The two sides of Wh-indeterminates in Mandarin : a prosodic and processing account

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Chapter 4 On the Role of *Diǎnr* in Licensing Mandarin *Wh*-existentials

4.1 Introduction

As we have seen in previous chapters, Mandarin *wh*-words (e.g. *shénme*) can have existential interpretation ('something'), subject to licensing (Huang, 1982; Cheng, 1991; Li, 1992; Lin, 1998, Lin, Weerman & Zeijlstra, 2014). Many of the examples of *wh*-declaratives with *wh*-existentials we introduced also contain the word *diǎnr* 'a little', which is considered to be a determiner with existential quantificational force (Tsai, 2010). In this chapter, we are particularly interested in the licensing of the existential reading of the *wh*-word *shénme* ('something') and the role of *diǎnr* as a potential licensor of *wh*-existentials.

The existential reading of *shénme* has been shown to be licensed by nonveridical contexts. For example, environments containing nonveridical operators like negation, questions, conditionals and epistemic modalities (see Li, 1992; Lin, 1998; Huang, 2017, for details). The definition of (non)veridicality is given in (1).

(1) (Non)veridicality for propositional operators:
A propositional operator F is veridical, iff Fp entails p: Fp ⊨ p; otherwise F is nonveridical.

[Zwarts, 1995]

Essentially, contexts exhibiting nonveridicality are normally contexts where the truth of a proposition cannot be entailed. As illustrated below, none of the examples in (2) entail the truth of 'Zhang San buys something.'

(2) a. 张三 没有 买 什么。 [negation]
Zhāng Sān méiyǒu mǎi shénme.
Zhang San didn't buy SHENME
'Zhang San didn't buy anything.'

b. 张三 买了 什么 吗? [yes-no question]
Zhāng Sān mǎi-le shénme ma?
Zhang San buy-PERF SHENME yes-no particle
'Did Zhang San buy anything?'

c. 如果 张三 买了 什么，别 生气。 [conditionals]
Rúguǒ Zhāng Sān mǎi-le shénme, bié shēngqì.
if Zhang San buy-PERF SHENME don't angry
'If Zhang San buys something, please don't be angry at him.'

d. 在 张三 买 什么 之前， 记得 讲价。 [before-clause]
Zài Zhāng Sān mǎi shénme zhīqián, jìdé jiǎngjià.
at Zhang San buy SHENME before remember bargain
'Remember to bargain about price before Zhang San buys something.'

e. 可能 张三 要去 买 什么。 [epistemic modality]
Kěnéng Zhāng Sān yàoqù mǎi shénme.
possibly Zhang San go buy SHENME
'Possibly, Zhang San goes to buy something. '

All the above contexts exhibit nonveridicality and they can license the existential reading of *wh*-words. Furthermore, it is noticed that some types of nonveridical contexts (i.e. some future environments, see Lin, 1998 for details) cannot license the existential reading of *wh*-words unless the *wh*-word is preceded by *diǎnr* 'a little' or by the classifier *gè*. *Diǎnr* has a meaning of small quantity, according to *Xiàndài hànyǔ cídiǎn* (Contemporary Chinese Dictionary, 2005: p 304). *Gè* is a "general" classifier usually used with nouns without a specific classifier; in some conditions, it can also be used with nouns that typically appear with a specific classifier (see *Xiàndài hànyǔ cídiǎn* (Contemporary Chinese Dictionary), 2005: p 462). As illustrated in (3a), the sentence without *diǎnr/gè* is interpreted as a *wh*-question (*wh*-word licensed by (Q) by default) but the declarative reading is not easily available, whereas adding *diǎnr/gè* in (3b) makes both the interrogative and the existential interpretations available.

(3) a. 张三 打算 买 什么 [future]
Zhāng Sān dǎsuàn mǎi shénme
Zhang San plan buy SHENME
i. 'What does Zhang San plan to buy?' (*wh*-question)
ii. * 'Zhang San plans to buy something.' (*wh*-declarative)

b. 张三 打算 买 点儿/个 什么 [future]
Zhāng Sān dǎsuàn mǎi diǎnr/gè shénme
Zhang San plan buy a.little/CL SHENME
i. 'What does Zhang San plan to buy (a little)?' (*wh*-question)
ii. 'Zhang San plans to buy (a little) something.' (*wh*-declarative)

The contrast between (3a) and (3b) illustrates that some nonveridical contexts (i.e. future environments) still require *diǎnr* or *gè* in order to license existential readings of *wh*-words. On the other hand, is it possible that veridical contexts with the presence of *diǎnr* or *gè* can also allow the licensing of the existential readings of *wh*-words? Previous studies (Xie, 2007; Lin et al., 2014; Huang, 2017, among others) claim that the answer is no as they emphasize that *wh*-existentials are restricted to nonveridical contexts only. Nonetheless, we notice that there are also contexts which are veridical but still can allow the existential interpretation of *wh*-words and their default interrogative interpretation is still available. An example of such context is example (4), which contains veridical sentences with *wh*-words preceded by *diǎnr* or

gè and is ambiguous between interrogative and declarative interpretations. When *shénme* is interpreted as an interrogative, the clauses are information-seeking questions. On the other hand, when *shénme* is interpreted as an existential, the clauses are declarative sentences.

(4) a. 张三 昨天 买了 点儿 什么
Zhāng Sān zuótiān mǎi-le diǎnr shénme
Zhang San yesterday buy-PERF a.little SHENME
i. 'What did Zhang San buy a little of yesterday?' (*wh*-question)
ii. 'Zhang San bought a little of something yesterday.' (*wh*-declarative)

b. 张三 昨天 买了 个 什么
Zhāng Sān zuótiān mǎi-le gè shénme
Zhang San yesterday buy-PERF CL SHENME
i. 'What did Zhang San buy yesterday?' (*wh*-question)
ii. 'Zhang San bought something yesterday.' (*wh*-declarative)

The availability of both interpretations for the sentences in (4) seems to indicate that the existential reading of *wh*-words can also be licensed in veridical contexts, countering previous proposals on the licensing conditions of *wh*-existentials (Lin, 1998; Xie, 2007; Lin et al., 2014; Huang, 2017). Also, the role of *diănr* or *gè* in the licensing of *wh*-existentials in some nonveridical contexts as in (3) and in veridical contexts as in (4) poses the question of how *diănr* or *gè* can function to license the existential reading of *wh*-words. We mainly focus on *wh*-declaratives containing *diănr* in the present study. To answer the above question, we first review the studies which discuss *wh*-declaratives containing *diănr* (section 4.2); then we confirm that *wh*-existential reading is indeed licensed by *diănr* through a reading study (section 4.3) and through an audio-gating experiment (section 4.4); finally we discuss the licensing environments of *diănr* on *wh*-existentials in Mandarin (section 4.5).

4.2 What is *diănr* and discussions about effects of *diănr* on *wh*-existentials

Before we discuss the effect of *diănr* on *wh*-existentials, we first introduce the basic meaning and usage of *diănr*. *Diănr*, also used as *yi-diănr* [16], modifies the noun phrase following it. As illustrated in example (5), (*yi*)-*diănr* denotes the meaning of 'a small quantity' and modifies the noun phrase 'gold'.

(5) 张三 昨天 买了 (一)点儿 金子
Zhāng Sān zuótiān mǎi-le (*yi*)-diănr jīnzi
Zhang San yesterday buy-PERF one-a.little gold
'Zhang San bought a little bit of gold yesterday.'

[16] *Yi* has a literal meaning of 'one'. The presence of *yi* is optional and both *diănr* and *yi-diănr* have the interpretation of 'a little'.

In the above example, the noun modified by (*yi*)-*diănr* is a mass noun. Iljic (1994) and Lü (1999) claim that (*yi*)-*diănr* is usually used with mass or abstract nouns, while Zhang (2013) claims that (*yi*)-*diănr* has little selection restriction on its noun phrase and can also be used to modify a countable noun under some conditions, resulting in the interpretation of 'a few'. We are not particularly interested in under what conditions (*yi*)-*diănr* can also be used to modify a countable noun. Instead, what we are concerned with is the meaning of 'a small quantity' that (*yi*)-*diănr* denotes when it modifies a noun phrase.

From a different perspective, Shih (1997) and Chen (2000) describe *diănr* as a bound morpheme that cliticizes obligatorily leftwards. When *yi* is used in *yi-diănr*, *diănr* cliticizes to *yi* prosodically. On the other hand, when *yi* does not appear as in examples (3b) and (4a), *diănr* cliticizes leftwards onto the verb-(PERF) prosodically, although syntactically it belongs to the DP phrase.

In addition to modifying the ordinary noun phrase and denoting the meaning of 'a small quantity', *diănr* can also be used with a *wh*-word, be it a *wh*-interrogative as in (6a) or a *wh*-existential as in (6b).

(6) 张三 昨天 买了 点儿 什么
Zhāng Sān zuótiān mǎi-le diănr shénme
Zhang San yesterday buy-PERF a.little SHENME
a. 'What did Zhang San buy a little of yesterday?' (*wh*-question)
b. 'Zhang San bought a little bit of something yesterday.' (*wh*-declarative)

When *diănr* is used with a *wh*-word as in (6), the mass noun and countable noun distinction does not play a role any more, as no matter it is milk or two books that Zhang San bought, the *wh*-question and *wh*-declarative in (6) are always valid. It is worth noting that the above examples in (6) will be infelicitous if the speaker already knows that the stuff bought by Zhang San is something big in quantity/value/significance. This meaning of 'small in value/significance' is not obtained when *diănr* is modifying a non-*wh* noun phrase, as in *(yi)-diănr jīnzi* ('a little bit of gold', which is valuable). Only in combination with a *wh*-word is the meaning of 'small in value/significance' triggered in addition to 'small in quantity'. It remains to be investigated why this extra meaning of 'small in value/significance' is obtained when *diănr* is used with a *wh*-word. Summarizing briefly, *diănr* is a quantification-denoting expression that denotes the meaning of 'small in quantity' when used with an ordinary noun phrase and a *wh*-word; it adds the qualification of 'small in value/significance' when used with a *wh*-word. Also, *diănr* cliticizes leftwards onto the verb-(PERF) when *yì* is not used.

Consider now the contribution of *diănr* in *wh*-existential interpretation, regardless of whether we are dealing with a veridical or a nonveridical context. It is worth noting that Tsai (2010) analyzes *diănr* as an element with existential quantificational force. Also, Zhang (2013) describes that *diănr* functions as an existential quantifier. In other words, they both consider *diănr* to be the one providing existential force to the *wh*-word, and therefore licensing the *wh*-existential interpretation.

With respect to *diǎnr*'s licensing of *wh*-existential interpretation, as *diǎnr* 'a little' can be used together with the numeral *yì* 'one' optionally, a natural question arises: since *yìdiǎnr* denotes the meaning of 'a little', is it possible that *diǎnr* in Mandarin has the negative interpretation 'little' when *yì* is not present, so that the negative environment licenses the *wh*-existential as in a normal nonveridical context? We think that the answer is no: *diǎnr* has the same interpretation as *yìdiǎnr*, interpreted as 'a little' as *yì* in *yìdiǎnr* can be optionally present. *Diǎnr* is not a negative expression that introduces a nonveridical context such as *little* in English, *weinig* in Dutch, *wenig* in German or *peu* in French. We can illustrate the different interpretations of Mandarin *diǎnr* and French *peu* utilizing a test example proposed by Ducrot (1972: 193).

(7) a. Il semble devenir sobre: il a bu peu de vin hier.
he seems become sober he has drunk little of wine yesterday
'He is sober: he has drunk little wine yesterday.'

b. Il semble devenir moins sobre: *il a bu peu de vin hier.
he seems become less sober he has drunk little of wine yesterday
*'He is not sober: he has drunk little wine yesterday.'

[Ducrot, 1972]

(8) a. 他 似乎 很 清醒： *他 昨天 喝了 点儿 酒。
Tā sìhū hěn qīngxǐng: *tā zuótiān hē-le diǎnr jiǔ.
he seem very sober: he yesterday drink-PERF a.little wine
*'He is sober: he drank a little wine yesterday.'

b. 他 似乎 不太 清醒： 他 昨天 喝了 点儿 酒。
Tā sìhū bútài qīngxǐng: tā zuótiān hē-le diǎnr jiǔ.
he seem not sober: he yesterday drink-PERF a.little wine
'He is not very sober: he drank a little wine yesterday.'

As illustrated in (7), French *peu* is a negative expression and therefore the sequence of statements in (7a) is felicitous, while (7b) is not. In contrast, in the case of Mandarin *diǎnr*, (8b) is falicitous while (8a) is not, since *diǎnr* only has the positive interpretation 'a little'. Based on this, we can ascertain that *diǎnr* is not a negative expression and hence the licensing of *wh*-existentials in (4a) or (6b) with *diǎnr* cannot be accounted for by assuming any type of nonveridicality, as the sentence in (4a) or (6b) is simply a veridical context.

Besides the investigation of *diǎnr* itself, there are a limited number of studies on *wh*-indeterminates that discuss the role of *diǎnr*. Nevertheless, they either only notice the mysterious role of *diǎnr* without giving an account (Lin, 1998), or propose that classifiers provide existential force for the *wh*-words but excluding veridical cases like (4a) or (6b) (Huang, 2017). Below we discuss these studies in detail.

Lin (1998) generalizes three groups of environments/contexts that license the existential interpretation of *wh*-words: group A, consisting of Negation, questions

and *if*-clauses (our example (2a-c) belong to this group); group B, corresponding to epistemic modality contexts (example (2e) belongs to this group); and group C, some sort of "future" environments (example (3) belongs to this group). The three groups of contexts classified by Lin (1998) are all nonveridical. According to Lin, the three groups of contexts in his study decrease in their strength for licensing polarity *wh*-words[17] while the need for a classifier like *diǎnr*[18] (or *gè*) increases. For example, Lin (1998: 222) summarizes that in group B adding *diǎnr* (or *gè*) "may (sometimes) increase naturalness but this is not essential"; but in group C *diǎnr* (or *gè*) seems to be generally required for the licensing of the existential reading, similar to our observation in example (3).

Lin (1998) notices the role of *diǎnr* (or *gè*) and finds that *diǎnr* (or *gè*) increases the naturalness of the *wh*-existential reading when the context strength for licensing the *wh*-existential is decreasing. As the licensing contexts listed in Lin (1998) (negation, question, if-clause, epistemic modality and future environment) can be understood as licensors, Lin's observation can be further generalized as the following: as the licensors' licensing strength decreases, the necessity of *diǎnr* (or *gè*) increases in the licensing of the existential reading of *wh*-words. However, Lin (1998) only briefly introduces the naturalness that *diǎnr* (or *gè*) brings about in context group B and C without discussing how *diǎnr* (or *gè*) helps in the licensing of *wh*-existentials. Furthermore, all the contexts discussed by Lin (1998) are restricted to nonveridical contexts only and the possibility that *wh*-existentials can be licensed in veridical contexts containing *diǎnr* (or *gè*) as in (4) was not considered.

A more recent study is Huang (2017), who systematically investigates the role of classifiers[19] like *gè* or *diǎnr* in licensing the *wh*-existential reading in Mandarin. First, he proposes that Mandarin *wh*-words require two ingredients to be existential, nonveridicality (Zwarts, 1995; Xie, 2007; Lin et al, 2014) and an existential closure (∃) (Kratzer & Shimoyama, 2002) that applies higher than vP. The existential closure provides the existential force to the *wh*-word when the existential closure is in the scope of the nonveridical operator. Furthermore, Huang proposes that existential closure can only apply higher than vP; if the nonveridical operator in the sentence is not higher than vP, the existential closure is hence not in the scope of the nonveridical operator and accordingly the existential closure cannot provide the existential force to the *wh*-word. In this case, classifiers like *diǎnr* or *gè* play the role of providing existential force to the *wh*-word. Take the *wh*-existential reading in (9a,b) as an example. (9a) has an epistemic modal word *hǎoxiàng* (roughly translated as 'seem') while (9b) has a deontic modal[20] word *yīnggāi* 'should'. Both sentences satisfy the nonveridicality condition but the crucial difference is that the two modals/nonveridical operators have different syntactic positions, which affect the application of existential closure. (9a) is grammatical without a classifier

[17] *Wh*-words in Mandarin behave like negative polarity items, as stated in Cheng (1991, 1994), among others.

[18] Both Lin (1998) and Huang (2017) describe *diǎnr* as a classifier, although Tsai (2010) holds a different opinion, as introduced in the beginning of section 2.

[19] See reference 6.

[20] According to Lin (1998) and Huang (2017), sentences with deontic modality can be grouped into future environments.

because the epistemic modal which licenses the *wh*-existential is generated above vP and hence in the scope of the epistemic modal there is applicable existential closure. (9b) is ungrammatical without a classifier like *diǎnr* or *gè* because the deontic modal is generated lower than vP and hence has a scope lower than vP; the existential closure that applies higher than vP therefore falls outside the scope the deontic modal, but the sentence can be rescued by adding *diǎnr* or *gè*, which plays the role of providing existential force to the *wh*-word.

(9) a. 张三 好像 吃了 什么。
Zhāng Sān hǎoxiàng chī-le shénme.
Zhang San seem eat-PERF something
'It seems that Zhang San ate something.'

b. 张三 应该 吃了*(点儿) 什么
Zhāng Sān yīnggāi chī *(diǎnr) shénme.
Zhang San should eat a.little something
'Zhang San should eat something.'

[Huang, 2017]

To our knowledge, Huang's study is the first one that gives an analysis on why licensing *wh*-existentials sometimes needs classifiers like *gè* or *diǎnr* while sometimes not. We agree with Huang that *diǎnr* or *gè* provides existential force for the *wh*-word, but there are a couple of issues in Huang's analysis that require further investigations.

The first issue concerns *diǎnr* as a classifier (in accounts such as Huang, 2017). According to Cheng and Sybesma (1999), which follows Allan (1977), Tai and Wang (1990) and Tai (1992), Mandarin classifiers can be roughly divided into two types, (a) classifiers which combine with count-nouns, denoting some inherent and permanent properties of the object/noun (e.g., *yì-běn shū* [one-CL book] 'a book'), and (b) classifiers that create a unit of measure indicating temporary states of the object/noun, giving a quantifying description of the object (e.g., *yì-píng shuǐ* [one-CL water] 'a bottle of water'). Clearly, *diǎnr* does not denote any inherent and permanent properties of an object like the first type of classifiers. Similar to the latter type of classifiers, *diǎnr* does denote the quantifying description of the object ('a little') and somehow indicates a temporary state of the object. But as opposed to the latter type of classifiers or any type of classifiers, *diǎnr* has a different syntactic distribution. For instance, quantifiers and numerals can co-occur with classifiers, as in *hěnduō píng shuǐ* [many-CL water] 'many bottles of water' and *wǔ-píng shuǐ* [five-CL water] 'five bottles of water', but they cannot co-occur with *diǎnr*, as **hěnduō diǎnr shuǐ* (many DIANR water) and **wǔ-diǎnr shuǐ* (five-DIANR water) are not grammatical. Hence *diǎnr* cannot be considered as a standard type of classifier.

The second issue, which is a key issue, concerns the nonveridicality. According to Huang (2017), nonveridicality is always needed in licensing the *wh*-existential. Only in cases when a nonveridical operator has a syntactic position that is not above vP and hence the existential closure is not available, does *gè* or *diǎnr* start to play a role of existential closure. This line of analysis proposed by Huang (2017) rules out

the non-interrogative readings in a veridical context as in (4) or (6b), contrary to our observation.

In short, it is evident that *diǎnr* is connected to the licensing of *wh*-existentials in addition to 'nonveridicality' by providing existential force for the *wh*-word; nevertheless, previous studies either neglect (Lin, 1998) or deny (Huang, 2017) the possibility that *wh*-existentials can be licensed in veridical contexts containing *diǎnr* as in (4) and (6). As we can see, all the claims so far about whether *wh*-declaratives can be licensed by *diǎnr* in veridical contexts is based on observations. Opting for empirical support, we conduct two empirical studies, a sentence reading study on *wh*-sentences containing *diǎnr* and an audio-gating study on *wh*-sentences containing *diǎnr* respectively.

4.3 A reading study testifying the two interpretations

4.3.1 Participants

Eighty-four native speakers of Beijing Mandarin (53 females and 31 males, $\bar{x}$ age = 20 years old) participated in this study and were reimbursed for their participation. All of them came from the northern part of Mainland China and were students at Tsinghua University. Prior to testing informed written consent was obtained from each participant.

4.3.2 Experimental materials

We created a total of 40 stimuli. Half of the stimuli were the control stimuli that could be interpreted only as *wh*-questions, which involve typical veridical contexts, as in (10b). The other half of the stimuli were target stimuli with the *wh*-word preceded by *diǎnr*, which also involve veridical contexts, see (10a). As shown in (10), target and control stimuli were string identical except for the licensor *diǎnr* 'a little', which was present in the target stimuli but absent in the control.

(10) a. Target stimuli

冯涛	昨天	做了	点儿	什么	给	王英
FéngTāo	zúotiān	zùo-le	diǎnr	shénme	gěi	WángYīng
FengTao	yesterday	make-PERF	a.little	SHENME	for	WangYing

'What did FengTao make for WangYing yesterday?' (*wh*-question)
or 'FengTao yesterday made a little something for WangYing.' (*wh*-declarative)

b. Control stimuli

冯涛	昨天	做了	什么	给	王英
FéngTāo	zúotiān	zùo-le	shénme	gěi	WángYīng
FengTao	yesterday	make-PERF	what	for	WangYing

'What did FengTao make for WangYing yesterday?'

Target and control stimuli were intermingled with 120 fillers. The fillers consisted of 20 yes-no questions with *ma* "yes-no particle", 20 A-not-A questions (a type of

yes-no question in Mandarin) and 80 declaratives. All stimuli lacked punctuation and were randomized for each participant.

4.3.3 Procedure

Participants were tested individually in a quiet room in Tsinghua University in Beijing. The whole experiment lasted about 15 minutes. The participants' task was to read silently the stimulus on screen, and to choose one of the two punctuation marks (i. question mark (?) or ii. full stop (。)) to complete the sentence. The experiment was organized as a semi-self-paced procedure and participants were under time pressure (maximum of 5 seconds for reading silently the stimulus, and maximum of 5 seconds for indicating their response). In particular, the procedure was as follows. First, the stimulus appeared on the computer screen, and participants had a maximum of 5 seconds to read it silently. After participants read the stimulus, they press the space bar and move to the next screen to indicate their response. If participants exceeded the 5 seconds time limit, the next screen appeared automatically. This next screen showed two punctuation marks, namely, a question mark (?) and a full stop (。) and participants had again 5 seconds to indicate their response. If participants exceeded the time limit of 5 seconds, the next stimulus appeared automatically on screen. The question mark and the full stop were counter-balanced on screen to avoid any left or right preference by participants. The experiment was conducted with the experimental software E-prime 2.0 (Psychology Software Tools).

4.3.4 Statistical analysis and results

We first inspected the data for missing responses; we had a total of 10 missing responses (7 for target stimuli and 3 for control stimuli). We obtained a total of 3350 responses (1673 responses for target stimuli and 1677 responses for control stimuli). These responses were analyzed statistically. We also examined participants' stimuli reading time and response time respectively.

Response. As illustrated in Figure 1, participants interpreted the control stimuli (*wh*-sentences without *diănr*) as questions 93.1% of the time. When inspecting participants' responses to the target stimuli (*wh*-sentences with *diănr*), we see a more balanced response distribution; participants interpreted *wh*-sentences with *diănr* as questions 59.7% of the time, while they interpreted them as declaratives 40.3% of the time. The chi-square analysis showed that there was a significant association between the stimulus type (target or control) and the participants' responses, $x^2 = 518.91$ (1), $p < 0.001$.

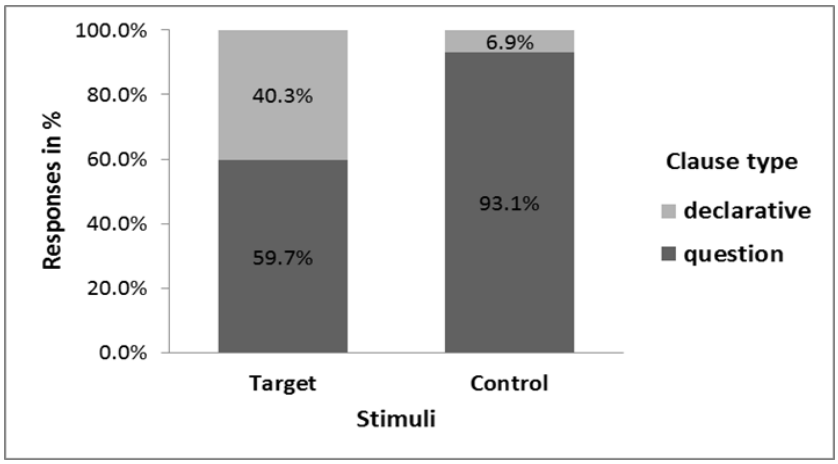

Figure 1. Participants' responses in percentage (%) in the reading study

We also ran a logistic regression analysis in R to investigate whether participants' responses can be predicted on the basis of the stimulus' type by using the stimulus' type (control or target) as an independent variable and participants' responses as a dependent variable. A test of the full model against a constant only model was statistically significant, as shown by the results presented in Table 1, indicating that stimulus' type (control or target) is a reliable predictor for participants' response as in (10a) and (10b).

Table 1. Logistic regression of stimulus' type (Target/Control) on participants' response of the clause type.

		95% CI for Odds Ratio		
	B (*SE*)	Lower	Odds Ratio	Upper
Constant	0.39(0.05)			
Stimulus' Type	2.21*(0.11)	7.36	9.10	11.26

Note: *$p < 0.001$.

Stimuli reading time and response time. We also inspected the time participants needed to read the stimuli and to indicate the clause type. As shown in Figures 2 and 3, participants spent more time reading the target stimuli ($\bar{x}$ = 2364.5ms) and indicating their responses ($\bar{x}$ = 559.7ms) than the control stimuli ($\bar{x}$ = 2024.1ms for the reading time; $\bar{x}$ = 445.7ms for the response time).

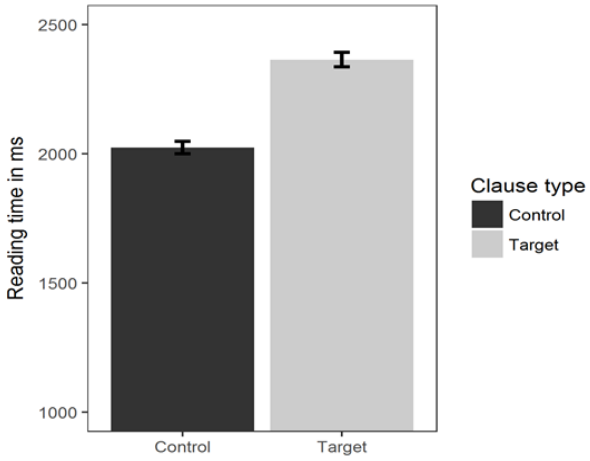

Figure 2. Participants' stimuli reading time with error bars showing standard errors

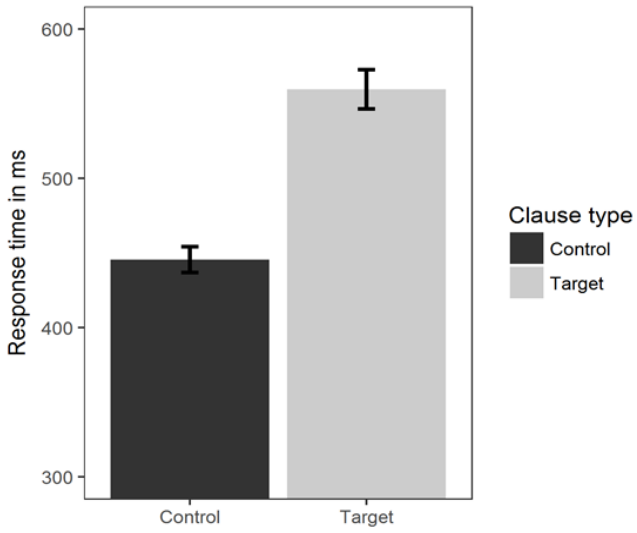

Figure 3. Participants' response time in indicating the clause types with error bars showing standard errors

The paired sample T-test in R showed significant differences between the target and control stimuli in both stimuli reading time and response time. The time participants spent in reading target stimuli is significantly longer than that in control stimuli, t (83) = 8.20, $p < 0.001$. Also, the time participants spent in indicating the clause type is significantly longer in target stimuli than that in control stimuli, t (83) = 6.28, $p < 0.001$. The results revealed that it is less straightforward to interpret a *wh*-sentence with *diǎnr* and more difficult to identify its clause type due to its ambiguity, as

compared with the control stimuli. The longer reading and response time offers another piece of evidence that *wh*-sentences with *diănr* are ambiguous between *wh*-questions and *wh*-declaratives.

Taken together, the results show that in the absence of *diănr*, the control stimuli with a *wh*-word are interpreted dominantly as *wh*-questions; in the presence of *diănr*, participants' response pattern (59.7% as questions and 40.3% as declaratives), as well as the longer stimuli reading time and response time as opposed to *wh*-sentences without *diănr* confirm that a *wh*-sentence containing *diănr* is indeed ambiguous between a declarative and a *wh*-question interpretation. This offers us empirical evidence that even if sentences like (4a) and (10a) do not conform to nonveridicality, *diănr* still can license the *wh*-existential reading, rejecting the analysis in Huang (2017) on empirical grounds.

4.4 An audio-gating study investigating the licensing of *diănr* on *wh*-declaratives

As shown from the above reading study, *wh*-words preceded by *diănr* as in (4a) and (10a) can have *wh*-existential interpretations, although they appear in a veridical context. As we mentioned above, although *diănr* is modifying the noun phrase following it and syntactically it belongs to the DP, *diănr* cliticizes obligatorily leftwards onto the verb-(perf) as in example (4a) and (10a), forming a verb-*diănr* prosodic clitic group (Shih, 1997; Chen, 2000). The question thus arises whether verb-*diănr* is required as a prosodic clitic group in licensing the *wh*-existential. To be specific, we want to investigate whether the licensing of *wh*-existentials is affected if we break this clitic group into different domains.

The answer to this question can be sought from an audio-gating paradigm we have used in Chapter 3, in which the audio recordings of *wh*-questions with *diănr* and *wh*-declaratives with *diănr* like (10a) were generated into different audio fragments for participants to listen to and to anticipate the upcoming clause type (i.e. a *wh*-question containing a question word or a *wh*-declarative containing a *wh*-existential). In this study, we had four types of audio fragments that were presented in four gates[21]. In addition to the three gates reported in Chapter 3, namely Gate *a* (subject), Gate *b* (subject and adverb) and Gate *d* (subject, adverb, verb plus *le* and *diănr*), audio fragments in Gate *c* consisted of subject, adverb, verb plus *le*. As already introduced in Chapter 3, the remaining sentence parts of each gate were shown on the screen as corresponding sentence continuations for listeners to choose from based on their anticipation. As shown in Chapter 3, listeners can anticipate the clause type incrementally in the sense that the more information/the longer audio fragments they hear, the more accurate their anticipation is. Given this, the clause type anticipation accuracy is expected to increase from gate *a* to gate *d* for both clause types, if verb-*diănr* is not required as a clitic group in licensing the *wh*-existential.

On the other hand, if verb-*diănr* is required as a clitic group in licensing the *wh*-existential, the anticipation of clause types might be affected. In gate *a* and *b* where

[21] In chapter 3, we report the results of 3 gates (gate *a*, *b* and *d*) for the investigation of clause type anticipation.

diănr co-occurs with the verb in the sentence continuations on the screen and in gate *d* where *diănr* co-occurs with the verb in the audio-fragment, verb-*diănr* can still be perceived as one unit/clitic group without being separated apart. The critical gate is gate *c*, in which *diănr* and the verb are separated, with the verb showing up in the audios and *diănr* in the sentence continuations on the screen. If verb-*diănr* is indeed required as a clitic group in the licensing of *wh*-existentials, our hypothesis is as follows. Different from the incremental clause type anticipation accuracy (for both *wh*-questions and *wh*-declaratives) from gate *a* to gate *b* and to gate *d*, listeners' anticipation accuracy for *wh*-declaratives in gate *c* would be affected (namely, less accurate than the other three gates), as in this gate *diănr* is separated from the verb. The details will be reported below.

4.4.1 Participants

See 3.3.1 in Chapter 3 for the details.

4.4.2 Acoustic stimuli

As introduced in 3.3.2 in Chapter 3, we have 40 stimuli (20 items × 2 clause types) that were used to generate audio fragments. Example (11) illustrates an item set.

(11) a. 陶薇 昨天 拿了 点儿 什么 给 刘刚? [*wh*-Q]
TáoWēi zúotiān ná-le diănr shénme gěi LíuGāng?
TaoWei yesterday bring-PERF a.little what for LiuGang
'What did TaoWei bring (a little) for LiuGang yesterday?'

b. 陶薇 昨天 拿了 点儿 什么 给 刘刚。 [*wh*-D]
TáoWēi zúotiān ná-le diănr shénme gěi LíuGāng.
TaoWei yesterday bring-PERF a.little something for LiuGang
'TaoWei brought a little something for LiuGang yesterday.'

As already introduced in Chapter 3, the 40 audio stimuli were directly used in our audio-gating experiment for generating gates. Here we only reported the acoustic properties in detail up to *diănr* where the acoustic information of all gates are given.

Duration. As reported in Chapter 3 and briefly mentioned here, the prosodic analysis of the two clause types up to *diănr* revealed that it is mainly duration that differentiates the two clause types before the *wh*-word. Figure 4 depicts the mean word duration in millisecond for *wh*-questions and *wh*-declaratives. As shown in Figure 4, already from the subject, there is a consistent duration difference between the two clause types.

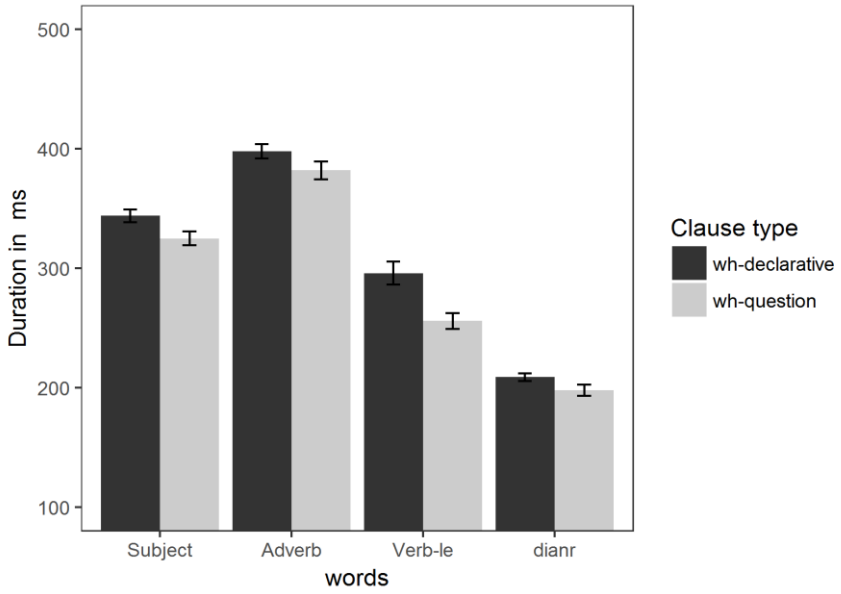

Figure 4. Mean word duration across clause types with error bar showing standard error.

4.4.3 Stimuli for audio-gating experiment

As introduced above, the 40 audio stimuli were used as a basis for generating the four types of audio fragments in the four gates. We also created two kinds of sentence continuations, *wh*-questions and *wh*-declaratives. Examples (12)-(15) showed an example of the audio fragments of the four gates and their corresponding sentence continuations on the screen. As the examples of gate *a*, *b* and *d* were already given in Chapter 3, here we just briefly presented them.

(12) Gate *a* (audio) sentence continuations (visual)
TáoWēi -- zúotiān ná-le diǎnr shénme gěi LíuGāng?
-- zúotiān ná-le diǎnr shénme gěi LíuGāng.

(13) Gate *b* (audio) sentence continuations (visual)
TáoWēi zúotiān -- ná-le diǎnr shénme gěi LíuGāng?
TaoWei yesterday -- ná-le diǎnr shénme gěi LíuGāng.

(14) Gate *c* (audio) sentence continuations (visual)
TáoWēi zúotiān ná-le -- diǎnr shénme gěi LíuGāng?
TaoWei yesterday bring-PERF a.little what for LiuGang
-- diǎnr shénme gěi LíuGāng.
a.little something for LiuGang

(15) Gate *d* (audio) sentence continuations (visual)

TáoWēi zúotiān	ná-le	diǎnr	-- shénme gěi LíuGāng?
TaoWei yesterday	bring-PERF	a little	-- shénme gěi LíuGāng.

This resulted in a total of 40 audio fragments in each gate and 160 in total. The detailed acoustic properties can be found in 4.4.2.

4.4.4 Procedures

See section 3.3.3 in Chapter 3 for the detailed procedure. The audio fragments were presented in four consecutive gates, from gate *a* to gate *d*, to make sure that the information participants heard were incremental. The whole testing time lasted about 25-30 minutes.

4.4.5 Results

The response accuracy for each clause type per gate was presented in Figure 5. As shown in Figure 5 and also reported in Chapter 3, the clause type anticipation accuracy in gate *a*, *b* and *d* demonstrates that listeners can make use of prosody to anticipate clause types and their clause type anticipation accuracy is incremental in the sense that the more information/longer audio fragments listeners hear, the more accurate their anticipation is.

Let us now turn to gate *c*, as this is the gate where *diǎnr* is (prosodically) separated from the verb. As shown in Figure 5, the response pattern of gate *c* differs from all the other three gates. The overall accuracy in *wh*-questions jumped to 73.1%[22] while the accuracy in *wh*-declaratives dropped to chance level 53.5% (lower than than the accuracy of gates *a* and *b*).

[22] As our audio-gating studies are forced choice studies, when participants didn't anticipate the audios to be declaratives (regardless the audios they heard are from *wh*-questions or *wh*-declaratives), they can only choose them to be questions; therefore the accuracy for *wh*-questions increased.

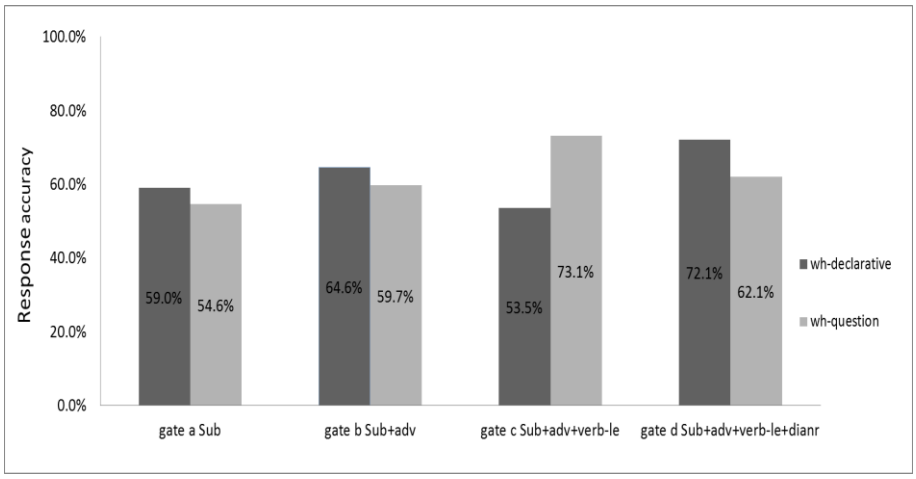

Figure 5. Listener's response in percentage (%) in gate *a*, *b*, *c* and *d*

In summary, the accuracy of the clause type anticipation is incremental as we see from the results of gate *a*, *b* and *d*, where *diănr* co-occurs with the verb in the same domain, either in sentence continuations presented on the screen (gate *a* and *b*) or in audios heard by listeners (gate *d*). When *diănr* was separated from the verb in gate *c*, the anticipation for *wh*-declaratives dropped to the chance level, even lower than the accuracy in gate *a*, in which only the subject is heard by the listeners. The audio-gating results are consistent with our hypothesis that although *diănr* can license the *wh*-existential, verb-*diănr* is required as a clitic group for a legitimate licensing of the *wh*-existential.

4.5 Discussions on the licensing of *diănr* on *wh*-existentials

We started our study from an interesting case, a veridical sentence containing a *wh*-word and *diănr*, which can have both an interrogative reading and a declarative reading. We repeat it here as (16).

(16) 陶薇 昨天 拿了 点儿 什么 给 刘刚
TáoWēi zúotiān ná-le diănr shénme gěi LíuGāng
TaoWei yesterday bring-PERF a.little what for LiuGang
'What did TaoWei bring a little for LiuGang yesterday?' or
'TaoWei brought a little something for LiuGang yesterday.'

Although a sentence such as (16) does not conform to the typical nonveridicality condition (Lin et al., 2014; Huang, 2017), our reading study shows that it has both interrogative (interpreting *shénme* as *wh*-interrogative 'what') and declarative readings (interpreting *shénme* as *wh*-existential 'something'). To our limited knowledge, this study is the first empirical study that investigates the licensing of *wh*-existentials in veridical contexts, confirming that *diănr* can provide the existential force in licensing the *wh*-existential interpretation and at the same time

rejecting the claim that *wh*-existentials can only be licensed in nonveridical contexts. Hence, the licensing environments of *wh*-existentials will be revised and proposed later in (18) based on our findings and the previous analysis of the licensing of *wh*-existentials in nonveridical conditions.

Our audio-gating experiment further demonstrates that although the presence of *diănr* can license the interpretation of a *wh*-existential, the licensing comes with a constraint. In other words, in order to license the *wh*-existential, *diănr* must co-occur with the verb as a prosodic clitic group, while in contrast, the interpretation of a *wh*-interrogative does not have such a requirement.

Taken together, our two empirical studies confirm that *diănr* can license *wh*-existentials, even in veridical contexts, but the licensing has a constraint: *diănr* has to cliticize to the verb prosodically as a clitic group in licensing the *wh*-existential in the VP. Further, these findings not only reject the claim that *wh*-existentials can only be licensed in nonveridical contexts, but also shed light on the puzzle that in the "weak" nonveridical contexts (i.e. future environments as in (3) and (9b)), *diănr* seems to be generally required for the licensing of the *wh*-existential reading. To be specific, we suggest that under these "weak" nonveridical contexts, it is actually *diănr* that is functioning as a licensor for the licensing of the *wh*-existential and that is why the presence of *diănr* becomes necessary.

In the current study, we do not zoom in on the details of the abstract formal semantic discussion on the licensing of *wh*-existentials as Lin (1998) or Huang (2017) did. Based on the above empirical studies and discussions, we aim to shed light on the licensing environments of *wh*-existentials in Mandarin, especially when it is preceded by *diănr*. If a *wh*-word in a sentence can be interpreted as a *wh*-existential, the sentence normally has the following environments:

(18) i. Either the sentence contains a nonveridical operator (negation, questions, conditionals and epistemic modalities) that can license the *wh*-existential.
or ii. When the nonveridical contexts (i.e. containing future environments) are not able to license *wh*-existential or when the sentence is simply veridical, it needs a last resort licensor like *diănr*. *Diănr* provides the existential force in licensing the *wh*-existential in the VP when *diănr* cliticizes to the verb.