Fragment questions: Deleting question items*

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1. Introduction

Ellipsis refers to the phenomenon that some expected materials are missing in a sentence. Since the 1970s, ellipsis has been discovered not only in declaratives but also in questions. In questions, the kinds of ellipsis that have been taken up by many studies are sluicing and sprouting, as illustrated in (1) (Merchant 2001; AnderBois 2010; Barker 2013; a.o.).

(1) a. Peter met someone, but I don't know who [*e*]. Sluicing
b. Peter met someone, but I don't know when [*e*]. Sprouting

A common property of these elliptical structures is that question items such as the *wh*-words are retained. When elliptical sites are big enough to contain whole questions (including question operators (Q-ops)), eliding constituents containing *wh*-words is possible, as in (2a)-(2b). Throughout this paper, elided materials are enclosed by angle brackets.

(2) a. Peter knows who will come, but I don't ⟨ know [Q-op who will come]⟩
b. Peter wonders who will come, but I don't ⟨ wonder [Q-op who will come] ⟩.

By contrast, eliding *wh*-containing constituents is not allowed if whole questions are not deleted (Tomioka 2014). Consider (3a) and (3b), which are taken from Tomioka (2014). The elliptical sites both contain *wh*-words but not Q-ops (capitalization indicates that a word is pitch accented). The fact that these examples are unacceptable seems to suggest that deleting *wh*-words without deleting the question operators is problematic.

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(3) a. Who wonders what Anna wants to give to whom? And *[Q-op who wonders [Q-op what Anna WILL ⟨ give to whom ⟩]]?
b. Who wonders what Anna gave to whom? And *[Q-op who actually ASKED her [Q-op what ⟨ Anna gave to whom ⟩]]?

The contrast about the deletion of *wh*-words can be observed in different types of ellipsis constructions and it holds at least also in Mandarin, as demonstrated by the following example. It has been well-known that Mandarin has argument ellipsis (Huang 1991; Aoun & Li 2008; a.o.), but *wh*-objects cannot be elided in *wh*-questions.

(4) *Mandarin*
a. Libai he-le shenme? Dufu you he-le shenme?
Libai drink-Asp what Dufu YOU drink-Asp what
'What did Libai drink? And what did Dufu drink?'

b. *Libai he-le shenme? Dufu you he-le [*e*]?
Libai drink-Asp what Dufu YOU drink-Asp

The co-habitation relationship between *wh*-words and the Q-op has also been built into standard linguistic theories. Syntactic theories often understand this intimate relationship as feature checking—the uninterpretable *wh*-feature on a *wh*-word has to be checked by the Q-op (Chomsky 1995); some semantic theories take a *wh*-word as a special focus-marked item with an undefined ordinary value, which must be evaluated by the Q-op (Beck 2006). A number of previous studies take this co-habitation requirement to ensure that deletion of a *wh*-word necessitates deletion of the Q-op (Ikawa 2012; Tomioka 2014).

In this paper, however, I show that eliding question items like *wh*-words without eliding the Q-op is empirically attested, as well as theoretically supported. Consider the dialogue in (5): (5a) is a *wh*-question and (5b) is an answer to this question. (5c) is a follow up question. It does not contain any *wh*-word, but is still understood as a *wh*-question, as evidenced by the answer in (5d). Since the question consists of a fragment and a particle, we call it 'a fragment question.' All fragment questions in this paper are embedded in a discourse context like (5).

(5) a. Libai he-le shenme?
Libai drink-Asp what
'What did Libai drink?'

b. Hongjiu.
red.wine
'Red wine.'

c. **Dufu ne**?
Dufu NE
Int 'What did Dufu drink?'

d. Baijiu.
white.wine
'White wine.'

The current study proposes that fragment questions are derived from full questions by deleting constituents that contain question items, as illustrated in the configuration in (6). The deletion is licensed only if the remnant fragments are marked as contrastive topic (CT) in the sense of Büring (2003) and Constant (2014). As a consequence, deleting question items but retaining the Q-op is possible.

(6) [Q-op [Fragment]$_{CT}$ [⟨ ... question-item ... ⟩]]

The paper is organized as follows. Section 2 shows that a fragment question can be interpreted as different kinds of questions depending on the the context. Section 3 reviews Constant's 2014 argument that the fragments in fragment questions are marked as CT by the CT operator, i.e., the particle *-ne*. My proposal is laid out in section 4 and an extension is discussed in section 5. Section 6 concludes the paper.

2. Contextual sensitivity

In Mandarin, questions can be classified into wh-questions, alternative questions, A-not-A questions and yes-no questions, which are marked by question items such as *wh*-phrases, interrogative *haishi*-disjunctions, A-not-A forms and the question particle *-ma*, respectively, as listed below.

(7) a. Libai he-le **shenme**?
Libai drink-ASP what
'What did Libai drink?' *Wh*-question

b. Libai he-le kafei **haishi** cha?
Libai drink-ASP coffee HAISHI tea
'Did Libai drink coffee or tea?' Alternative question

c. Libai **he-mei-he** kafei?
Libai drink-not-drink coffee
'Did Libai drink coffee or not?' A-not-A question

d. Libai he-le kafei **ma**?
Libai drink-ASP coffee MA
'Did Libai drink coffee?' *Yes-no* question

Fragment questions are different from these four types of questions in the syntactic form, as they do not contain any question items. However, a fragment question can be interpreted as any of these questions depending on the context. To be more specific, a fragment question 'mirrors' the interpretation of an antecedent question (Lu 1982; Shao 1996). Compare the dialogue in (8) with that in (9).

(8) a. Libai he-le shenme?
Libai drink-Asp what
'What did Libai drink?'

b. Kafei.
coffee
'Coffee.'

c. **Dufu ne**?
Dufu NE
Int: 'What did Dufu drink?'

d. Niunai.
milk
'Milk.'

(9) a. Libai he-le jiu haishi cha?
Libai drink-Asp wine HAISHI tea
'Did Libai drink wine or tea?'

b. Jiu.
wine
'Wine.'

c. **Dufu ne**?
Dufu NE
Int: 'Did Dufu drink wine or tea?'

d. (i) Cha. (ii) # Niunai.
tea milk
'Black tea.' 'Milk.'

Although the fragment questions in (8) and (9) have the same surface form, they have different interpretations, paralleling the *wh*-questions in (8a) and the alternative question in (9a), respectively. The different interpretations can be teased apart by the responses. The same short answer *Milk* is felicitous for (8c), as in (8d), but not for (9c), as in (9d)-(ii). It shows that an appropriate response to a fragment question with an antecedent alternative question must involve choosing from the alternatives spelled out in the antecedent (Biezma & Rawlins 2012). If the interpretation of (9c) is parallel to the antecedent alternative question, as shown by its English translation, the infelicity of (9d)-(ii) is predicted. By contrast, *wh*-questions are not subject to this requirement. Paralleling its antecedent question, (8c) is interpreted as a *wh*-question, and hence can be answered by (8d).

Additionally, the same fragment question can be understood as an A-not-A question, as exemplified in (10). Not surprisingly, the antecedent question in this dialogue is an A-not-A question. In Mandarin, an A-not-A question cannot be answered by a fragment answer. Instead, it must be answered affirmatively by repeating the A-form or negatively by repeating the *not*-A form. Therefore, the contrast between the answers in (10d)-(i) and (10d)-(ii) indicates that the fragment question in (10c) cannot be interpreted as a *wh*-question like (8c) or an alternative question like (9c).

(10) a. Libai he-mei-he cha?
Libai drink-not-drink tea
'Did Libai drink tea or not?'

b. He-le.
drink-Asp
'He did.'

c. **Dufu ne**?
Dufu NE
Int: 'Did Dufu drink tea or not?'

d. (i) Mei he. (ii) # Niunai.
not drink milk
'He didn't' 'Milk.'

The fragment question can also be understood as a *yes-no* question. Consider the dialogue in (11). The antecedent question is a *yes-no* question and can be answered by affirmative items like *shi* 'yes' and *dui* 'right' or negative items like *meiyou* 'no' and *bu-dui* 'wrong'. The fragment question in (11) requires the same strategy from the answer.

(11) a. Libai laizi Shaanxi ma?
Libai come.from Shaanxi QP
'Is Libai from Shaanxi?'

b. Shi a.
yes SFP
'Yes, he is.'

c. **Dufu ne**?
Dufu NE
Int:'Is Dufu from Shaanxi?'

d. Ye shi.
too yes
'Yes, he is too.'

In short, the meaning of a fragment question varies depending on its antecedent question in a dialogue. This phenomenon raises a puzzle of form-meaning mismatch: although fragment questions do not have question items in their surface forms, they are chameleonic enough to be understood as various types of questions.

3. Fragments as CT

Constant (2014) proposes that the particle *-ne* is a morphological counterpart of the English CT contour defined by Büring (2003). Consider the dialogue in (12), in which *Libai* is marked as CT by *-ne*. According to Büring (2003), in discourse, CT marks a response to a question which is part of a larger strategy, i.e., a set of questions. The strategy is formed to resolve a big issue that concerns the participants of a dialogue. In the above example, the sentence in (12d) answers the question in (12c), which forms a strategy with the question in (12a). The big issue implied from this context may be 'what did Libai and Dufu drink?'.

(12) a. Libai he-le shenme?
Libai drink-Asp what
'What did Libai drink?'

b. Ta he-le kafei.
he drink-Asp coffee
'He drank coffee.'

c. Na, Dufu he-le shenme?
then Dufu drink-Asp what
'Then, what did Dufu drink?'

d. [Dufu]^{CT} ne, he-le [cha]$_F$.
Dufu NE drink-Asp tea
'[Dufu]^{CT} drank [tea]$_F$.'

Additionally, Constant (2014) points out that Mandarin CT phrases can occur in questions, as exemplified in (13c). Furthermore, he proposes a felicity condition for CT questions. According to him, a CT question is felicitous in discourse iff it is *part* of a larger strategy. In other words, there must be another question that can form a set with the CT question. In (13), obviously, the existence of the first question makes the CT question felicitous.

(13) a. Libai he-le shenme?
Libai drink-Asp what
'What did Libai drink?'

b. Kafei.
coffee
'Coffee.'

c. Na, Dufu ne, he-le shenme?
then Dufu NE drink-Asp what
'As for Dufu, what did he drink?'

d. Cha.
tea
'Tea.'

Due to the parthood property of CT, Constant (2014) predicts a series of behaviors that CT phrases must have, as summarized in (14). All of these can be verified by CT declaratives and CT questions in Mandarin.

(14) As for a CT phrase marked by *-ne*, (Constant 2014: 312-319)

a. it cannot be exhaustive;
b. it cannot be a maximal element like *all*;
c. it must be interpreted contrastively;

d. it can be a *if*-clause and cannot be a *because*-clause.

For this work, the most important finding of Constant's study is that fragments in fragment questions behave similarly to CT phrases. To begin with, a fragment cannot be exhaustive. It cannot associate with *jiu* 'only', as shown in (15).

(15) a. Jiu Libai he-le cha.
only Libai drink-Asp tea
'Only Libai drank tea.'

b. *Jiu Dufu ne?
only Dufu NE
Int: 'What did only Dufu drink?'

Secondly, a fragment in a fragment question must be contrastive to something previously introduced in the context. In the dialogue (16), there is nothing salient that the fragment can stand in contrast to. As a consequence, the fragment question is not felicitous.

(16) a. Xuexiao wudian cai fangxue.
school five.clock just let.out
'My school doesn't finish until 5.'

b. *Baba ne?
father NE
'What about Dad?'

Thirdly, maximal elements cannot occur as fragments in fragment questions, as illustrated in the dialogue (17). Suppose the issue that the dialogue attempts to resolve is 'which professor drank what.' The strategy is to find out what each professor drank. Obviously, the *wh*-question (17a) is part of the strategy, but the fragment question (17c) is not.

(17) a. Li jiaoshou he-le shenme?
Li professor drink-Asp what
'What did Professor Li drink?'

b. Kafei.
coffee
'Coffee.'

c. #Suoyou-de jiaoshou ne?
all-DE professor NE
Int: 'What did all the professors drink?'

Finally, as with CT phrases, *if*-clauses are commonly used as fragments in fragment questions, but *because*-clauses are rejected, as shown in (18) and (19).

(18) a. Yaoshi ni bu qu, wo jiu bu qu.
if you not go I just not go
'If you don't go, I don't go.'

b. Yaoshi wo qu ne?
if I go NE
Int: 'If you don't go, I don't go.'

(19) a. Yinwei ni qu, wo cai xiang qu.
because you go I just want go
'Becasue you go, I wanna go.'

b. *Yinwei wo bu qu ne?
because I not go NE
Int: 'Because I don't go, what do you wanna do?'

In short, fragments in fragment questions demonstrate CT-like behaviors in the same ways as CTs marked by *-ne* do. Hence, Constant concludes that these fragments should be analyzed as CTs. In fact, treating the fragments in fragment questions as CTs is not surprising to Chinese linguists working in the non-generative tradition. Many of them have also suggested that the fragments should function as topic (Chao 1968; Wu 2006; a.o.).

4. Proposal: Deleting question items

I propose that fragment questions are derived from full CT questions through deletion. Take the question in (20c) as an example. Its underlying form is a *wh*-question with the CT phrase *Dufu*.

(20) a. Libai he-le shenme?
Libai drink-Asp what
'What did Libai drink?'

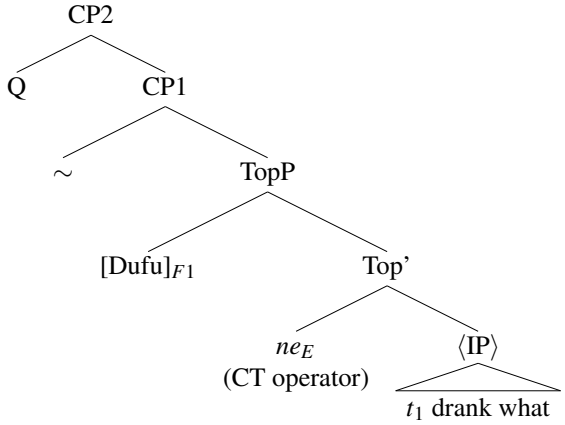
b. Hongjiu.
red.wine
'Red wine.'

c. **Dufu ne**?
Dufu NE
Int 'What did Dufu drink?'

d. Baijiu.
white.wine
'White wine.'

Syntactically, the structure of the fragment question can be represented as in Figure 1. According to Constant (2014), a CT phrase is focused and undergoes topic raising that is triggered by the CT operator (CT-op). Specifically, *-ne* as the CT-op projects a TopP and attracts the focused phrase *Dufu* to Spec-TopP. For the evidence for the movement analysis, I refer the reader to Wei (2013), who agrees with the movement step, but disagrees on what is being elided.

(21) *Figure 1 The syntactic structure of fragment questions*



Moreover, following the spirit of Merchant (2001, 2004), I assume that the CT operator *-ne* bears an E feature in fragment questions. The E feature serves two functions. On the one hand, it triggers non-pronunciation of its complement, in this case the IP. On the other hand, it introduces a presuppositional condition for ellipsis. However, unlike Merchant, who attributes the ellipsis to e-GIVENNESS, I adopt Rooth's (1992a) focus condition of ellipsis, which is stated in (22).

(22) Focus Condition of Ellipsis
A constituent α in XP can be deleted only if there is an antecedent YP, where $[\![\text{YP}]\!]^g$ either is or implies an element of $[\![\text{XP}]\!]^f$.

The insight of the focus condition of ellipsis has been accepted and extended to other types of ellipsis (Romero 1998; Reich 2007). Extending the focus condition of ellipsis to fragment questions, IP in TopP can be deleted only if there is an antecedent question Q, where $[\![\text{Q}]\!]^g$ is or implies an element of $[\![\text{TopP}]\!]^f$.

As a consequence of my proposal, deleting question items without deleting the Q-op is possible. However, this deletion is restricted to CT questions, since only the appearance of a CT phrase can ensure that the focus condition of ellipsis is satisfied. It can directly account for the unacceptability of (3) and (4), in which no CT phrases occur. In addition, the form-meaning mismatch described in section 2 is due to the variety of the underlying structures of fragment questions. That is, fragment questions may be derived from any type of questions, depending on their antecedent questions. Otherwise, the focus condition of ellipsis cannot be satisfied. The following subsections will lay out the semantic composition of fragment questions, showing how the focus condition is met.

4.1 Theoretical background

Before presenting the compositional process, I briefly introduce the semantic theories that my analysis is based on: Kratzer's (1991) implementation of Rooth's (1985) theory of focus interpretation and a neo-Hamblin semantics for question interpretation.

Rooth (1985, 1992b) divides the semantic contribution of a focus along an ordinary dimension and a focus dimension. The denotation of a focus in the ordinary dimension is its ordinary semantic value, which is derived by applying the interpretation function '$[\![\cdot]\!]^g$' to the focus. The denotation of a focus in the focus dimension is a set of alternatives. For this, we follow Krazter's (1991) amendment of Rooth's theory and derive it via a secondary semantic value '$[\![\cdot]\!]^{g,h}$,' in which h is a designated assignment function. Kratzer proposes that the focus feature borne by a focused phrase is indexed and functions as a distinguished variable subject to the interpretation by h. The assignment function h is applied only to the index on a focus. If there is no focus feature on a constituent α, h is not applied, i.e., $[\![\alpha]\!]^{g,h}$ is identical to $[\![\alpha]\!]^g$. The focus semantic value of α corresponds to the set of $[\![\alpha]\!]^{g,h}$, obtained by quantifying over designated assignments h, with H being the set of designated assignments, i.e., $\{[\![\alpha]\!]^{g,h} \mid h \in \text{H}\}$. (23b)-(23f) demonstrate how the denotation of the sentence containing the focus *Peter* in (23a) is derived.

(23) a. $[_{\text{IP}}\ \text{Peter}_{F1}\ [_{\text{VP}}\ \text{drank tea}]]$

b. $[\![\mathit{Peter}_{F1}]\!]^g = \text{Peter};\quad [\![\mathit{Peter}_{F1}]\!]^{g,h} = h(1)$

c. $[\![\text{VP}]\!]^g = \lambda y.\lambda w.\text{drink}_w(y, \text{tea})$

d. $[\![\text{IP}]\!]^g = \lambda w.\text{drink}_w(\text{Peter}, \text{tea})$

e. $[\![\text{IP}]\!]^{g,h} = \lambda w.\text{drink}_w(h(1), \text{tea})$

f. $[\![\text{IP}]\!]^f = \{\lambda w.\text{drink}_w(h(1), \text{tea}) \mid h \in H\}$

Moreover, Rooth (1992b) formalizes focus licensing by positing an operator $\sim$. The $\sim$ operator is attached to focus-containing constituents, making use of a contextual restriction C, which stands for a set of contextual alternatives, and adding the presupposition that C

is a subset of the focus value of the focus-containing constituent. The formal definition is given in (24).

(24) a. $[\![[\sim \mathrm{C}\ \phi]]\!]^g = [\![\phi]\!]^g$ if $\mathrm{C} \subseteq [\![\phi]\!]^f$, otherwise undefined
b. $[\![[\sim \mathrm{C}\ \phi]]\!]^{g,h} = [\![[\sim \mathrm{C}\ \phi]]\!]^g$

Suppose that (23a) is used to answer the question in (25). Following Hamblin (1973) and Karttunen (1977), the denotation of the question corresponds to the set of propositions {Peter drank tea, John drank tea, Mary drank tea}. In this case, the denotation of the question is taken as the contextual restriction C of the $\sim$ operator. According to (24), it must be a subset of the focus value of IP in (23f).

(25) Q: Who drank tea?
A: Peter$_F$ drank tea.

As for question interpretation, I adopt a neo-Hamblin approach to formalize it. Here, *wh*-questions are taken as an example to sketch this approach. Based on Hamblin's (1973) original semantics and neo-Hamblin semantics (Kratzer & Shimoyama 2002), we propose that an in-situ *wh*-phrase does not bear any focus index. It merely denotes a set of alternatives as its ordinary semantic value (see also Eckardt 2007, contra Beck 2006). On this view, the denotation of the in-situ *wh*-phrase in (26) is a set of activities in the evaluation world *w* and its domain is restricted by the context, as in (27a). Since the *wh*-phrase bears no focus index, the designated assignment function *h* is not applied. The secondary semantic value of the *wh*-phrase is identical to its ordinary semantic value, as in (27b).

(26) Libai he-le shenme?
Libai drink-Asp what
'What did Libai drink?'

(27) a. $[\![\textit{shenme}]\!]^{w,g} = \{x \mid \mathrm{thing}_w(x)\}$
b. $[\![\textit{shenme}]\!]^{w,g,h} = [\![\textit{shenme}]\!]^{w,g}$

By carrying out functional application in a pointwise manner, which is formally defined in (28)-(29), the predicate is applied to each member of the set denoted by the *wh*-phrase, yielding a set of properties, as in (30a). Afterwards, the subject is composed in the same way to form a set of propositions, as in (30b).

(28) Semantic type for alternative sets (Yatsushiro 2009: 152)
For any type α ; α/t is the type of sets of entities of type α, $\mathrm{D}_{\alpha/t} = \mathrm{POW}(D_\alpha)$

(29) Pointwise functional application (a notational variant of Yatsushiro 2009: 153)
If X is a phrase with two immediate subconstituents Y and Z, then $[\![\mathrm{X}]\!]^g$ is defined as follows:

a. if $[\![\mathrm{Y}]\!]^g \in \mathrm{D}_\alpha$, $[\![\mathrm{Z}]\!]^g \in \mathrm{D}_{\langle\alpha,\beta\rangle}$, $[\![\mathrm{X}]\!]^g = [\![\mathrm{Z}]\!]^g([\![\mathrm{Y}]\!]^g) \in D_\beta$;
b. if $[\![\mathrm{Y}]\!]^g \in \mathrm{D}_{\alpha/t}$, $[\![\mathrm{Z}]\!]^g \in \mathrm{D}_{\langle\alpha,\beta\rangle}$, $[\![\mathrm{X}]\!]^g = \{[\![\mathrm{Z}]\!]^g(y) \mid y \in [\![\mathrm{Y}]\!]^g\} \in D_{\beta/t}$;
c. if $[\![\mathrm{Y}]\!]^g \in \mathrm{D}_\alpha$, $[\![\mathrm{Z}]\!]^g \in \mathrm{D}_{\langle\alpha,\beta\rangle/t}$, $[\![\mathrm{X}]\!]^g = \{z([\![\mathrm{Y}]\!]^g) \mid z \in [\![\mathrm{Z}]\!]^g\} \in D_{\beta/t}$;
d. if $[\![\mathrm{Y}]\!]^g \in \mathrm{D}_{\alpha/t}$, $[\![\mathrm{Z}]\!]^g \in \mathrm{D}_{\langle\alpha,\beta\rangle/t}$, $[\![\mathrm{X}]\!]^g = \{z(y) | z \in [\![\mathrm{Z}]\!]^g \wedge y \in [\![\mathrm{Y}]\!]^g\} \in D_{\beta/t}$;

(30) a. $[\![\text{drank what}]\!]^g = \{\lambda y.\lambda w.\text{drink}_w(y,x) \mid x \in [\![what]\!]^g\}$
b. $[\![\text{Libai drank what}]\!]^g = \{\lambda w.\text{drink}_w(\text{Libai},x) \mid x \in [\![what]\!]^g\}$

Finally, it is noted that the neo-Hamblin approach can be extended to other types of questions. For example, in alternative and A-not-A questions, disjunctions and A-not-A forms are treated as set-evoking items respectively, and pointwise functional application is exploited to generate sets of propositions. For more details, I refer the reader to Dong (2009), Biezma & Rawlins (2012), Li (2013) and Li & Law (2014).

4.2 Semantic composition and license of deletion

Now, we are in the position to enunciate the composition of the underlying structure of fragment questions, i.e., CT questions. Let's return to the syntactic structure in (21). According to Constant (2014), the focused phrase *Dufu* undergoes topic raising triggered by the CT operator *-ne*. Correspondingly, Constant defines a new abstraction rule that the CT operator triggers in semantics–the topic abstraction rule. Since Constant's definition is built on Rooth's (1985, 1992b) original framework of focus semantics, I have to revise it in accordance with Kratzer's (1991) implementation, as shown in (31).

(31) Topic abstraction
a. $[\![\text{CT-}\lambda_i\ \phi]\!]^g = \lambda x.[\![\phi]\!]^{g[i\to x]}$
b. $[\![\text{CT-}\lambda_i\ \phi]\!]^{g,h} = \lambda x.[\![\phi]\!]^{g[i\to x],h}$
c. $[\![\text{CT-}\lambda_i\ \phi]\!]^f = \{[\![\text{CT-}\lambda_i\ \phi]\!]^{g,h} \mid h \in H\}$

Crucially, the topic abstraction rule applies a 'näive' abstraction rather than an alternative-friendly abstraction, which is posited by Hagstrom (1998) and Kratzer & Shimoyama (2002), when it meets a set of alternatives. The difference is illustrated as below. Simply speaking, the 'näive' abstraction applies the predicate abstraction to the whole set, while the alternative-friendly abstraction pointwisely applies the predicate abstraction to each member of the set.[1]

(32) a. 'Näive' abstraction
$\lambda x.[\![\phi]\!]^{g[i\to x]}$: $\langle e,\alpha\rangle/t$
λ_i $[\![\phi]\!]^g$: α/t

b. Alternative-friendly abstraction
$\{f_{\langle e,\alpha\rangle} \mid \forall x_e.f(x) \in [\![\phi]\!]^{g[i\to x]}\}$: $\langle e,\alpha\rangle/t$
λ_i $[\![\phi]\!]^g$: α/t

Following the composition of *wh*-questions that have been presented in the last section, the *wh*-containing IP in Figure 1 denotes a set of propositions as in (33a). When the CT operator is applied, the topic abstraction rule is motivated. The result is visualized in (33b)-(33c). Then, combining the focused phrase *Dufu* with the *wh*-containing constituent yields the ordinary and secondary values of TopP, as in (33d)-(33e).

[1] The 'näive' abstraction rule causes a type mismatch problem in Alternative Semantics (Shan 2004; Novel & Romero 2010), hence is discouraged to proliferate freely in Alternative Semantics. In the current proposal, the CT-op can be taken to be a trigger for this special abstraction rule.

(33) a. $[\![\text{IP}]\!]^g = \{\lambda w.\text{drink}_w(g(1),x) \mid x \in [\![what]\!]^g\}$
b. $[\![ne\text{-}\lambda_1\ \text{IP}]\!]^g = \lambda y.[\![\text{IP}]\!]^{g[1\to y]} = \lambda y.\{\lambda w.\text{drink}_w(y,x) \mid x \in [\![what]\!]^g\}$
c. $[\![ne\text{-}\lambda_1\ \text{IP}]\!]^{g,h} = \lambda y.[\![\text{IP}]\!]^{g[1\to y],h} = \lambda y.\{\lambda w.\text{drink}_w(y,x) \mid x \in [\![what]\!]^{g,h}\}$
d. $[\![\text{TopP}]\!]^g = \{\lambda w.\text{drink}_w(\text{Dufu},x) \mid x \in [\![what]\!]^g\}$
e. $[\![\text{TopP}]\!]^{g,h} = \{\lambda w.\text{drink}_w(h(1),x) \mid x \in [\![what]\!]^g\}$

From the secondary value of TopP, its focus value can be derived as in (34). Clearly, the focus value is a set of sets of propositions, i.e., a set of questions. In the given context, i.e., the dialogue (20), the contextual alternative to Dufu should be Libai. Hence, the set can simply be presented as {*what did Libai drink, what did Dufu drink*}. It is noted that this result also perfectly matches the CT value defined by Büring (2003).[2]

(34) $[\![\text{TopP}]\!]^f = \{[\![\text{TopP}]\!]^{g,h} \mid h \in H\}$
$= \{\{\lambda w.\text{drink}_w(h(1),x) \mid x \in [\![what]\!]^g\} \mid h \in H\}$

Under the focus semantics introduced in section 4.1, this focus value must be evaluated by the $\sim$ operator. In particular, the $\sim$ operator requires that its contextual restriction be a subset or a member of the focus value. Recall that in the dialogue (20), the fragment question is preceded by another *wh*-question, i.e., (20a). The $\sim$ operator can take this question as its restriction and it is indeed a member of the focus value. Thus, the requirement of the $\sim$ operator is satisfied. Now, Rooth's (1992a) focus condition of ellipsis is simultaneously met: the fragment question takes the *wh*-question as its antecedent, and the latter is an element of the former's focus value. Therefore, the deletion at PF is licensed.

5. Fragment questions with implicit antecedent questions

In the proposed analysis, antecedent questions play a significant role in licensing the syntactic ellipsis in fragment questions. However, fragment questions are not always anteceded by another question, as in (18). The following example shows the same point.

(35) a. Libai he-le kafei.
Libai drink-Asp coffee
'Libai drank coffee.'

b. Na, **Dufu** ne?
then Dufu NE
'What about Dufu?'

This fragment question can receive different answers, including the following ones:

[2]The compositional process presented in this section basically follows Constant (2014), but there is a non-trivial difference. Constant (2014) adopts Beck's (2006) semantics of *wh*-questions, which assumes that *wh*-phrases only have focus values, which denote sets of alternatives, and lack ordinary values. Consequently, the semantic composition of *wh*-questions follows the focus semantics. Although Beck's approach is compatible with the semantics of CT, it is confronted with a problem when focus intervention in Mandarin is considered (Yang 2012; Li 2013). Li & Law (2014), based on Hamblin semantics, propose a novel analysis for focus intervention, which not only avoids the problem in Beck's approach but also make more attested predictions. Thus, I suggest that Hamblin semantics is more appropriate to analyze *wh*-questions in Mandarin, and make use of it in my analysis.

(36) a. Ta he-le cha.
he drink-Asp tea
'He drank tea.'

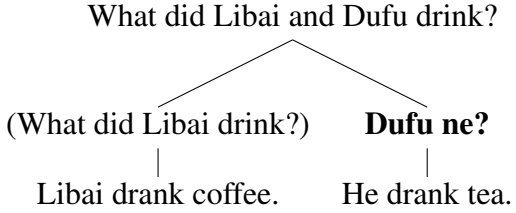
b. Ta mei he.
he not drink
'He didn't.'

c. Ta chi-le dangao.
he eat-Asp cake
'He ate cake.'

We know from the last section that fragment questions must be interpretively parallel to their antecedent questions. Without antecedent questions, it becomes puzzling why a fragment question can be well-formed and still shows interpretive ambiguities. I propose that the puzzle can be straightforwardly resolved by positing implicit antecedent questions, which have been already argued to be necessary by Büring (2003) for understanding CTs in the framework of questions under discussion (QUD).

Depending on the type of the implicit antecedent question, the fragment question in (35) can be understood as different questions. When the implicit question is understood as 'what did Libai and Dufu drink?', the discourse can be represented in the following discourse tree. A felicitous answer to this fragment question is (36a). Of course, when the big question and the implicit antecedent questions differ, the same fragment question can take on a different interpretation and admit a different felicitous answer, one that may resemble (36b) or (36c). Note that implicit questions, are nothing novel, as they have been defended by many authors (Kuppevelt 1996; Roberts 2012; Biezma & Rawlins 2012; a.o.).

(37)



6. Conclusion

This paper conerns a kind of ellipsis in questions, i.e., eliding constituents containing questions items without eliding the respective Q-ops. Although this kind of ellipsis is traditionally considered impossible, the current study shows that it is not only empirically attested in Mandarin fragment questions, but also theoretically supported by the studies on CTs and Rooth's focus condition of ellipsis. Since CTs have been argued to exist in a few other languages, such as Japanese (Tomioka 2010; Constant 2014) and English (Büring 2003, Constant 2014), it should be clarified in future studies whether these languages also exhibit fragment questions.

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