Only in the office does the Chinese teacher grade homework.'

d. Yuwen laoshi zai bangongshi pigai zuoye.
Chinese teacher LOC office grade homework
'The Chinese teacher grades homework in the office.'

e. Yuwen laoshi ye zai tushuguan pigai zuoye.
Chinese teacher too LOC library grade homework
'The Chinese teacher grades homework in the library, too.'

(16) Context: Where does the roommate review for exams?

a. Shiyou shi zai zixishi fuxi kaoshi de.
roommate COP LOC individual.study.room review exam DE
'It is in the individual study room that the roommate prepares for exams.'

b. Shiyou shi zai zixishi fuxi kaoshi.
roommate COP LOC individual.study.room review exam
'It is in the individual study room that the roommate prepares for exams.'

c. Shiyou zhi zai zixishi fuxi kaoshi.
roommate only LOC individual.study.room review exam
'Only in the individual study room does the roommate prepare for exams.'

d. Shiyou zai zixishi fuxi kaoshi.
roommate LOC individual.study.room review exam
'The roommate prepares for exams in the individual study room.'

e. Shiyou ye zai jiaoshi fuxi kaoshi.
roommate too LOC classroom review exam
'The roommate prepares for exams in the classroom, too.'

(17) Context: Where does the queen take her family for afternoon tea?

a. Nüwang shi zai huikeshi dai jiaren hecha de.
queen COP LOC reception.room bring family drink.tea DE
'It is in the reception room that the queen drinks tea with her family.'

b. Nüwang shi zai huikeshi dai jiaren hecha.
queen COP LOC reception.room bring family drink.tea
'It is in the reception room that the queen drinks tea with her family.'

c. Nüwang zhi zai huikeshi dai jiaren hecha.
queen only LOC reception.room bring family drink.tea
'Only in the reception room does the queen drink tea with her family.'

d. Nüwang zai huikeshi dai jiaren hecha.
queen LOC reception.room bring family drink.tea
'The queen drinks tea with her family in the reception room.'

e. Nüwang ye zai huayuan dai jiaren hecha.
queen too LOC garden bring family drink.tea
'The queen drinks tea with her family in the garden, too.'

(18) Context: Where does the secretary order catering?

a. Mishu shi zai shouji yingyong shang ding waimai de.
secretary COP LOC phone application on order take.out DE
'It is at the cellphone app that the secretary orders take-out food.'

b. Mishu shi zai shouji yingyong shang ding waimai.
secretary COP LOC phone application on order take.out
'It is at the cellphone app that the secretary orders take-out food.'

c. Mishu zhi zai shouji yingyong shang ding waimai.
secretary only LOC phone application on order take.out
'Only at the cellphone app does the secretary order take-out food.'

d. Mishu zai shouji yingyong shang ding waimai.
secretary LOC phone application on order take.out
'The secretary orders take-out food at the cellphone app.'

e. Mishu ye zai canting wangzhan shang ding waimai.
secretary too LOC restaurant website on order take.out
'The secretary orders take-out food at the restaurant website, too.'

(19) Context: Where does the class president do holiday purchases?

a. Banzhang shi zai zhanxiaohui shang mai nianhuo de.
class.president COP LOC trade.fair on buy holiday.good DE
'It is at the trade fair that the class president buys holiday treats.'

b. Banzhang shi zai zhanxiaohui shang mai nianhuo.
class.president COP LOC trade.fair on buy holiday.good
'It is at the trade fair that the class president buys holiday treats.'

c. Banzhang zhi zai zhanxiaohui shang mai nianhuo.
class.president only LOC trade.fair on buy holiday.good
'Only at the trade fair does the class president buy holiday treats.'

d. Banzhang zai zhanxiaohui shang mai nianhuo.
class.president LOC trade.fair on buy holiday.good
'The class president buys holiday treats at the trade fair.'

e. Banzhang ye zai jishi shang mai nianhuo.
class.president too LOC bazaar on buy holiday.good
'The class president buys holiday treats at the bazaar, too.'

(20) Context: Where does the art teacher do sketches?

a. Meishu laoshi shi zai hubian huasumiao de.
art teacher COP LOC lake.side paint.sketch DE
'It is at the lake side that the fine arts teacher does his sketches.'

b. Meishu laoshi shi zai hubian huasumiao.
art teacher COP LOC lake.side paint.sketch
'It is at the lake side that the fine arts teacher does his sketches.'

c. Meishu laoshi zhi zai hubian huasumiao.
art teacher only LOC lake.side paint.sketch
'Only at the lake side does the fine arts teacher do his sketches.'

d. Meishu laoshi zai hubian huasumiao.
art teacher LOC lake.side paint.sketch
'The fine arts teacher does his sketches at the lake side.'

e. Meishu laoshi ye zai guchengqiangbian huasumiao.
art teacher too LOC old.defensive.wall.side paint.sketch
'The fine arts teacher does his sketches at the foot of the city wall, too.'

(21) Context: Where does the section chief check voice mails?

a. Kezhang shi zai bangongshi chakan yuyinliuyan de.
section.chief COP LOC office check voice.mail DE
'It is in the office that the section chief listens to voice messages.'

b. Kezhang shi zai bangongshi chakan yuyinliuyan.
section.chief COP LOC office check voice.mail
'It is in the office that the section chief listens to voice messages.'

c. Kezhang zhi zai bangongshi chakan yuyinliuyan.
section.chief only LOC office check voice.mail
'Only in the office does the section chief listen to voice messages.'

d. Kezhang zai bangongshi chakan yuyinliuyan.
section.chief LOC office check voice.mail
'The section chief listens to voice messages in the office.'

e. Kezhang ye zai kafeiguan chakan yuyinliuyan.
section.chief too LOC café check voice.mail
'The section chief listens to voice messages in the cafe, too.'

(22) Context: Where does the school hold networking events?

a. Xuexiao shi zai jietijiaoshi zuzhi jiaoliu huodong de.
School COP LOC Amphitheatre.classroom hold networking event DE
'It is in the amphitheater classroom that the school holds exchange activities.'

b. Xuexiao shi zai jietijiaoshi zuzhi jiaoliu huodong.
School COP LOC Amphitheatre.classroom hold networking event
'It is in the amphitheater classroom that the school holds exchange activities.'

c. Xuexiao zhi zai jietijiaoshi zuzhi jiaoliu huodong.
School only LOC Amphitheatre.classroom hold networking event
'Only in the amphitheater classroom does the school hold exchange activities.'

d. Xuexiao zai jietijiaoshi zuzhi jiaoliu huodong.
School LOC Amphitheatre.classroom hold networking event
'The school holds exchange activities in the amphitheater classroom.'

e. Xuexiao ye zai xueshengzhongxin zuzhi jiaoliu huodong.
School too LOC student.center hold networking event
'The school holds exchange activities in the student center, too.'

(23) Context: Where does the German teacher review journal articles?

a. Deyu laoshi shi zai jiaoyanshi shenyue lunwen de.
German teacher COP LOC teaching.research.room proof-read article DE
'It is in the seminar room that the German teacher reviews papers.'

b. Deyu laoshi shi zai jiaoyanshi shenyue lunwen.
German teacher COP LOC teaching.research.room proof-read article
'It is in the seminar room that the German teacher reviews papers.'

c. Deyu laoshi zhi zai jiaoyanshi shenyue lunwen.
German teacher only LOC teaching.research.room proof-read article
'Only in the seminar room does the German teacher review papers.'

d. Deyu laoshi zai jiaoyanshi shenyue lunwen.
German teacher LOC teaching.research.room proof-read article
'The German teacher reviews papers in the seminar room.'

e. Deyu laoshi ye zai zixishi shenyue lunwen.
German teacher too LOC individual.study.room proof-read article
'The German teacher reviews papers in the individual study room, too.'

(24) Context: Where does the section chief prepare for classes?

a. Nianji zuzhang shi zai kafeiguan beike de.
section chief COP LOC café prepare.class DE
'It is in the cafe that the section chief prepares for classes.'

b. Nianji zuzhang shi zai kafeiguan beike.
section chief COP LOC café prepare.class
'It is in the cafe that the section chief prepares for classes.'

c. Nianji zuzhang zhi zai kafeiguan beike.
section chief only LOC café prepare.class
'Only in the cafe does the section chief prepare for classes.'

d. Nianji zuzhang zai kafeiguan beike.
section chief LOC café prepare.class
'The section chief prepares for classes in the cafe.'

e. Nianji zuzhang ye zai xiuxishi beike.
section chief too LOC resting.room prepare.class
'The section chief prepares for classes in the resting lounge, too.'

(25) Context: Where does the German teacher borrow books?

a. Deyu laoshi shi zai gedexueyuan jieshu de.
German teacher COP LOC Goethe.Institute borrow.book DE
'It is at the Goethe Institute that the German teacher borrows books.'

b. Deyu laoshi shi zai gedexueyuan jieshu.
German teacher COP LOC Goethe.Institute borrow.book
'It is at the Goethe Institute that the German teacher borrows books.'

c. Deyu laoshi zhi zai gedexueyuan jieshu.
German teacher only LOC Goethe.Institute borrow.book
'Only at the Goethe Institute does the German teacher borrow books.'

d. Deyu laoshi zai gedexueyuan jieshu.
German teacher LOC Goethe.Institute borrow.book
'The German teacher borrows books at the Goethe Institute.'

e. Deyu laoshi ye zai shitushuguan jieshu.
German teacher too LOC city.library borrow.book
'The German teacher borrows books at the city library, too.'

(26) Context: Where does your son read comic books?

a. Wo erzi shi zai tushuguan kan manhuashu de.
I son COP LOC library watch comic.book DE
'It is at the library that my son reads comic books.'

b. Wo erzi shi zai tushuguan kan manhuashu.
I son COP LOC library watch comic.book
'It is at the library that my son reads comic books.'

c. Wo erzi zhi zai tushuguan kan manhuashu.
I son only LOC library watch comic.book
'Only at the library does my son read comic books.'

d. Wo erzi zai tushuguan kan manhuashu.
I son LOC library watch comic.book
'My son reads comic books at the library.'

e. Wo erzi ye zai manhua shudian kan manhuashu.
I son too LOC comic bookstore watch comic.book
'My son reads comic books at the comic bookstore, too.'

(27) Context: Where does the department head store beverages?

a. Xizhuren shi zai xuexiao chufang cunfang yinliao de.
department.head COP LOC school kitchen store beverage DE
'It is at the school kitchen that the department head stores his beverages.'

b. Xizhuren shi zai xuexiao chufang cunfang yinliao.
department.head COP LOC school kitchen store beverage
'It is at the school kitchen that the department head stores his beverages.'

c. Xizhuren zhi zai xuexiao chufang cunfang yinliao.
department.head only LOC school kitchen store beverage
'Only at the school kitchen does the department head store his beverages.'

d. Xizhuren zai xuexiao chufang cunfang yinliao.
department.head LOC school kitchen store beverage
'The department head stores his beverages at the school kitchen.'

e. Xizhuren ye zai bangongshi cunfang yinliao.
department.head too LOC office store beverage
'The department head stores his beverages at his office, too.'

(28) Context: Where does the manager buy toiletries?

a. Jingli shi zai liansuodian mai xiyuyongpin de.
manager COP LOC chain.store buy toiletry DE
'It is at the chain store that the manager buys hygiene products.'

b. Jingli shi zai liansuodian mai xiyuyongpin.
manager COP LOC chain.store buy toiletry
'It is at the chain store that the manager buys hygiene products.'

c. Jingli zhi zai liansuodian mai xiyuyongpin.
manager only LOC chain.store buy toiletry
'Only at the chain store does the manager buy hygiene products.'

d. Jingli zai liansuodian mai xiyuyongpin.
manager LOC chain.store buy toiletry
'The manager buys hygiene products at the chain store.'

e. Jingli ye zai bianlidian mai xiyuyongpin.
manager too LOC convenient.store buy toiletry
'The manager buys hygiene products at the convenience store, too.'

(29) Context: Where does the class director buy soaps?

a. Banzhuren shi zai chezhan bianlidian mai feizao de.
class.director COP LOC bus.station convenience.store buy soap DE
'It is at the bus stop convenience store that our class director purchases soaps.'

b. Banzhuren shi zai chezhan bianlidian mai feizao.
class.director COP LOC bus.station convenience.store buy soap
'It is at the bus stop convenience store that our class director purchases soaps.'

c. Banzhuren zhi zai chezhan bianlidian mai feizao.
class.director only LOC bus.station convenience.store buy soap
'Only at the bus stop convenience store does our class director purchase soaps.'

d. Banzhuren zai chezhan bianlidian mai feizao.
class.director LOC bus.station convenience.store buy soap
'Our class director purchases soaps at the bus stop convenience store.'

e. Banzhuren ye zai xuexiao chaoshi mai feizao.
class.director too LOC school supermarket buy soap
'Our class director purchases soaps at the school supermarket, too.'

(30) Context: Where does the principal buy bentos?

a. Xiaozhang shi zai jiaogong shitang mai hefan de
head.master COP LOC staff dining.hall buy bento DE
'It is at the staff cafeteria that the principal buys bentos.'

b. Xiaozhang shi zai jiaogong shitang mai hefan
head.master COP LOC staff dining.hall buy bento
'It is at the staff cafeteria that the principal buys bentos.'

c. Xiaozhang zhi zai jiaogong shitang mai hefan
head.master only LOC staff dining.hall buy bento
'Only at the staff cafeteria does the principal buy bentos.'

d. Xiaozhang zai jiaogong shitang mai hefan
head.master LOC staff dining.hall buy bento
'The principal buys bentos at the staff cafeteria.'

e. Xiaozhang ye zai bianlidian mai hefan
head.master too LOC convenience.store buy bento
'The principal buys bentos at the convenience store, too.'

(31) Context: Where does the instructor check emails?

a. Zhidaoyuan shi zai bangongshi chakan youjian de.
instructor COP LOC office check email DE
'It is at the office that the instructor checks his emails.'

b. Zhidaoyuan shi zai bangongshi chakan youjian.
instructor COP LOC office check email
'It is at the office that the instructor checks his emails.'

c. Zhidaoyuan zhi zai bangongshi chakan youjian.
instructor only LOC office check email
'Only at the office does the instructor check his emails.'

d. Zhidaoyuan zai bangongshi chakan youjian.
instructor LOC office check email
'The instructor checks his emails at the office.'

e. Zhidaoyuan ye zai gongjiaozhan chakan youjian.
instructor too LOC bus.stop check email
'The instructor checks his emails at the bus stop, too.'

(32) Context: Where does the chemistry teacher hold his office hours?

a. Huaxue laoshi shi zai huaxue shiyanshi dayi de.
chemistry teacher COP LOC chemistry laboratory answer.question DE
'It is at the chemistry laboratory that the chemistry teacher answers his students' questions.'

b. Huaxue laoshi shi zai huaxue shiyanshi dayi.
chemistry teacher COP LOC chemistry laboratory answer.question

'It is at the chemistry laboratory that the chemistry teacher answers his students' questions.'

c. Huaxue laoshi zhi zai huaxue shiyanshi dayi.
chemistry teacher only LOC chemistry laboratory answer.question
'Only at the chemistry laboratory does the chemistry teacher answer his students' questions.'

d. Huaxue laoshi zai huaxue shiyanshi dayi.
chemistry teacher LOC chemistry laboratory answer.question
'The chemistry teacher answers his students' questions at the chemistry laboratory.'

e. Huaxue laoshi ye zai taolunshi dayi.
chemistry teacher too LOC discussion.room answer.question
'The chemistry teacher answers his students' questions at the seminar room, too.'

(33) Context: Where does the head of the student union heat up bentos?

a. Xueshenghuizhang shi zai er'lou canting jiare hefan de.
Student.union.head COP LOC second.floor restaurant heat.up bento DE
'It is at the second floor restaurant that the head of the Student Union heats up his bentos.'

b. Xueshenghuizhang shi zai er'lou canting jiare hefan.
Student.union.head COP LOC second.floor restaurant heat.up bento
'It is at the second floor restaurant that the head of the Student Union heats up his bentos.'

c. Xueshenghuizhang zhi zai er'lou canting jiare hefan.
Student.union.head only LOC second.floor restaurant heat.up bento
'Only at the second floor restaurant does the head of the Student Union heat up his bentos.'

d. Xueshenghuizhang zai er'lou canting jiare hefan.
Student.union.head LOC second.floor restaurant heat.up bento
'The head of the Student Union heats up his bentos at the second floor restaurant.'

e. Xueshenghuizhang ye zai xuesheng zhongxin jiare hefan.
Student.union.head too LOC student center heat.up bento
'The head of the Student Union heats up his bentos at the student center, too.'

(34) Context: Where does the housemate call family members?

a. Shiyou shi zai keting gei jiaren dadianhua de.
house.mate COP LOC living.room OBJ family call DE
'It is at the living room that the housemate calls his family.'

b. Shiyou shi zai keting gei jiaren dadianhua.
house.mate COP LOC living.room OBJ family call
'It is at the living room that the housemate calls his family.'

c. Shiyou zhi zai keting gei jiaren dadianhua.
house.mate only LOC living.room OBJ family call
'Only at the living room does the housemate call his family.'

d. Shiyou zai keting gei jiaren dadianhua.
house.mate LOC living.room OBJ family call
'The housemate calls his family at the living room.'

e. Shiyou ye zai ditiezhan gei jiaren dadianhua.
house.mate too LOC subway.station OBJ family call
'The housemate calls his family at the subway station, too.'

(35) Context: Where does the deskmate read news?

a. Tongzhuo shi zai sushe kan xinwen de.
deskmate COP LOC dormitory read news DE
'It is at the dorm that the deskmate checks news.'

b. Tongzhuo shi zai sushe kan xinwen.
deskmate COP LOC dormitory read news
'It is at the dorm that the deskmate checks news.'

c. Tongzhuo zhi zai sushe kan xinwen.
deskmate only LOC dormitory read news
'Only at the dorm does the deskmate check news.'

d. Tongzhuo zai sushe kan xinwen.
deskmate LOC dormitory read news
'The deskmate checks news at the dorm.'

e. Tongzhuo ye zai jiaoshi kan xinwen.
deskmate too LOC classroom read news
'The deskmate checks news at the classroom, too.'

(36) Context: Where does the principal buy egg tarts?

a. Xiaozhang shi zai xuexiao dianxindian mai danta de.
principal COP LOC school bakery buy egg.tart DE
'It is at the campus bakery that the principal buys egg tarts.'

b. Xiaozhang shi zai xuexiao dianxindian mai danta.
principal COP LOC school bakery buy egg.tart
'It is at the campus bakery that the principal buys egg tarts.'

c. Xiaozhang zhi zai xuexiao dianxindian mai danta.
principal only LOC school bakery buy egg.tart
'Only at the campus bakery does the principal buy egg tarts.'

d. Xiaozhang zai xuexiao dianxindian mai danta .
principal LOC school bakery buy egg.tart
'The principal buys egg tarts at the campus bakery.'

e. Xiaozhang ye zai chezhanbian dantadian mai danta .
principal too LOC bus.stop.side egg.tart.shop buy egg.tart
'The principal buys egg tarts at the bus stop egg tart place, too.'

Appendix B

The pilot study in Chapter 4

Evaluating the empirical picture: A pilot judgment study

My proposal has treated the contribution of the cleft *de* particle as a pragmatic phenomenon. The pattern here is obviously very subtle, as mentioned in Section 4.1. To make sure that the empirical basis of the present work is as solid as possible, and particularly because I am arguing that the actual pattern governing the use of the cleft *de* particle is not the same as has traditionally been assumed, I conducted a pilot acceptability judgment task, with the aim of addressing the question of whether the placement of the cleft *de* particle is subject to the type of partial answers and subject to the relative order of partial answers.

Participants A total of 20 participants were recruited (11 male, 9 female, average age: 23.7±1.13). All participants were Mandarin native speakers currently enrolled in non-linguistics undergraduate programs from a college in China.

Materials A total of 32 target sentences were distributed across 4 lists, randomized across participants, with 8 items apiece. Each list followed a Latin square design. One variable was the placement of the particle *de* (first vs. second prejacent). The other variable kept track of the numbers of situation types (the current way of measuring informativity). All combinations of the ordered partial answers are summarized in Table J.10. Each individual rated 8 target sentences and 24 fillers on a Likert scale from 1 to 7 (ascending order, 1 being the

least natural/least acceptable). All items followed a prior *wh*-question indicating the immediate QUD.

Condition	Position of *de*
a.	Tue–Fri/usually *de* < Mon/occasionally
b.	Mon/occasionally < Tue–Fri/usually *de*
c.	Tue–Fri/usually < Mon/occasionally *de*
d.	Mon/occasionally *de* < Tue–Fri/usually

Table J.10: An illustration of the four combinations of ordered partial answers, varying by the placement of the particle *de* and the numbers of situation type (more vs. less informativity). Only English translation is provided. '<' represents linear precedence. Condition (a) thus reads as: *"From Tuesday until Friday, teacher Wang handles refunds* ***de****. On Monday, teacher Cai handles refunds"*.

Procedure The task was conducted online on Qualtrics. A *wh*-context was displayed on the same page as the target, with scores (1-7) horizontally aligned on the lower half of the page. A radio button was present underneath each score. After choosing a score by mouse-clicking on the radio button, the participant clicked on the CONTINUE button to proceed to the next sentence.

Results An ordinal mixed effect model (Christensen 2019) was adopted: *a*, *b*, *c* conditions were contrast-coded against the reference level of condition *d*. As Figure J.9 shows, no significant effect was observed between condition *c* and *d* by an ordinal mixed model (Christensen 2019, Tukey α-adjustment), with a random intercept for `participant` and `item` and a random by-`participant` slope. However, a significant difference was observed between condition *a* and *d*, to the effect that the *de* particle attached to a 'more-situations' prejacent was preferred over the one with 'fewer-situations'.

The preliminary acceptability judgment task revealed that when partial answers (i.e. two partial sentences) are juxtaposed, judgments are significantly better with *de* attached to the 'more-situations' partial answer than the 'fewer-situations' one. The order of the two answers was not significant, excluding the possibility that the contrast is due to the preference for uttering the more informative partial answer earlier. The positioning of *de* in less informative partial answers still yielded scores tending towards being acceptable (slightly above the middling point within a range of 7). This, I believe, points to the strong cancellability

Condition	Position of *de*	mean values
a.	Tue--Fri/usually *de* < Mon/occasionally	6.331
b.	Mon/occasionally < Tue--Fri/usually *de*	5.797
c.	Tue--Fri/usually < Mon/occasionally *de*	4.631
d.	Mon/occasionally *de* < Tue--Fri/usually	4.422

n.s. ** ***

Figure J.9: ('***': $p < 0.001$; '**': $p < 0.01$; 'n.s.': not significant) Pattern of judgment based on permutations of partial answers with placement of *de*. Only English translation is provided. '<' represents linear precedence. Condition (a) thus reads as: *"From Tuesday until Friday/usually, Wang handles refunds* ***de****. On Monday/occasionally, Cai handles refunds."* ('***': $p < 0.001$; '**': $p < 0.01$; 'n.s.': not significant).

that is characteristic of pragmatics-based constraints, especially those involving speaker-oriented meaning, and hence can be rendered compatible with a game-theoretic pragmatic characterization.

Finally, as has already been mentioned in Section 4.1, I suggest that the Gricean maxim of Quantity could factor into the rather mild differences between condition *a* and *b*. Specifically, with the novel information structured into two information chunks/units, by holding back the more informative chunk (hence uttering the less informative chunk first), the maxim of Quantity is violated. The maxim of Quantity is respected if the more informative partial answer is uttered preceding a less informative one. In this way, the observation that condition *b* sounds less natural than condition *a* can be explained on independent Gricean grounds. Meanwhile, examples with *de* attached to the 'fewer-situations' partial answer (which is less informative) yielded a degradation in both orders (condition *c* and *d*), indicating that such infelicity with *de*-attachment cannot be reduced to the precedence of a less informative answer before a more informative one.

Stimuli in the pilot study

(37) a. Baoxiao de hua gai zhao nei-ge laoshi?
reimbursement POSS COND should find which-CLF teacher
'Which teacher should I find if I want to get reimbursed?'

b. Zhouyi-ne, shi cai laoshi fuze baoxiao de. Zhouer dao
Monday-NE COP Cai teacher take.charge reimbursement DE Tuesday till
zhouwu-ne, shi huang laoshi fuze baoxiao.
Friday-NE COP Huang teacher take.charge reimbursement
'On Monday it is Teacher Cai who is in charge of reimbursement. On Tuesday till Friday it is Teacher Huang who is in charge.'

(38) Q: Nimen yuan de laoshi zhongwu zai na'r chifan?
you.PL department POSS teacher noon LOC where eat
'Where do teachers from your department have lunch?'

A: You geweishu laoshi shi zai xuexiao waimian chifan de. Daduoshu laoshi
have single.digit teacher COP LOC school outside eat DE most teacher
shi zai xuexiao shitang chifan.
COP LOC school cafeteria eat
'A couple of teachers have lunch off campus. Most of the teachers have lunch at the on-campus cafeteria.'

(39) Q: Huaxue laoshi zai nali gei xueshengmen dayi?
chemistry teacher LOC where give student answer.question
'Where does the chemistry teacher answer students' questions?'

A: Huaxue laoshi zhouwu shi zai shiyanshi gei xueshengmen
chemistry teacher Friday COP LOC laboratory give students
dayi. Zhouyi dao zhousi shi zai bangongshi gei
answer.questions Monday till Thursday COP LOC office give
xueshengmen dayi.
students answer.questions
'On Friday it is in the lab that the chemistry teacher answers questions. From Monday till Thursday it is in the office that he answers questions.'

(40) Q: Waiyuan de tongxue zai na'er shangke ni zhidao
foreign.language.department POSS students LOC where take.class you know
ma?
POL.Q
'Where do the students from the foreign language department have classes? Do you know that?'

A: Tamen jishaoshu jitian shi zai bei xiaoqu shangke de. Shengxia de
they very.few days COP LOC north campus take.class DE rest POSS
shijian shi zai nan xiaoqu shangke.
time COP LOC south campus take.class

'On extraordinarily few occasions it is on North Campus that they take classes. The rest of the time they take classes on South Campus.'

(41) Q: Sushezhang zai nali gei youxika chongzhi?
dorm.supervisor LOC where give game.card top.up
'Where does the dorm supervisor top up his game card credits?'

A: Sushezhang shaoshu qingkuang xia shi zai kefu zhongxin chongzhi.
dor.supervisor a.few occasion under COP LOC customer center top.up
daduoshu qingkuang xia shi zai wangba chongzhi.
most occasion under COP LOC internet.cafe top.up
'On a few occasions the dorm supervisor tops up his card credits at the customer service center. On most occasions he tops up at internet cafes.'

(42) Q: Na-zhi juhuang liulangmao zai na'r neng kanjian?
DEM-CLF orange stray.cat LOC where can see
'That orange stray cat, where can I spot him?'

A: Ta ou'er shi zai gongchengguan chuxian de. Yiban shi zai
he occasionally COP LOC engineering.building appear DE usually COP LOC
di'er shitang chuxian.
second cafeteria appear
'Occasionally he shows up at the engineering building. Most of the time he shows up at the second cafeteria.'

(43) Q: Jiaodao zhuren zai nali paobu?
teaching supervisor LOC where jog
'Where does the teaching director jog?'

A: Jiaodao zhuren ou'er shi zai caochang paobu. Yiban dou shi
teaching supervisor occasionally COP LOC playing.field jog usually DOU COP
zai ziji jia louxia paobu.
LOC self house downstairs jog
'Occasionally the teaching director jogs at the playing field. Usually he jogs outside his own residential building.'

(44) Q: Xueshenghui zai nali zuzhi liuxuesheng jiaoliu huodong?
student.union LOC where organize international.student exchange activity
'Where do the Student Union hold international student exchange activities?'

A: Xueshenghui kaixue qian ji zhou shi zai jieti
Student.Union semester.start before a.few week COP LOC amphitheater
jiaoshi zuzhi. Zhihou quanbu dou shi zai yiban jiaoshi
classroom organize afterwards all DOU COP LOC general classroom
zuzhi.
organize
'A few weeks before the start of the semester the Student Union holds activities at the amphitheater classroom. Afterwards they always hold activities at the general classroom.'

(45) Q: Mishu zai nali mai xinfeng?
secretary LOC where buy envelope
'Where does the secretary buy envelopes?'

A: Youshi shi zai jiejiao youju mai. Youshi shi zai
sometimes COP LOC street.corner post.office buy sometimes COP LOC
tushuguan wenjudian li mai.
library stationery.store inside buy
'Sometimes she buys envelopes at the street corner post office. Sometimes she buys at the stationery store in the library.'

(46) Q: Nimen xuexiao shi zhao na-ge gongsi zuo xiaofu?
you.PL school COP find which-CLF company manufacture uniform
'To which company did your school commission the manufacturing of school uniforms?'

A: Youshi shi A gongsi zuo xiaofu de. Youshi shi B
sometimes COP A company manufacture uniform DE sometimes COP B
gongsi gei dajia zuo.
company give us manufacture
'Sometimes it is company A who makes school uniforms. Sometimes it is company B who makes them for us.'

Appendix C

The pilot study in Chapter 6

My proposal has treated the exhaustive inference of the cleft sentence as following from the property of specificational structures that bear an anaphoric relation to a prior *wh*-question and as such are subject to the strength of exhaustivity of said *wh*-question. To test this hypothesis, I conducted a pilot judgment study, with the aim of obtaining the interpretation of the *wh*-questions under controlled context and verifying whether the exhaustive reading of a *wh*-question influences the felicity of the corresponding cleft answer.

Participants A total of 8 participants were recruited (3 male, 5 female, average age: 21±0.82). All participants were Mandarin native speakers currently enrolled in non-linguistics undergraduate programs from a college in China.

Materials A total of 10 pairs of target sentences together with 10 pairs of contexts were distributed across 2 lists, randomized across participants. Each pair included one *wh*-question and one answer. One of the two variables was the context type (mention-all vs. mention-some). The other variable was the answer type of the *wh*-question (cleft answer vs. canonical focus answer). Each individual heard 5 target contexts and 5 target question-answer pairs. 10 fillers were inserted in between the target stimuli sentences so that participants were distracted from the purpose of the experiment. The *wh*-questions in the study comprised complex *wh*-phrases

containing a 'who'-word *shei* or a 'what'-word *shenme* together with a classifier, as well as a *where*-question.

Procedure The task was conducted using a questionnaire in a quiet lab setting. Participants sat before a computer and started by taking part in a practice trial, in which an auditory instruction explained the workings of slider and Likert scale rating. Following the instructions, they listened to two auditory practice stimuli and interacted with the slider and the Likert scale, then pressed the 'continue' button for the experiment. A context description and a subsequent *wh*-question sentence were auditorily presented to them 15 seconds after each page had been turned. Each page displayed two questions. The first question took the form of 'Given this context, what you want to know is more likely to be', with a slider underneath the description. Participants were instructed to drag the mouse on the slider to a location of their choice, which could be anywhere between 0 to 100, with 0 representing the upper bound of the interpretation *some place that x* and 100 representing the upper bound of the interpretation *all places that x*, where *x* stands for the property encoded in the nuclear scope of the *wh*-question. The second question asked *how natural is this answer to you?*, which elicits a choice on a Likert scale from 1 to 7.

Results The mean values on the slider and the Likert ratings were calculated and reported in Table 6.9 of Chapter 6, repeated here as (J.11).

	Context condition for questions & answers	Means of question slider	Answer Conditions	Likert-scale rating
(1)	Mention-all	94.7	cleft	4.78
(2)	Mention-some	12.8	cleft	3.4
(3)	Mention-all	93.9	canonical focus	7
(4)	Mention-some	4.07	canonical focus	7

Table J.11: Mean values of question slider rating across context conditions (mention-all and mention-some) and mean values of the corresponding Likert scale ratings across answer conditions (cleft and canonical focus answer). The question slider ratings range from 0 to 100. The Likert ratings range from 1 to 7 .

Due to the small number of data points, only two-tailed permutation tests were adopted for the results. The cleft-mention-all condition was contrast-coded against the reference level of the cleft-mention-some condition. The ratings for canonical focus under mention-all and mention-some contexts were run against the same test contrast-coded against the corresponding cleft conditions.

A significant difference in the mean values of question slider rating was found between the mention-all context and the mention-some context ($p < 0.0001$), regardless of answer type. A significant difference was also observed between the Likert scale ratings of cleft answers in the mention-all context and the mention-some context ($p < 0.001$). Both differed significantly from the corresponding ratings of canonical focus answers.

In addition, a correlation coefficient between the responses of question interpretation and answer acceptability was calculated, as shown in Figure J.10.

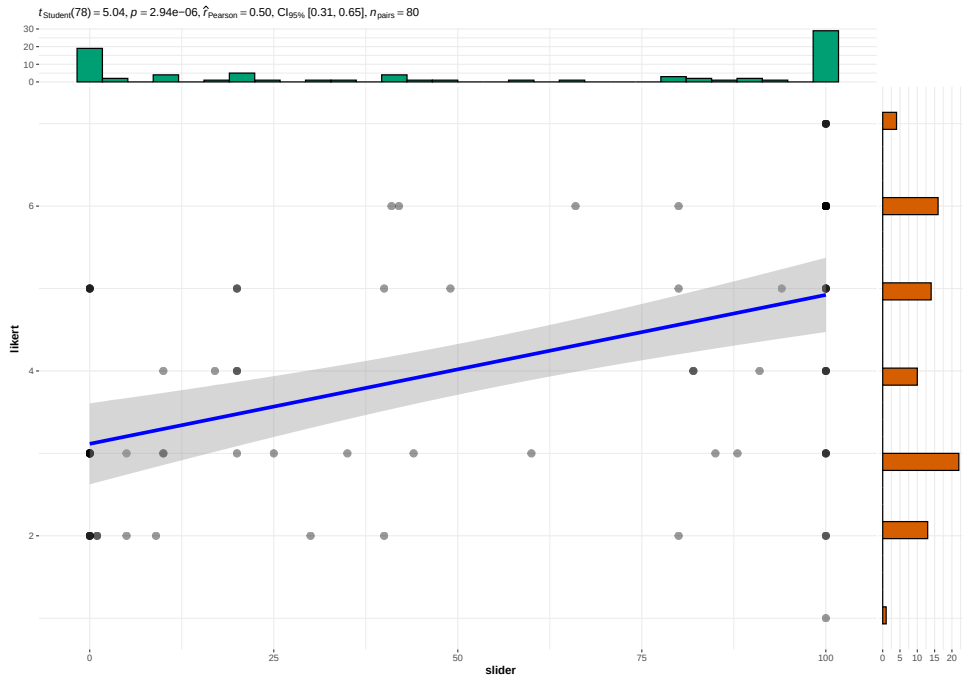

Figure J.10: Pearson correlation coefficient between the ratings of question slider interpretation (x-axis, 0 indicates the upper bound of a mention-some reading, 100 represents the upper bound of a mention-all reading) and the Likert scale ratings of cleft answers. The distribution of question slider interpretations is shown on the upper histogram. The distribution of Likert scale ratings is shown on the histogram to the right. The gray band indicates confidence interval size.

As Figure J.10 shows, a positive Pearson correlation of question interpretation and Likert scale rating was observed. Together with a significant p-value ($p < 0.0001$), the results pointed to the rejection of the null hypothesis that there was no correlation. In sum, I take the current results to indicate that the more participants interpreted a *wh*-question as having a mention-all reading, the more likely they found the corresponding cleft answer natural. The more they interpreted the question as a mention-some question, the more likely they found its cleft answer unnatural.

Stimuli in the pilot study

(47) Context: You go to the swimming pool to swim but realize that you forgot to bring your swimsuit, so you decide to buy a new one nearby. You ask a passerby:

Q: Nar mai yongyi?
Where sell swimsuit
'Where are swimsuits sold?'

A: Shi A chaoshi.
COP A supermarket
'It's Supermarket A.'

(48) Context: The weather is hot, and you really want to eat ice cream, but you don't know where to buy it. So you ask your roommate:

Q: Fujin shui-jia mai xuegao?
nearby who-CLF sell ice.cream
'Who sells ice cream around here?'

A: Shi Luosen.
COP Lawson
'It's Lawson.'

(49) Context: You are a medical student and your teacher asks you to answer a question. Pointing at several medication names on the PowerPoint slides, the teacher asks:

Q: Shenme yao zhi touteng?
What medicine treat headache
'What medicine treats headache?'

A: Shi toubao.
COP cephalosporin
'It's cephalosporin.'

(50) Context: You just finished a math problem and wanted to confirm if you did it correctly. So you ask your classmate:

Q: Shui zhidao zhe-dao ti de daan?
Who know DEM-CLF question POSS answer
'Who knows the answer to this question?'

A: Shi Zhangsan.
COP Zhangsan
'It's Zhangsan.'

(51) Context: You are in charge of the express delivery service in the A neighborhood and surrounding areas. Recently, your supervisor came to inspect how delivery service was covered locally. The supervisor asks you:

Q: Fujin shenme difang tigong kuaidi shouji fuwu?
nearby what place provide express delivery service
'What places nearby provide express delivery service?'

A: Shi Cainiao.
COP Cainiao
'It's Cainiao.'

(52) Context: Recently, you've been trying to lose weight and want to buy some sugar-free yogurt. You stand in front of the yogurt shelf but can't find the one you want. So you ask the store attendant:

Q: Zhe-xie suannai li, na-xie shi wutang suannai?
DEM-CLF yogurt in which-CLF COP sugar-free yogurt
'Among these yogurt, which ones are sugar-free?'

A: Shi Mingzhi suannai.
COP Mingzhi yogurt
'It's Mingzhi yogurt.'

(53) Context: You are a manager of a shopping district. The local market regulatory department wants to know the number and distribution of ice cream shops in the vicinity. The head of the market regulatory department asks you:

Q: Fujin shui-jia mai xuegao?
nearby who-CLF sell ice.cream
'Who sells ice cream around here?'

A: Shi Luosen.
COP Lawson
'It's Lawson.'

(54) Context: You have a cold and are experiencing headache. You go to the pharmacy to buy medicine and ask the salesperson:

Q: Shenme yao zhi touteng?
What medicine treat headache
'What medicine treats headache?'

A: Shi toubao.
COP cephalosporin
'It's cephalosporin.'

(55) Context: You are a math teacher, and your class representative tells you that the answer to the third question on the monthly exam has been leaked. So, you ask the class representative:

Q: Shui zhidao zhe-dao ti de da'an?
Who know DEM-CLF question POSS answer
'Who knows the answer to this question?'

A: Shi Zhangsan
COP Zhangsan
'It's Zhangsan.'

(56) Context: You want to send some local specialties to your family, but you don't know where to send the package. So you ask your friend:

Q: Fujin shenme difang tigong kuaidi shouji fuwu?
nearby what place provide express delivery service
'What places nearby provide express delivery service?'

A: Shi Cainiao.
COP Cainiao
'It's Cainiao.'

Appendix D

Corpus source in Chapter 5

ZhTenTen: Corpus of the Chinese Web

The Chinese Web Corpus (zhTenTen) is a Chinese corpus made up of texts collected from the Internet (13.5 billion words) by Jakubíček, M., Kilgarriff, A., Kovíř, V., Rychlý, P., & Suchomel, V. (2013, July). The TenTen corpus family. In the 7th International Corpus Linguistics Conference CL (pp. 125-127).