

Modal *wh*-indefinites in Mandarin¹

Mingming Liu — *Tsinghua University*

Yu'an Yang — *University of Maryland, College Park*

Abstract. Mandarin *wh*-indefinites have been long been analyzed as Negative Polarity Items (Huang 1982; Cheng 1991; Li 1992; Lin 1998; Xie 2007) that cannot occur in positive sentences. In this paper, we challenge this view by presenting naturally-occurring examples in various positive contexts. We find that in these positive contexts, *wh*-indefinites are usually associated with an “ignorance” or “indifference” inference, similar to modal indefinites like Spanish *algún* and German *irgendein* (Alonso-Ovalle and Méndez-Benito 2010, Aloni and Port 2010). We propose to analyze Mandarin *wh*-indefinites in the alternatives-&-exhaustification framework (contra Giannakidou 2018), where they trigger individual alternatives (contra Chierchia and Liao 2015), and the various inferences arise through the interaction between exhaustification and modals.

Keywords: *wh*-indefinite, modal indefinites, alternatives and exhaustification

1. Introduction

In Mandarin, *wh*-phrases have non-interrogative interpretations (henceforth *wh*-indefinites; see Huang 1982; Li 1992; Cheng 1991; Lin 1996 among many others). As shown in (1), the same sentence with *shenme* “what” can be read as a constituent question, or as a declarative in which *shenme* is interpreted as an existential quantifier.

- (1) Xiaoxiao zhongwu mei chi shenme.
Xiaoxiao lunch NEG eat what
a. “What didn’t Xiaoxiao eat?” *Interrogative*
b. “Xiaoxiao didn’t eat anything for lunch.” *Indefinite*

The traditional view considers *wh*-indefinites to be Negative Polarity Items (NPI, Huang 1982; Cheng 1991; Li 1992; Lin 1998; Xie 2007; Chierchia and Liao 2015; Giannakidou and Lin 2016; Lin et al. 2021 among others) that need to be licensed. For example, in (1), the *wh*-indefinite occurs under negation, a typical licenser for NPIs. The NPI view claims that without negation, the indefinite interpretation in (1) would be unavailable.

In this paper, we present naturally-occurring examples from literary works and natural dialogues (CallFriend Mainland Mandarin Corpus,²) showing that *wh*-indefinites can appear in positive environments (Section 2). Additionally, the interpretation of *wh*-indefinites is similar to that of modal indefinites like Spanish *algún* and German *irgendein* (Alonso-Ovalle and Méndez-Benito 2010; Aloni and Port 2010 among others), as we will see in Section 3. We offer to analyze *wh*-indefinites in the alternatives-&-exhaustification framework (Section 4), as

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²The CallFriend Mainland Mandarin Corpus (MacWhinney and Wagner 2010) contains phone calls from mainland Mandarin speakers.

in Chierchia and Liao (2015) but different from the latter in crucial aspects. We discuss the implication of our observations and analysis, and our plans for future work in Section 5.

2. Mandarin *wh*-indefinite is not an NPI

For over three decades, the received view for *wh*-indefinites is that they behave like Negative Polarity Items (NPI), and are only permissible in certain environments (Huang 1982; Li 1992; Cheng 1991; Lin 1998; Xie 2007; Chierchia and Liao 2015; Giannakidou and Lin 2016 among others): in typical NPI-licensing downward entailing (DE) environments like negation (2), polar question (3), and antecedent of conditionals (4); in epistemic contexts like with modals (5) or non-factive predicates like *renwei* “think” (6); in deontic or future contexts like in imperatives (7) or in the complement of attitude verbs (8) (the following examples are from Lin 1998: p.220-227).

- (2) Wo mei mai shenme dongxi.
I NEG buy what thing
“I didn’t buy anything” *Negation, ex. (1a), p.220*
- (3) Ni ren-bu-renshi shenme da renwu?
you know-NEG-known what big person
“Do you know any famous person or not?” *Polar question, ex. (4), p.221*
- (4) Ruguo ni you shenme haochi de dongxi...
if you have what tasty DE thing
“If you have something good to eat, ...” *Antecedent of conditionals, ex. (2b), p.220*
- (5) Ta yiding/dagai shi bei shenme shi gei dangge-le
he must/probably be by what thing by delay-ASP
“He must/probably have been delayed by something.” *Modals, ex. (12b)*
- (6) Zhangsan yiwei/renwei wo mai-le shenme, (keshi wo genben mei mai renhe
Zhangsan falsely believe/think I buy-ASP what but I at all NEG buy any
dongxi
thing
“Zhangsan thinks that I bought something, but I didn’t buy anything at all.”
Non-factive predicates, ex. (17), p.224
- (7) (Nimen) shei qu bang wo na ge diezi lai
you who go help me take CL plate come
“Somebody go get a plate for me.” *Imperatives, ex. (21a), p.226*
- (8) Wo xiang chi dian shenme dongxi.
I want eat CL what thing
“I want to eat something.” *Verb Complements, ex. (22a), p.226*

One challenge for the NPI view is that While NPIs are usually only licensed in DE contexts, Mandarin *wh*-indefinites, as shown above, can occur in more environments. However, many argue that *wh*-indefinites in fact contribute to an important piece to the puzzle of NPI licensing. For example, in English, *yet* and *any* are both NPIs, but the former is more restricted in distri-

bution than the latter. Mandarin *wh*-indefinites, then, would be on the other side of the scale, imposing a looser restriction on its environments. Lin (1998), for example, proposes that Mandarin *wh*-indefinites are licensed by the Non-Entailment-of-Existence Condition (NEEC). The NEEC states that the use of a *wh*-indefinite is felicitous if and only if the proposition in which the *wh*-indefinite appears does not entail the existence of a referent satisfying the description of the *wh*-indefinite (Lin, 1998: 230). For example, in DE contexts like negation, as in (2), the referent that fits the description of *shenme dongxi* “what thing” does not exist, satisfying the NEEC. In contrast, *wh*-indefinites in positive contexts as in (9) are unacceptable, since the proposition entails the existence of the referent of *shen/shenme ren* “who/what person,” violating the NEEC.

- (9) #Wo xihuan shei/shenme ren
 I like who/what person
 (int) “I like someone.” *Positive Episodic Context*, ex. (38b), p. 231

However, recent discussions suggest that there are cases of *wh*-indefinites in unembedded contexts in naturalistic speech. For example, Chen (2017) notes that when the *wh*-word *shenme* refers to the kind that some individuals fall in, instead of referring to the individuals themselves, the indefinite interpretation is acceptable in positive contexts. For example, in (10), *shenme* refers to the kind of books that Zhangsan bought:

- (10) Zhangsan mai le san ben *shenme* shu
 Zhangsan buy ASP three CL what book
 “Zhangsan bought three books of a certain kind (but I don’t know what kind it is).”
 (Chen, 2017: p. 116), ex. (2)

We find similar examples in the corpus as well:

- (11) Ta xianzai zai yi-ge, nei-ge, chaoxiande yi-ge shenme gongsi limian
 She now at one-CL, that-CL, North Korean one-CL what company LOC
 “She’s working in a, um, some North Korean company.”
 CallFriend, Mainland Mandarin Corpus, File 4689.

In these examples, the *wh*-indefinite does not fit the description of Lin’s generalization: the speaker acknowledges that there exists a North Korean company, so the referent that fits the description of the *wh*-indefinite exists. Yet the *wh*-indefinite is acceptable in this context. Similar to (10), the *wh*-item *shenme* in (11) also takes a kind reading, and triggers an ignorance inference “some company or other, I don’t remember” (see Section 3 for more discussion on the ignorance inference).

It is of course possible to argue that the “kind” reading of *shenme* is special and other *wh*-indefinites still fit the patterns of NPIs (Giannakidou and Lin 2016; Giannakidou 2018; Lin et al. 2021). However, we find other *wh*-words like *na* “which,” *na* “where,” and *shenme shihou* “when” in positive episodic sentences as well:

- (12) Laoyudajie... feixinde cong na-ben shu-shang zhaolai-le zhemeiyixiehua lai
 Laoyudajie... carefully from which-CL book-LOC find-PERF these words to
 anwei ta.
 comfort her

“Laoyudajie went out of her way to find these words from some book (but I don’t know which book) to comfort her.”

Tong Tong, 2006, *Life alone*

- (13) *Context: the protagonist is taken to a market to be sold as a slave. The slaves for sale are marked by sticking a leaf in their hair or clothes.*

Ye youren cha-zhe suibian cong nar balai de yecao...
also some person stick-ASP randomly from where pull POSS weed...

“There are also people marked by weed in their hair, weed that was plucked from somewhere (that does not matter).”

Mo Yan, 1996, *Fengrufeitun*

- (14) *Context: A and B are on a phone call.*

B: Where have you been? Were you guys out?

A: No, we are home the whole time.

B: You guys were home?

A: Yeah.

B: O, Wo shenme shihou gei ni da-guo dianhua, haoxiang shi mei ren.

Oh I what time to you call-ASP phone, seem is NEG person

“Oh, I called you at some point (I don’t remember when), but it seemed like nobody was home.”

CallFriend Mainland Mandarin Corpus, File 4198

In (12), the *wh*-item *na* “which” is not used to refer to a “kind”, but rather an individual book, and yet the *wh*-phrase is interpreted as an indefinite. Similarly in (13) and (14), *nar* “where” *shenme shihou* “when” cannot be considered as referring to kinds. Yet in all these cases, the *wh*-phrases are interpreted as indefinites. These examples show that, *shenme* is not the only *wh*-item with indefinite reading in positive sentences.

Moreover, we also found corpus examples of indefinite *shenme* that does not refer to kinds:

- (15) Keting-li ... Yang Chong you shuo-le ji-ju *shenme*, xiaosheng you
living room-LOC Yang Chong again say-ASP some-CL what laughter again
qi

arise

“In the living room ... Yang Chong said something (that I don’t know) and there are laughs again.”

Wang Shuo, 1988, *Wanzhu*

- (16) Liang-ge chuan qunzi de guniang ... shuo-zhe *shenme* zoukai

Two-CL wear skirts DE girl say-ASP what walk away

“Two girls wearing skirts walked away while talking to each other about something.”

Wang Shuo, 1988, *Wanzhu*

In both (15) and (16), *shenme* simply refers to the things that the agent says, and cannot be interpreted as referring to kinds. These naturally-occurring examples with *shenme* suggest that indefinite *shenme* can be acceptable in positive episodic contexts without referring to kinds. So the good uses of *wh*-indefinites in positive sentences go well beyond a small set of exceptional cases.

Moreover, Xie (2019) and Lin et al. (2014) observe that *wh*-indefinites are acceptable in positive

sentences with progressive aspects, such as in (17) and (18). In these two examples, *shenme* is interpreted as an indefinite but its acceptability violates the NEEC, as the referents fit the description of the two *wh*-phrases, namely “stuff that the agent is drinking” and “TV programs that the agent is watching,” exist.

- (17) Wo jinqu de shihou, ta zhengzai he *shenme*
 I enter DE time s/he PROG drink what
 “When I went in, s/he was drinking something.” Xie, 2019: p.40, ex. (10)

- (18) Ta xianzai zhengzai kan *shenme* dianshiju ne
 s/he now ASP watch what television program SFP
 ‘S/he is now watching a television program.
 Lin et al. (2014), Appendix 1, ex.(11)

Additionally, progressive aspect is not an environment that licenses NPIs, challenging the traditional view that *wh*-indefinites pattern like NPIs. However, both Xie (2019) and Lin et al. (2014) don’t consider such examples to refute the NPI view, and instead modify the licensing environments for NPIs to include progressive aspect.

Although we agree that the progressive positive context supports the indefinite reading, and found corpus examples like (11) in this context, it is not the only positive context that supports the indefinite interpretation. As we have seen in (14), and in (19) below, when the sentence is marked with perfective marker *guo*, a *wh*-indefinite is still acceptable. Besides *guo*, positive sentences marked with the post-verbal marker *le* also allow the indefinite interpretation, as we have seen in (15).

- (19) Context: B and A are talking about someone in B’s church who got a doctor’s license despite being an immigrant.
 A: Ei, Women jiaohui you yi-ge ren ... ta kao-**guo** shenme zhizhao ...
 Ei our church has one-CL person he take exam-ASP what license
 (zhihou) cai qu zuo yisheng
 afterwards CAI go be doctor
 “This reminds me, our church has someone who took an exam to get some license, (and then) went on to be a doctor.” CallFriend Mainland Mandarin Corpus, File 4227, line 494-502

Moreover, we found cases of *wh*-indefinites under factive predicates like (21). According to the NEEC, the indefinite interpretation should not be acceptable under factive predicates, as the complement of these predicates are usually true in the actual world, and therefore entails the existence of the referent of a *wh*-phrase. The verb *faxian* is a factive verb, as shown in (20): it is infelicitous to state that Zhangsan discovers that it’s raining outside when it is not raining outside.

- (20) #Zhangsan faxian waimian xiayule, dan waimian meiyou xiayu
 Zhangsan discover outside rain but outside NEG rain
 (int) “Zhangsan discovers that it is raining, but it’s not.”

And yet the indefinite interpretation of *shenme* is acceptable under this verb:

- (21) Shangke shi, wo **faxian** ganggang buhao de qiang you gei shei ti-huai
 class during I discover just now fixed DE wall again by who kick-break
 le.
 ASP
 “During class, I found out that the wall that had just been fixed was kicked by someone
 (I don’t know who) and broke again.” People’s Daily, 1994

Thus, *wh*-indefinites can be found in positive sentences with progressive or perfective aspect, and even in sentences with factive predicates. Again, if we postulate that progressive is an exception to the no-positive-context rule for *wh*-indefinites, then we have to postulate the same exception for perfective aspects with *guo* and *le* as well as factive verbs. As we include more environments as exceptions, the strength of the theory is undermined. It is therefore more compelling if we abandon the no-positive-context rule.

Finally, Yang (2018) observes that when *wh*-indefinites are modified by classifiers, their acceptability in positive episodic contexts improves. It is therefore tempting to claim that *wh*-indefinites are licensed by classifiers in positive contexts. However, as we have seen in (16), there are cases of *wh*-phrases taking the indefinite interpretation without classifiers. (22) is another such case:

- (22) Ta-de jiao bei *shenme* dongxi ban-le yixia.
 His foot BEI what thing trip-ASP once
 “He got tripped by something” Mo Yan, 1996, *Fengru feitun*

In sum, we find uses of *wh*-indefinite in environments that do not licence NPIs, such as positive contexts, in both the spoken corpus and literary works. We have shown that *shenme* is the only *wh*-item that can occur in positive sentences; progressive aspect is not the only aspect that licenses *wh*-indefinites in positive sentences; the presence of classifiers might help improve the acceptability of *wh*-indefinites in positive sentences, but they are not necessary, since there are cases of indefinite *shenme* without classifiers. The restriction that *wh*-indefinites cannot occur in positive sentences does not seem to stand. If we twist the definition of NPIs to accommodate the distribution of *wh*-indefinites, we have to accept the undesirable conclusion that some NPIs are not restricted in their distribution. However, when we abandon the position that Mandarin *wh*-indefinites are NPIs, we do not have to take on these arbitrary assumptions. This is the view that we will now develop.

Abandoning the view that *wh*-indefinites are NPIs faces its own challenges, however. If *wh*-indefinites are observed to appear in simple past positive sentences, why are they unacceptable in (9)? In the next section, we will argue that *wh*-indefinites in positive sentences are associated with an ignorance inference, namely the speaker does not know the identity of the referent that fits the description of the *wh*-phrases. For example, in (14), it is crucial that the speaker does not know the exact time that he called his friend, and in (12), the exact book that Laoyudajie found the comforting words is not known to the speaker. In (9), however, it is odd that the speaker does not know the person she likes. Thus, the *wh*-indefinites might be unacceptable in this sentence due to pragmatic and not semantic reasons (see Section 5 for more discussions on this example).

As we will see below, the distribution and interpretation of Mandarin *wh*-indefinites pattern

together with epistemic indefinites like Spanish *algún*.

3. Mandarin *wh*-indefinites are modal indefinites

As we have seen, *wh*-indefinites in Mandarin can occur in positive sentences that generally do not license NPIs, suggesting that they are not NPIs. In this section, we will compare the interpretations of *wh*-indefinite to modal indefinites. As noted by many (e.g. Alonso-Ovalle and Menéndez-Benito 2013), modal indefinites come in different kinds. By comparing Mandarin *wh*-indefinites with other modal indefinites, we will locate the place of Mandarin *wh*-indefinite in the typology of modal indefinites.

3.1. Ignorance inference

In positive sentences, the *wh*-indefinite triggers an ignorance inference similar to other modal indefinites like Spanish *algún*. For instance, in the example (12), the speaker implies that they do not know which book Laoyudajie found her quotes.

This inference seems to be obligatory: when ignorance is not supported in the context, the indefinite reading of *wh* in positive sentences is unacceptable. The requisite of this ignorance inference is a hallmark of modal indefinites like Spanish *algún* (Alonso-Ovalle and Méndez-Benito 2010). As shown in (23), when the identity of the student that María married to is known, *algún* is unacceptable:

- (23) #María se casó con algún estudiante del departamento de lingüística:
 María SE married with ALGÚN student of the department of linguistics:
 en concreto con Pedro
 namely with Pedro
 (int.)“María married with a linguistic student, namely Pedro.”
 Alonso-Ovalle and Méndez-Benito, 2010: p.2, ex.(2)

The same is true for *wh*-indefinites. (25) is a modified version of the *namely* test applied to a corpus example (24):³ when the referent is specified, as in (25a), *wh*-indefinite is infelicitous, but the regular indefinite is acceptable, as seen in (25b).

- (24) Gouxiong zhengzai disheng he shui jianghua.
 Gouxiong is low voice with who speaking
 “Gouxiong is talking to someone in a low voice.”
 Kuang-pin Luo and Yiyan Yang, 1961, *Hongyan*
- (25) a. Gou Xiong zhengzai disheng he shui jianghua, #wo kande
 Gou Xiong is low voice with who speaking I can see
 qingqingchuchu, na-ge ren jiushi Xingxing.
 clearly that-CL person is Xingxing

³Our intuition, as confirmed by other native speakers we have consulted, is that a literal translation of (23) into Mandarin seems to be degraded. But the reason for its unacceptability might be due to the fact that *jiushi* “namely” requires the followup to be a paraphrased explanation rather than an expansion of the previous statement. Therefore, we modified the test to avoid this complication.

(int.) “Gouxiong is talking to someone in a low voice. I saw it clearly, it was Xingxing.”

- b. Gouxiong zhengzai disheng he yi-ge ren jianghua. wo kande
 Gouxiong is low voice with one-CL person speaking I can see
 qingqingchuchu, na-ge ren jiushi Xingxing.
 clearly that-CL person is Xingxing
 “Gouxiong is talking to a person in a low voice. I saw it clearly, it was Xingxing.”

This inference disappears in DE contexts like the antecedent of a conditional:

- (26) Ruoguo shei qifu ni, qing gaosu wo.
 If who bully you, please tell me.
 “If anyone bullies you, please let me know.”
 NOT: “If anyone whose identity the speaker cannot identify bullies you, ...”

In (26), *shui* is interpreted as a regular indefinite, without being associated with any ignorance inference.

While many modal indefinites are associated with the ignorance inference, they differ in to what extent the speaker is ignorant. Aloni and Port (2010) uses different methods of identification to classify modal indefinites. For example, when using Spanish *algún*, as in (27a), the speaker cannot have direct perceptual access to the referent, but with English *some*, one can, as show in (27b).

- (27) a. #Mira! Algún professor está bailando encima de la mesa!
 Look! ALGÚN professor is dancing on of the table.
 (int.) “Look! Some professor is dancing on the table!”
 Alonso-Ovalle and Menéndez-Benito, 2003: p.4
 b. Look! Some professor is dancing on the table!
 Alonso-Ovalle and Menéndez-Benito, 2003: p.4

Unlike Spanish *algún* but similar to English *some*, Mandarin *wh*-indefinites are felicitous when the speaker has visual evidence of the referent but cannot identify the referent by name:

- (28) *Zhangsan and Lisi went to a party that has a mix of doctors and nurses. They knew that doctors all wear white lab coats. Zhangsan saw a person wearing the white coat dancing. he pointed to the dancing person and says:*
 Kan, nei -ge yisheng zai tiaowu ne.
 Look, which-CL doctor ASP dance SFP
 “Look, some doctor (that I don’t know) is dancing.” Ignorance of name
 adapted from Aloni and Port 2010, ex. (32)⁴

Another inference that modal indefinites are usually associated with is an indifference inference (Kratzer and Shimoyama 2002; Alonso-Ovalle and Menéndez-Benito 2013; Aloni and Port 2010). Mandarin *wh*-indefinites can also trigger an indifference inference in positive sentences (Chierchia and Liao 2015), similar to German *irgendein* but not Spanish *algún*. When the sentence sets up a goal for the agent, using the *wh*-indefinite suggests that the identity of the

⁴We change professors to doctors is for cultural reasons; for most Mandarin speakers, doctors are usually associated with a special attire but professors are not.

object described by the *wh* does not matter for achieving the current goal (or for addressing the question at hand):

- (29) *Context: A is trying to explain to B how to open a bank account in America.*
Hai, suibian zhao ge shenme difang (peng-ge-mian), wo gei ni nong liang-zhang
Hey just find CL what place meet-CL-up I to you get two-CL
dongxi (shenqingbiao) guoqu, daoshi ni tian, yiji, jiu wan le.
thing application over then you fill in send JIU over ASP
“That’s easy, (we) meet up somewhere, I get you two application forms, you fill it in,
send it out, and it’s done.”

CallFriend Mainland Mandarin Corpus, File 4389

In this example, the goal is to open a bank account, and the precise location where A and B meet up to fill in the applications is irrelevant for achieving this goal.

In sum, similar to other modal indefinites like Spanish *algún* and German *irgendein*, Mandarin *wh*-indefinites are associated with modal inferences like ignorance or indifference in positive contexts. When this inference is not supported, the indefinite interpretation is illicit. Unlike Spanish *algún*, the ignorance inference that Mandarin *wh*-indefinites is less strict in the method of identification: if the speaker has visual information of the referent but cannot identify the referent by name, *wh*-indefinites are acceptable.

3.2. Interacting with modals

When embedded under modals, *wh*-indefinites can be associated with ignorance or indifference inference depending on the modal flavor. For example, when embedded under epistemic modals, as in (30), the *wh*-indefinite triggers an ignorance inference: the speaker does not know the bad people or book that are influencing Ma Rui.

- (30) Ta (Ma Rui) benzhi shang hai shi ge haizi, **yiding** shi shou-le *shenme* ren de
He Ma Rui in essence still is CL child must be affect-ASP what person DE
huai yingxiang, kan-le *shenme* huai shu
bad influence read-ASP what bad book
“He (Ma Rui) is still a child, he must have been influenced by some bad people (I don’t know who), and read some bad books.”

Wang Shuo, 1992 *I’m Your Dad*

When the modal flavor is non-epistemic, *wh*-indefinites elicits an indifference inference “the identity is not important for the current goal/question under discussion (QUD).” For example, in (31), the *wh*-indefinite is embedded under deontic necessity modal *bixu*, and the sentence is associated with the inference “the identity of the person doing the housework” is irrelevant, as long as there is someone taking up the housework. Similarly, in (32), the identity of the person reviewing your code is irrelevant to the topic

- (31) (Jiawuliaodong) ruguo jiatingzhufu bu zuo de hua, jiu **bixu** zhao shui lai
housework if housewife NEG do DE say JIU must find who to
dai zuo
substitute do

“If housewives do not do housework, we have to find someone to do the work instead.”
 Zou Yun and Xue Mei [trans.] Chizuko Ueno, 2020, *Patriarchy and Capitalism*

- (32) Nin **yinggai** zhao shui kan yixia ninde daima.
 You should find who look a bit your code.
 “You should have someone check your code.”

CoLang Chinese online discussion board

As noted by many, modal indefinites differ with respect to the extent of variation (“freedom of choice”) imposed on the domain of quantification (Kratzer and Shimoyama 2002; Alonso-Ovalle and Méndez-Benito 2010; Aloni and Port 2010, a.o.). Some modal indefinites like German *irgendein* trigger total variation, requiring that all individuals in the domain are possibilities (free choice); others like Spanish *algún*, trigger partial variation, and signal that at least two individuals are possibilities. Mandarin *wh*-indefinites pattern with *algún*. Using the classic hide-and-seek test (33) (Alonso-Ovalle and Méndez-Benito 2010: p.6), we can see that that *wh*-indefinite triggers partial variation (cf. Chierchia and Liao 2015), namely as long as there are two possible rooms, the sentence is felicitous, as shown in (33a). In contrast, the free choice item *renhe* “any” requires that all rooms must be potential hiding locations, and is thus infelicitous in this scenario, as shown in (33b).

- (33) *Hide-and-seek scenario*

Zhangsan, Lisi, and Wangwu are playing hide-and-seek. Lisi is hiding. Wangwu is sure that Lisi is inside the house. Furthermore, he knows that Lisi is not in the bathroom or in the kitchen.

- a. Lisi **kending** cang zai fangzi de na-jian wuzili.
 Lisi must hide in house POSS which-CL room
 “Lisi must be hiding in some room or other in this house.”
 b. #Lisi **kending** cang zai fangzi de renhe yi-jian wuzili.
 Lisi must hide in house POSS any one-CL room
 (int.) “Lisi must be hiding in any one of the rooms.”

Wh-indefinites embedded under non-epistemic modals also trigger partial variation as well (cf. Law 2018), different from German *irgendwas*:

- (34) Zhangsan is about to submit his codes written in Java, and before final submission he could ask a supervisor to check his code. His supervisors are L, W, and Z. L and W are experts on Java, but not Z.
 a. Zhangsan **yinggai** zhao na-ge laoshi kan-yixia ta-de daima.
 Zhangsan should find which-CL supervisor check-CL his code
 “Zhangsan should have some supervisor check his code.”
 b. #Zhangsan keyi zhao renhe yi-ge laoshi kan-yixia ta-de daima.
 Zhangsan can find any one-CL supervisor check-CL his code
 (int) “Zhangsan should have some supervisor check his code.”

In (34), not all supervisors are able to check the code for Zhangsan, and yet the *wh*-indefinite is felicitous. The free choice item *renhe*, which requires total variation, is unacceptable in this context, as shown in (34b).

In summary, Mandarin *wh*-indefinites pattern like other modal indefinites when embedded un-

der modals. In particular, they trigger partial variation under epistemic and non-epistemic modals.

3.3. Summary of data

As we have shown in this section, the interpretation of Mandarin *wh*-indefinite bears many similarities to other modal indefinites. It is associated with an ignorance or indifference interpretation in unembedded contexts; when embedded under modals, it triggers partial variation. In Downward Entailing contexts, the modal inference disappears. Here is a summary of the interpretation of Mandarin *wh*-indefinite in various contexts, in comparison with other modal indefinites:

	Episodic	Epistemic	Non-epistemic	DE
Mandarin <i>wh</i>	Ignorance/Indifference	Partial ignorance	Partial indifference	None
Spanish <i>algún</i>	Ignorance	Partial ignorance	Partial indifference	None
German <i>irgendein</i>	Ignorance/Indifference	Partial ignorance	Total indifference	None
Romanian <i>vreun</i>	(cannot occur)	Partial ignorance	(cannot occur)	None
Japanese <i>wh-ka</i>	Ignorance/Indifference	Partial ignorance	Partial indifference	None

4. Proposal

We propose that the analysis of Spanish *algún* developed in Alonso-Ovalle and Méndez-Benito (2010) can be applied straightforwardly to Mandarin *wh*-indefinites to account for their distribution and interpretation — in particular the modal inferences. We implement the analysis within the alternatives-and-exhaustification framework (Chierchia 2013, see also Fălăuş 2014)

In this analysis, the modal inferences triggered by *wh*-indefinites (ignorance and indifference) are taken to be implicatures. Following Alonso-Ovalle and Méndez-Benito (2010), we offer two pieces of evidence: disappearance under downward entailing contexts and reinforcement. As we have seen in (26), *who* is in the antecedent of a conditional – a classical DE environment, and it is interpreted as a simple indefinite with no modal inference attached. In (35), the modal inference of the *wh* in the first clause can be explicitly asserted via the second clause without causing redundancy, similar to the *not both* implicature triggered by *or* (*I will invite John or Mary, but not both*).

- (35) Lisi zheng he shei shuohua, dan wo bu zhidao juti shi shei.
 Lisi now with who talk, but I NEG know exactly be who
 “Lisi is talking to someone, but I don’t know exactly who.”

On the other hand, in non-DE contexts, the modal inference cannot be cancelled, as is illustrated in (25a). In this respect, Mandarin *wh*-indefinites seem to differ from *irgendein* and *algún* (Kratzer and Shimoyama 2002, ex. (11); Alonso-Ovalle and Méndez-Benito (2010), ex. (42))

In short, the modal inferences of Mandarin *wh*-indefinites seem to be a type of obligatory implicatures (Spector 2007; Chierchia et al. 2012; cf. the idea of “fossilized implicatures” associated with indefinites in Aloni 2019).

Implicatures can be derived grammatically in the alternatives-&-exhaustification framework

(Chierchia et al., 2012; Chierchia, 2013). Roughly, expressions such as *some* and *or* can activate alternatives, while there are covert operators in the grammar such as the *O* in (36) with the semantics similar to *only* that exhaustify over the alternatives. The process, called exhaustification, gives rise to implicatures as enrichment of meaning to the original sentence (the prejacent of *O*). This is briefly illustrated in (37).

$$(36) \quad O_{ALT}(p) = p \wedge \forall q \in ALT[q \not\subseteq p \rightarrow \neg q]$$

(The prejacent is true and alternatives not entailed by the prejacent are false.)

- (37) *Some students left* \approx Some but not all students left.
- a. ALT of *some* = {*some*, *all*}
 - b. ALT of *some students left* = {*some students left*, *all students left*}
 - c. $\llbracket O_{ALT}(\text{some students left}) \rrbracket = \text{some students left} \wedge \neg \text{all students left}$

This grammatical view of implicatures offers a simple way to handle obligatory implicatures: in contrast to standard conversational implicatures that are associated with items with optional alternatives, obligatory implicatures come with items that obligatorily activate alternatives and thus exhaustification always returns implicatures (in non-DE contexts).

Turning to Mandarin *wh*-indefinites, we first assume that non-interrogative and interrogative *wh*'s share the same basic meaning. Specifically, they denote existential quantifiers as in Karttunen (1977). This is illustrated in (38), with *C* being the domain argument of the quantifier. The treatment has the advantage of explaining the so-called “interrogative-indefinite affinity” (Haspelmath, 1997): in many languages, indefinites and question words are closely related in form or even with identical forms. Taking them both to be existentials offers a simple explanation to this typological tendency.

$$(38) \quad \llbracket na\text{-}CL_D \text{ room} \rrbracket = \llbracket a_D \text{ room} \rrbracket = \lambda P. \exists x \in D[\text{room}(x) \wedge P(x)]$$

Next, we assume that Mandarin *wh*-indefinites, as many other existentials do (Krifka, 1995; Chierchia, 2013), activate (sub-)domain alternatives (existential quantifiers with smaller domains). Crucially, we claim that they, as Spanish *algún* in Alonso-Ovalle and Méndez-Benito (2010), trigger singleton domain alternatives (different from Chierchia and Liao 2015; see Mayr 2014 on the use of singleton domain alternatives of *wh*-words in questions.).

$$(39) \quad ALT \text{ of } \llbracket na\text{-}CL_D \text{ room} \rrbracket = \{ \lambda P. \exists x \in \{u\}[\text{room}(x) \wedge P(x)] \mid \{u\} \subseteq D \}$$

equivalently individual alternatives:

$$= \{ \lambda P. \text{room}(u) \wedge P(u) \mid u \in D \} \quad \text{a set of lifted individuals}$$

These individual alternatives of *wh*-indefinites project to the sentence level (say, via pointwise composition in Rooth 1985), and we now have a sentence that contains a *wh*-indefinite associated with a set of propositions. For example, $\llbracket \text{Lisi is in } na\text{-}CL_D \text{ room} \rrbracket = \llbracket \text{Lisi is in } a_D \text{ room} \rrbracket$, and the ALT of $\llbracket \text{Lisi is in } na\text{-}CL_D \text{ room} \rrbracket = \{ \llbracket \text{Lisi is in room a} \rrbracket, \llbracket \text{Lisi is in room b} \rrbracket, \dots \}$

We now have everything we need to account for behaviors of Mandarin *wh*-indefinites. The main ideas are all standard in the alternatives-&-exhaustification framework: since *wh*-indefinites obligatorily trigger alternatives, they need exhaustification via *O*; exhaustification in different modal environments deliver different modal inferences (epistemic, deontic, etc.); crucially, the use of individual alternatives (not alternatives to the full range) captures the relative weak inference (partial variation instead of total free choice, as we have seen in (33) and (34)).

Consider (33a) repeated here as (40) from the hide-and-seek scenario, where the *wh*-indefinite *na-jian room* appears under an epistemic \Box . Its LF in (40b) comes with an overt exhaustification operator O since by assumption *wh*-indefinites always trigger alternatives and thus need exhaustification. Interpretation of the LF is given in (40c): the first conjunct is the prejacent (by assumption an existential statement), and the second conjunct the result of exhaustification, where each individual alternative triggered by the *wh* are negated by O (since all entail the prejacent). The result is equivalent to (40d), and partial variation across epistemic worlds – that is, ignorance – is derived.

- (40) a. Lisi **kending** cang zai fangzi de na-jian wuzili.
 Lisi must hide in house POSS which-CL room
 “Lisi must be hiding in some room or other in this house.”
 b. LF: $O_{ALT}\Box[\text{Lisi is in na-ge}_D \text{ room}]$
 c. $\llbracket O_{ALT}\Box[\text{Lisi is in na-ge}_D \text{ room}] \rrbracket$
 $= \Box[\exists x \in D[\text{room}(x) \wedge \text{Lisi.is.in}(x)]] \wedge \forall x \in D \cap \text{room}[\neg\Box[\text{Lisi.is.in}(x)]]$
 d. $= \Box[\exists x \in D[\text{room}(x) \wedge \text{Lisi.is.in}(x)]] \wedge$
 $\exists x \exists y \in D \cap \text{room}[x \neq y \wedge \Diamond \text{Lisi.is.in}(x) \wedge \Diamond \text{Lisi.is.in}(y)]$

We can also look at the verifying and falsifying models in (41) to see that (40c) amounts to partial variation: while the prejacent (the first conjunct) is true in all M1 to M3, the result of exhaustification (the second conjunct) is obviously only compatible with M2 (a partial variation model) and M3 (a total variation model), and thus (40c) as a whole conveys partial variation.

- (41) Verifying and Falsifying models (room = {a, b, c}, modal base = {w1, w2, w3})
- | | M1 | M2 | M3 |
|----|----|----|----|
| w1 | a | a | a |
| w2 | a | b | b |
| w3 | a | b | c |
- no variation partial variation total variation

Next, to capture *wh*-indefinites under possibility modals, pre-exhaustified alternatives need to be employed (Kratzer and Shimoyama, 2002; Fox, 2007; Chierchia, 2013), since exhaustifying plain individual alts across \Diamond gives rise to a contradiction. This is illustrated in (42b) for (42a).

- (42) a. Lisi **keneng** zai na-jian wuzili.
 Lisi might in which-CL room
 “Lisi might be in some room or other.”
 b. Exhaustifying plain individual alts across $\Diamond \rightarrow$ contradiction
 $\llbracket O_{ALT}\Diamond[\text{Lisi is in na-ge}_D \text{ room}] \rrbracket$
 $= \Diamond[\exists x \in D[\text{room}(x) \wedge \text{Lisi.is.in}(x)]] \wedge \forall x \in D \cap \text{room}[\neg\Diamond[\text{Lisi.is.in}(x)]]$
 $= \perp$

Pre-exhaustified alternatives, as the name suggests, are alternatives that have already been exhaustified by O . This is specified in (43b) for the individual alternatives associated with the *wh* in (42a). Roughly, a pre-exhaustified alternative for an individual alternative of (42a) — say *Lisi is in room a* — amounts to *Lisi is only in room a*, which gives us the set of pre-exhaustified alternatives ALT_{EXH} in (43c). These are the alternatives exhaustified by the matrix O^5 . Exhaust-

⁵Pre-exhaustified alternatives have been independently used to analyze free choice effects (Kratzer and Shi-

tifying these alternatives returns the result in (43c), where the first line is the prejacent and the last three lines the result of exhaustifying pre-exhaustified alternatives — the anti-exhaustivity inferences.

- (43) Lisi might be in na-CL room.
- a. LF: $O_{ALT_{EXH}} \Diamond [\text{Lisi is in } \underline{\text{na}}\text{-CL}_D \text{ room}]$
 - b. $ALT_{EXH} = \{O_{ALT} \Diamond [\text{room}(u) \wedge \text{Lisi.is.in}(u)] \mid u \in D\}$
 - c. Assume contextually salient rooms ($D \cap \text{room}$) are $\{a, b, c\}$:

$$ALT_{EXH} = \left\{ \begin{array}{l} \Diamond \text{Lisi.is.in}(a) \wedge \neg \Diamond \text{Lisi.is.in}(b) \wedge \neg \Diamond \text{Lisi.is.in}(c) \\ \Diamond \text{Lisi.is.in}(b) \wedge \neg \Diamond \text{Lisi.is.in}(a) \wedge \neg \Diamond \text{Lisi.is.in}(c) \\ \Diamond \text{Lisi.is.in}(c) \wedge \neg \Diamond \text{Lisi.is.in}(a) \wedge \neg \Diamond \text{Lisi.is.in}(b) \end{array} \right\}$$
 - d. $\llbracket O_{ALT_{EXH}} \Diamond [\text{Lisi is in } \underline{\text{na}}\text{-CL}_D \text{ room}] \rrbracket =$
 $\Diamond [\exists x \in \{a, b, c\} [\text{Lisi.is.in } x]] \wedge$ (Prejacent)
 $(\Diamond \text{Lisi.is.in } a \rightarrow (\Diamond \text{Lisi.is.in } b \vee \Diamond \text{Lisi.is.in } c)) \wedge$
 $(\Diamond \text{Lisi.is.in } b \rightarrow (\Diamond \text{Lisi.is.in } a \vee \Diamond \text{Lisi.is.in } c)) \wedge$
 $(\Diamond \text{Lisi.is.in } c \rightarrow (\Diamond \text{Lisi.is.in } a \vee \Diamond \text{Lisi.is.in } b))$ (Anti-exhaustivity inferences)

To see that (43c) amounts to (partial) ignorance, consider again the verifying and falsifying models, as in (44). Crucially, the anti-exhaustivity inferences are not true in a no variation model such as M2 (in this particular case, the second conjunct in (43c) is not true in M2). Thus, the prejacent together with the result of exhaustification is compatible with only partial variation models and total variation models, and the sentence conveys partial variation across epistemic worlds.

(44) room = $\{a, b, c\}$, modal base = $\{w1, w2, w3, w4\}$, $o \approx \text{outside}$

	M1 (prejacent.false)	M2 (no.variation)	M3 (partial.var.)	M4 (total.var.)
w1	o	a	a	a
w2	o	a	b	b
w3	o	o	o	c
w4	o	o	o	o

We have shown how *wh*-indefinites under epistemic modals give rise to (partial) ignorance; (partial) indifference of *wh*-indefinites under non-epistemic modals can be captured in exactly the same way. The ignorance vs. indifference contrast arises from exhaustification over modals of different flavors: with epistemic modals, *O* – as a meaning-enriching mechanism – adds partial variation over epistemic worlds (and thus ignorance); with non-epistemic modals, *O* adds indifference.

As discussed in Section 3, *wh*-indefinites in positive contexts are acceptable and trigger modal inferences. However, exhaustifying plain individual alternatives in positive contexts again gives rise to contradiction, illustrated in (45).

- (45) a. Lisi zai na-jian wuzili.
Lisi in which-CL room

moyama, 2002; Fox, 2007) and free choice items (Chierchia, 2013; Dayal, 2013), and they have a pragmatic/Gricean basis: in the case of plain alternatives, the speaker chooses the actual utterance instead one of the alternatives to avoid making a false claim; in the case of pre-exhaustified alternatives, the speaker does not choose the alternative expressions between they would bring in false exhaustivity inferences.

- “Lisi is in some room or other.”
- b. LF₁: $O_{ALT}(\text{Lisi is in na-CL}_D \text{ room})$
 - c. Prejacent: $\exists x \in D[\text{room}(x) \wedge \text{Lisi.is.in}(x)]$
 - d. $ALT = \{ \text{Lisi.is.in room } a, \text{Lisi.is.in room } b, \text{Lisi.is.in room } c, \dots \}$
 - e. Result of exhaustification: contradiction!

Yet with positive sentences we have the option⁶ of exhaustifying across a covert modal (assertoric/belief operator) (Kratzer and Shimoyama 2002; Alonso-Ovalle and Méndez-Benito 2010; Chierchia 2013; Meyer 2013), as in (46):

- (46) $\llbracket \Box_s \rrbracket = \lambda p. \lambda w. \forall w' \text{ compatible with what the speaker believes in } w. p(w') = 1$
 Roughly: $\llbracket \Box_s p \rrbracket$ is true iff the speaker believes p .

With the covert modal \Box_s , exhaustification of the *wh* works in exactly the same way as exhaustification with overt \Box . The result is consistent and a modal inference is triggered—in this case, an ignorance inference since the inserted modal is epistemic relative to the speaker.

- (47) a. Lisi is in na-CL room.
 b. LF₂: $O_{ALT}\Box_s(\text{Lisi.is.in na-CL}_D \text{ room})$

Finally, in downward-entailing environments, the negated prejacent is the strongest among all the alts triggered by the *wh*-indefinite, so exhaustification would not have enriched the meaning, and thus no modal inferences are generated. This is illustrated in (48)⁷.

- (48) a. Lisi bu zai na-jian wuzili.
 Lisi not in which-CL room
 “Lisi is not in any room.”
 b. LF: $O_{ALT}(\neg(\text{Lisi is in na-CL}_D \text{ room}))$
 c. Prejacent: $\neg \exists x \in D[\text{room}(x) \wedge \text{Lisi.is.in}(x)]$
 d. $ALT: \{ \neg \text{Lisi.is.in}(a) \mid a \in D \cap \text{room} \}$
 e. Result of exhaustification: vacuous (and thus consistent)

The following table summarizes the discussion so far.

⁶The option of inserting an overt modal has to be better than employing pre-exhaustified alternatives. This has to be stipulated for the current proposal. See Chierchia (2013), p. 120-122 for some discussion.

⁷Under negation, *wh*-indefinites sometimes generate a “not much/many” reading (Huang 2013):

- (i) Context: *B is describing Philadelphia to A over the phone.* B: (Lou) quan shi aiaide, meiyou *shenme* lou,
 jiu downtown nabian you dian lou.
 building all be low NEG what building only downtown there have CL building
 “(Philadelphia’s) buildings are all very low, there aren’t many building, just some over around downtown.”
 NOT: “(Philadelphia’s) buildings are all very low, there aren’t any buildings, just some over around downtown.”

CallFriend Mainland Mandarin, File43258

In (i), *shenme* is interpreted as “not many” with negation. If the *wh*-indefinite is interpreted as “not any” in the sentence, the followup that “there are some buildings over around downtown” is infelicitous.

This “not much/many” reading arises when *wh*-indefinites compete with the real *any* in Mandarin *renhe* “any”: under negation, *meiyou renhe* “not any” is much stronger than *meiyou shenme*, so using *shenme* triggers the inference that *renhe* is too strong, not supported by the context, and thus gives rise to the “not much” reading (cf. Fălăuş 2014).

(49)	Episodic Positive	Partial ignorance	Exh across covert \Box_s
	Epistemic	Partial ignorance	Exh across overt \Box_E
	Non-Epistemic	Partial indifference	Exh across overt \Box_D or covert \Box_s
	Negative	No modal inference	Exh vacuous

5. Discussion

In this paper, we used naturalistic data to show that *wh*-indefinites can occur in positive environments that cannot license NPIs. Additionally, we showed that in these contexts, *wh*-indefinites obligatorily carry modal inferences (ignorance or indifference), a pattern frequently observed with modal indefinites. We proposed an exhaustification-and-alternatives account for *wh*-indefinites. In particular, we argued that *wh*-indefinites trigger individual alternatives, which allows *wh*-indefinites to trigger partial rather than total variations. In positive contexts, the exhaustification operator interacts with a covert necessity modal, which allows *wh*-indefinites to trigger modal inferences.

While our proposal could capture the distribution and interpretation of *wh*-indefinites, there are still some remaining issues. First, some have argued that, in non-epistemic and non-DE environments (deontic, imperative, future, etc.), *wh*-indefinites are acceptable only when classifiers are added (Lin 1998; Law 2018). However, this requirement seems to apply only to *shenme*; other *wh*-items like *shui* ‘who’ and *nar* do not have such constraints, as we have seen in (32) in Section 3 and (50) below:

- (50) Women hai **keyi** zai nar zuo yi-huer.
 We also can at where sit one-while
 ‘We can also sit for a while somewhere.’

Moreover, classifiers do not seem to be a requirement for the acceptability of *wh*-indefinites in these cases, but merely a tendency (Lin 1998). We have found examples from corpus that have *wh*-indefinites in positive episodic sentences without classifiers. (22) repeated here as (51) is a case where *shenme* occurs in object position without classifiers:

- (51) Women jiaohui you yi-ge ren ... ta kao-guo shenme zhizhao ... ta cai
 our church has one-CL person he take exam-ASP what license he CAI
 qu zuo yisheng
 go be doctor
 ‘Our church has someone who took an exam for some license, and then he went on to be a doctor.’
 CallFriend Mainland Mandarin Corpus, File 4227

We speculate that classifiers don’t necessarily play the most important role in a general theory of Mandarin *wh*-indefinites.

Another problem concerns the unacceptability of *wh*-indefinites in (9). As mentioned in Section 3, when the ignorance inference is not supported in the context, *wh* might be unacceptable, but if we change the subject of (9) to Zhangsan, as in (52), the ignorance inference could be satisfied, and yet the indefinite interpretation is not as acceptable:

- (52) Wo/Zhangsan xihuan shei/shenme ren
 I/Zhangsan like who/what person

“Who do(es) I/Zhangsan like?”
 Not: “I/Zhangsan like(s) someone.”

However, when we add a modification to the object *wh*, the sentence is still a simple affirmative sentence, and yet the indefinite interpretation is acceptable again:

- (53) Zhangsan xihuan yuyanxuexi de shei/shenme ren
 Zhangsan like Linguistics Department POSS who/what person
 a. “Which person from Linguistics Department does Zhangsan like?”
 b. “Zhangsan likes someone from Linguistics Department.”

We suspect that stress might be the culprit in this case: the indefinite interpretation of *wh* cannot receive stress (Dong, 2009), but the bare *wh* object in (52) receives a default (object) stress. When we add a relative class modifying the bare *wh*-item, other elements are available for the assignment of stress, and thus the *wh*-item could be left unstressed, improving the acceptability of the indefinite interpretation. We plan to explore other factors influencing the acceptability of *wh*-indefinites in positive contexts in future research.

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