The Mandarin NPI *shenme* is not exhaustive: a reply to Chierchia and Liao (2015)

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Abstract

Our goal in this paper is to refute empirically the claim that the Mandarin negative polarity item (NPI) *shenme* is an exhaustive [+∑] bearing NPI like *any*—a claim made recently by Chierchia and Liao (2015). The [+∑] analysis predicts similar behavior (i.e. distribution and interpretation) of *any* and *shenme* in polarity contexts, and building on the existing literature we develop a number of diagnostics to compare the two NPIs. Our diagnostics establish significant asymmetries – indicating that a mere extension of the [+∑] account of *any* to *shenme*, as Chierchia and Liao propose, is not empirically justified. The two are distinct NPIs. In the diagnostics we develop, *shenme* patterns with non-exhaustive NPIs such as Greek *kanenas,* we therefore conclude that *shenme* belongs to this NPI class (Giannakidou 1998, 2011). The *kanenas* NPI contains a dependent variable, and this explains the fact that *shenme* also functions as a question word. The dual use of *shenme* as a question word and NPI, on the other hand, remains co-incidental in Chierchia and Liao.

Keywords

dependent variable; exhaustivity; free choice items (FCIs); negative polarity items (NPIs); non-exhaustive NPIs; nonveridicality; referential vagueness; *shenme* 'a/some or other'.

1 Exhaustive and non-exhaustive NPIs: where should we place *shenme*?

Polarity is a pervasive phenomenon in language, and received considerable attention since Klima's (1964) seminal work on English negation. The polarity sensitive item, or negative polarity item (NPI), is an expression that requires negation in the sentence where it appears. *Any* is an NPI, and so are the Greek *kanenas* (Giannakidou 1997, 1998), and Mandarin *shenme* (Cheng 1994, Li 1992, Lin 1996, 1998), illustrated below:

(1) a. Nicholas didn't say anything. [English]

b. *Nicholas said anything.

(2) a. Dhen idhe kanenan o Janis. [Greek]
not saw NPI the John
'John didn't see anybody.'

b. *Idhe kanenan o Janis.
saw NPI the John

(3) a. Yuehan zuotian mei-you mai shenme shu. [Mandarin]
John yesterday not-have buy NPI book
'John didn't buy books yesterday.'

b. *Yuehan zuotian mai-le shenme shu.
John yesterday buy-PERF NPI book

Shenme belongs to the well-known class of '*wh*-indeterminates', and is used both as a NPI (i.e. (3)) and as a question word (i.e. (4)) (Li 1924, Ding 1961, Lü 1982, Huang 1982, Cheng 1991, 1994, Li 1992, Lin 1996, among others):

(2) Yuehan zuotian mai-le shenme shu (ne)?
John yesterday buy-PERF what book Q
'What kind of books did John buy yesterday?'

As NPIs, *any, kanenas* and *shenme* are sensitive to the presence of negation; without it, they are ungrammatical (see all b-sentences above). Importantly, NPIs generally appear also in environments that are not negative; for instance with modal verbs and adverbs, and in imperatives. Modal contexts and imperatives are not negative but nonveridical. In such contexts, *any* typically receives the so-called *free choice* reading, which is indicated below with adding *whatsoever* (in (5) and (6)). The Greek NPI lacks this reading, and the free choice item (FCI) *opjosdhipote* is used instead, as exemplified in (7) and (8).

(5) On his birthday, John may eat anything whatsoever.

(6) Bring anything whatsoever to his birthday party.

(3) O Nikolas bori na milisei me kanenan/ophondhipote fititi.
the Nicholas may SUBJ talk.3SG with NPI/FCI student
'Nicholas may talk to some student or other/ any student whatsoever).

(4) Mila me kanenan/ophiondhpote fititi.
talk.IMP.2SG with NPI/FCI student.
'Talk to some student or other/any student (whatsoever)!'

In other words, the NPI and FCI uses of *any* are distinguished lexically in Greek, and the Greek NPI receives a non-free choice, anti-specific reading akin to *some or other* (Giannakidou 1997, 1998; Giannakidou and Quer 2013, Giannakidou and Yoon 2016) — a reading not available for English *any* in modal contexts. *Shenme* appears to have the *kanenas* reading in modal contexts (cf. Lin 1996), illustrated below with the adverb *probably:*

(5) Yuehan haoxiang mai-le shenme shu.
John probably buy-PREF NPI book
'John probably bought a book (some book or other, and I don't know what book it was).'

The anti-specific reading that *kanenas* and *shenme* appear to receive in modal contexts expresses referential indeterminacy, and is labeled *referential vagueness* in Giannakidou and Quer (2013), Giannakidou and Yoon (2016). It is attested also with Korean NPIs. Free choice, on the other hand, is the hallmark of *any* in non-negative contexts and has given rise to the idea that *any* expresses *domain widening* (Kadmon and Landman 1993), and *exhaustive variation* (Giannakidou 1998, 2001). A major goal here is to present arguments that distinguishing the two readings and NPIs is empirically necessary.

Before we proceed, for the sake of completeness, we wanted to ensure that it is understood that the three NPI paradigms we are discussing have similar distributions. The individual distributions have been exemplified in previous work, we will therefore not illustrate in detail here; in section 3 we see further contrasts emanating form the interpretation of the items. As a general pattern, NPIs appear in *nonveridical* contexts— including, to use Zwarts' 1995 terminology, *minimally negative* (i.e. downward entailing; hereafter DE) and *classically* negative contexts (i.e. anti-morphic), as well as non-negative contexts (Bernardi 2002, Hoeksema 1999, 2010, Giannakidou 1998, 2001, 2006, 2011, Zwarts 1995 and others):

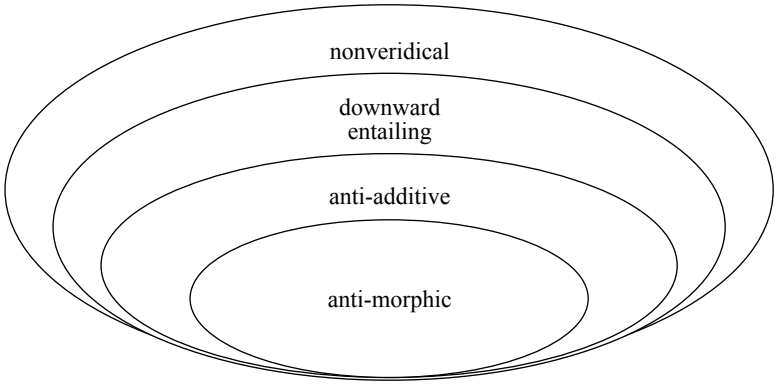

Figure 1: The Negative/Non-veridical Hierarchy of polarity contexts

Surprisingly, sometimes the rhetoric places nonveridicality *in opposition* to negation and DE, but it is important to note that, as can be seen here and emphasized in Giannakidou (1997, 1998), negative and DE functions are a subset of the nonveridical (see Zwarts 1995 for a proof). Nonveridicality is therefore an extension of negation and DE, allowing unification of the polarity contexts as a natural class, while also predicting correctly the wider distribution of NPIs in non-negative contexts consistent with what is generally observed in various languages.

In Table 1, we list representative distributions of the polarity items we discuss in this paper: English *any*, Mandarin Chinese *shenme* 'a/some or other', Greek *kanenas* 'a person', and FCIs such as Greek *opjosdhipote* 'anything':

Environments	*any*	*shenme*	*kanenas*	*opjosdhipote*
1. Negation (e.g. *not*, *nobody*)	OK	OK	OK	*
2. Questions	OK	OK	OK	OK
3. Conditional (*if*-clauses)	OK	OK	OK	OK
4. Restriction of *every*/*all*	OK	OK	OK	OK
5. DE quantifier (e.g. *few*)	OK	OK	OK	OK
6. Modal verbs (e.g. *may*)	OK, free choice	OK	OK	OK
7. Nonveridical verbs (e.g. *want*)	OK, free choice	OK	OK	OK
8. Imperatives	OK, free choice	OK	OK	OK
9. Habituals	OK, free choice	OK	OK	OK
10. Disjunctions	OK, free choice	OK	OK	OK
11. *Before*-clauses	OK	OK	OK	OK
12. Future	OK	OK	OK	OK
13. Affirmative past sentences	*	*	*	*

Table 1: Distributions of *any*, *shenme*, *kanenas*, and *opjosdhipote* (FCI)

The distributions exhibit clear patterns — though the NPIs may end up being further constrained by the interpretations, as we see with our tests in section 3. Giannakidou's work offers details for Greek NPIs and FCIs, and Lin 1996 notes that *shenme* appears in nonveridical contexts—'non-existence' as he calls them. More recent discussions are found in Liao 2011, Lin at al. 2014 and Lin 2015;[1] the parallelism in distribution and interpretation between Greek and Mandarin NPIs and FCIs is discussed in detail in Cheng and Giannakidou (2013).

If NPIs and FCIs crosslinguistically are sensitive to nonveridical contexts, a simple question arises: are NPIs and FCIs sensitive to these contexts for the same reason? There are currently two answers to this question. One answer says yes, they are. This answer is given by Chierchia (2006, 2013) who claims *no variation*: "in contrast to ordinary or plain indefinites, with NPIs and FCIs we *have* to exhaustify" (Chierchia 2013:8, emphasis in the original). Exhaustification is an axiom in this approach, i.e. it is stipulated for all NPI/FCI classes without empirical justification; *shenme* thus cannot but be exhaustive (Chierchia and Liao 2015).

On the other hand, we have the *variation* position: NPIs and FCIs become NPIs and FCIs for different reasons (Giannakidou 1997, 1998, 2001, 2011, Giannakidou and Cheng 2006, Giannakidou and Quer 2013, Giannakidou and Yoon 2016). This approach does not assume that all NPIs and FCIs are exhaustive, but identifies two general paths to PI-hood: one is via scalarity/exhaustivity (which could be done in the traditional Fauconnier 1974 style of pragmatic scales, or in more recent incarnations such as Krifka 1995, or even Chierchia-style if one wishes to do so). The second source of polarity is the existence of a *dependent variable* in the NPI. Dependent variables have been independently motivated in grammar (i.e. anaphoric and distributivity variables are dependent, controlled subjects, etc; see more discussion later). The NPIs with dependent variables (such as Greek *kanenas,* Korean *rato*-NPIs) are typically non-

exhaustive, anti-specific existentials that lack free choice readings but have instead referential vagueness, as mentioned earlier. Referential vagueness and free choice are both forms of anti-specificity, but in the referentially vague item variation is *not* exhaustive (Giannakidou and Quer 2013, Giannakidou and Yoon 2016). Crucially, a polarity item can both contain a dependent variable *and* be exhaustive, as is the case with FCIs (see Giannakidou and Cheng 2006, Giannakidou and Quer 2013). The variation approach, therefore, presents a flexible framework where NPI and FCI classes can be distinguished based on a constrained set of options.

Given the existence of both exhaustive and non-exhaustive NPIs, it is necessary to ask the question of whether the Mandarin NPI *shenme* is indeed exhaustive, as the Chierchia program has it. This question cannot be asked within the Chierchia system since, as we said, exhaustivity is adopted for all NPI and FCIs classes without empirical justification. But if both exhaustive and non-exhaustive NPIs exist, as it appears to be the case in a number of languages, exhaustivity cannot be an axiom of polarity. This means that it needs to be shown empirically that *shenme* is, or is not, exhaustive. To this end, we build in this paper a quite traditional and simple linguistic argument by comparing *shenme* to Greek *kanenas* and *any*, in order to see which NPI *shenme* patterns like. We develop a number of tests that can be helpful more broadly when one needs to distinguish the exhaustive from the non-exhaustive NPI type. We discover that, in all crucial respects, *shenme* patterns with the non-exhaustive NPI *kanenas,* and from this we conclude that the Chierchia and Liao's analysis is not empirically motivated for *shenme*.

The discussion proceeds as follows. First, we describe the Chierchia style exhaustivity analysis for *any* and *shenme* in section 2. In section 3 we develop our diagnostics for distributional and interpretational asymmetries between exhaustive NPIs and *shenme*. In section 4 we provide an additional argument from language acquisition that *shenme* is an NPI distinct from *any.* We conclude that *shenme* is an NPI containing a dependent variable — consistent with the acquisition path found in Lin (2015).

2 The Chierchia and Liao proposal for *shenme*

The Chierchia program is initiated in Chierchia's 2006 *Linguistic Inquiry* article. It is inspired by Kadmon and Landman's 1993 domain widening idea, and Krifka's 1995 extension of focus scalar semantics to *any* (itself inspired by Fauconier 1974 and Horn's 1976 earlier work on pragmatic scales). Unlike Chierchia, neither Kadmon and Landman nor Krifka propose their theories as general theories of *all* NPIs; rather, they suggest them with reference to *any*. Krifka, in fact, acknowledges *two* versions of *any,* one that is scalar and exhaustive, and one that is not (emphatic and non-emphatic *any).* There are additional voices in the recent literature supporting that not all uses of *any* are scalar, strong, or exhaustive (Duffley and Larivee 2010, Giannakidou 2011). The objections expressed in these works alone are enough to cast doubt on the exhaustivity enterprise even for *any,* but we will accept the position here for the sake of the discussion.

Chierchia's implementation of exhaustivity posits (scalar or domain) alternatives for *any* and therefore all NPIs. Again, unlike his predecessors, Chierchia stipulates two additional devices: (a) a phonologically null counterpart of *only (*O), and (b) a syntactic [+∑] feature on the NPI.[2] The null *only* O has the property below (Chierchia 2006: (19)):

(19) a. $O_C\,[q] = q \wedge \forall p\,[[p \in C \wedge p] \rightarrow q \subseteq p]$
(*O* is a mnemonic for *only*: q and its entailment are the only members of C that hold)[10]
b. $\|\phi\|_S = O_C\,[\|\phi\|]$, where $C = \|\phi\|^{ALT}$

O creates exhaustification: when O applies to a proposition *p*, we have a reading of *p* such that only *p* is true and all stronger alternatives are false. This delivers a contradiction in the positive sentence, which however is too weak to rule out the *ungrammatical* NPIs. Chierchia acknowledges this insufficiency as the following passage shows: "So why is a sentence like (47a) (an NPI-licensing violation) ungrammatical? There is an impasse here between the way

domain widening explains the distribution of NPIs (using Gricean principles) and the way such principles are typically taken to work…." (Chierchia 2006: 557). He then posits a lexical entry for *any* (his (51)) where *any* is claimed to have an uninterpretable feature [+σ] (Chierchia 2006: 559), ensuring that *any* will be in the scope of some operator. The [+σ] is a syntactic feature that needs to be checked; and the grammaticality of *any* depends ultimately on checking of the [+σ].

Chierchia and Liao (2015; CL) transfer this analysis to *shenme*, which now involves O and the syntactic feature ([∑]) (changed from [σ]). They posit a typology of indefinites based on the interaction between two syntactic features: a *wh*-feature ([WH]) and ([∑]). In their typology, exhaustivity means having the [+∑] feature, and *shenme* is argued to have it. To explain its use as a question word, which *any* lacks, CL claim that *shenme* has an unconstrained *wh*-feature ([u-WH]). An overview of the system is given below; *shenme* and English items are put in the cell according to their features assumed by the CL system.

	[u-WH]	[-WH]-only	[+WH]-only
[u-∑]		*a/some*	
[+∑]-only	*shenme*	*any*	*who*
[-∑]-only			

Table 2: Types of NPI-indefinites in Chierchia and Liao[3]

The unconstrained *wh*-feature explains why *shenme* appears as a question word, and in non-*wh* as an NPI.[4] [+∑], on the other hand, predicts *any*-like behavior since, as we said already several times, there is no other factor in the system that could be used to predict variation. The only difference between *any* and *shenme* is that *shenme* is additionally a *wh*-word. Polarity-wise, they are the same. We show next that this parallelism is confronted with a number of empirical challenges — but before we proceed, we want to offer two notes of caution concerning the foundations of the system concerning these two features.

The lexical entry of *any* in the Chierchia/CL system contains both covert O and the [+∑] feature — and 'exhaustification' seems to be both these things. Chierchia never clarifies the relation between O and [+∑]; the two appear to 'exhaustify' in two parallel levels (lexical pragmatics, syntax). But if [+∑] is, as we think it is intended to, the syntactic reflex O, and O itself is already syntactically present (as the Chierchia system has it), a systemic redundancy emerges — a problem which, to our knowledge, has not been properly appreciated. In any case, an NPI should walk and talk like *any* — and this will be the starting point in our critique next.

The *wh*-feature seems to likewise be unclear. CL connect the *wh*-feature with question word use, but this cannot be sufficient. The Greek FCI *opjosdhipote*, for instance, has a *wh*-feature (*pjos*) but is not used as a question word (Giannakidou 2001, Giannakidou and Cheng 2006). If *wh*-feature means 'used as a question word', morphological *wh*- and interrogative *wh* are collapsed, and this overgeneralizes. If all *wh*-words bear [u-WH], similar behaviors are predicted, but Cheng &Huang (1996), Lin (1996, 1999) show the contrary, at least for Mandarin. Giannakidou and Cheng (2006) also show that *wh*-FCI *na-ge* 'which-CL' differs substantially in distribution from *shenme*. It seems thus more reasonable to view grammaticalization of *wh*-forms into NPIs along different paths, not exclusively derivable from *wh*-feature.

Finally, the two features — [WH] and [∑] seem to bear no relation to one another. It is a mere coincidence that *any* lacks the *wh*-feature, and that *shenme* has it. This, in effect, renders the entire class of indeterminate NPIs (which have the *wh*-feature *and* are NPIs) accidental too. In the competing theory of dependent variable, by contrast, the indeterminate class emerges as prime material for NPI-hood because *wh*-words already denote dependent variables. We come back to this point in section 4.

We move on now to compare *shenme* and *any*. Remember, the CL account predicts only one kind of NPI, i.e. the [+∑] NPI exemplified by *any*. What is at stake is whether the decision to extend the [+∑] of *any* to *shenme* is justified empirically. Since there is no other dimension of

variation, the CL prediction is that the behaviors of *shenme* and *any* should be identical in polarity contexts. This prediction is not borne out. While both *any* and *shenme* appear in nonveridical contexts (cf. Table 1), we find systematic (also distributional) contrasts in these contexts between the two, suggesting that we are dealing with different types of NPIs.

3 *Shenme* is not exhaustive but referentially vague: six diagnostics

What are the crucial properties of *any* that reveal its exhaustive nature, and which we can use as properties that exhaustive NPIs should have? We have already mentioned one core fact: *any* has free choice meaning, and free choice meaning is exhaustified — that much all analyses agree on: either Chierchia style, as in Aloni (2007), Menéndez-Benito (2010), or via a presupposition of exhaustive variation as in Giannakidou 1998, 2001, Giannakidou and Cheng (2006), Giannakidou and Quer (2013). What matters for our purposes is that the behavior of FCIs and exhaustive NPIs can be used as the empirical measure for identifying a set of diagnostics for [+∑] bearing polarity items.

We list core properties of *any* below:

1. *Any* and FCIs have universal-like (*whatsoever*) readings with modals, conditionals, and imperatives.
2. *Any* and FCIs can be subtrigged with a relative clause in an otherwise veridical sentence. In this case again the *whatsoever*-reading arises.
3. *Any* and FCIs have supplementary uses, again akin to *whatsoever*.
4. *Any* and FCIs are implausible with universal modal verbs.

If *shenme* has [+∑], and since there is no other factor of variation, it should behave on a par with *any*. Based on above, we build six diagnostics — but find that *shenme* has the opposite behavior

from *any* patterning with the non-exhaustive Greek *kanenas* and Korean *rato*-NPIs, which have been explicitly argued to lack [+∑] (Giannakidou and Yoon 2016).

3.1 *Shenme* does not receive indiscriminative reading in conditionals

We start with *if*-clauses. The conditional is a good environment for *shenme* (Cheng 1994, Cheng and Huang 1996, Lin 1996, 1998), NPIs and FCIs. In some cases, crucially, only the free choice reading is available. Here is a variant of an example due to Larry Horn (2005), where a*ny* triggers the so-called *indiscriminative, just any* reading (see Haspelmath 1997, also recent discussion in Duffley and Larivee 2010):

(10) If you sleep with (just) anybody you are not being very selective.

Shenme/*kanenas* cannot convey the indiscriminative reading, while the item *renhe* — which arguably has free choice usage (Cheng and Giannakidou 2013) — and Greek FCIs can.

(11) Ruguo ni neng he renhe/*shenme ren shui, na ni hai
if you can with FCI/*NPI person sleep than you yet
zhenshi bu tai tiaoti.
really be not very selective
'If you can sleep with any person, then you are not very selective though.'

(12) An koimasai me opjondipote/*kanenan, den ise ke poly epilektikos.
If sleep.2SG with FCI/*NPI, not be.2SG very selective
'If you are sleeping with (just) anybody you are not being very selective.'

Hence, though *any*, *kanenas*, *shenme*, *renhe*, *opjosdhipote* all appear in conditionals, *any, renhe*, and *opjosdhipote* produce the *just-any* reading — while *shenme/kanenas* do not.[5]

3.2 *Shenme* does not exhaust options in imperatives

Li（1992), Lin (1996, 1998) observe that *shenme* appears in imperatives.[6] Greek NPIs also appear, but contrast with FCIs (Giannakidou and Quer 2013, Giannakidou and Yoon 2016):

(13) Fae kanena glyko!
eat NPI cookie
'Eat a cookie!'

(14) Fae opjodhipote glyko!
eat FCI cookie
'Eat any cookie whatsoever!'

The Greek FCI and *any* induce a reading where the addressee comes to the dessert table with a great appetite, and the speaker invites her to try every option if she wishes to. In such a context, the options are exhaustified (in whatever manner one choses to do that, as we said earlier). By contrast, with *shenme* or *kanena* we have weaker invitations to eat a cookie, it doesn't matter which one. In a context where some cookies are off limits (say, the ones to the left of the table because they are reserved) only the NPI versions are good:

(15) Fae kanena/ #opjodhipote glyko; ala oxi afta giati ine gia tin Mary.
eat NPI/#FCIcookie; but not these because are for the Mary
'Eat a cookie (#any cookie); but not these ones because they are for Mary.'

(16) Chi dian shenme binggan ba; dan bie chi na-xie

eat CL NPI cookie PART but not eat that-CL
yinwei tamen shi liu gei Mali de.
because they be reserved for Mary PART
'Eat some cookies; but not those ones one as they are reserved for Mary.'

(17) Eat any cookies (whatsoever); #but not those ones as they are reserved for Mary.

Notice the contrast with *any: shenme/kanenas*, unlike *any,* are fine in contexts required not to exhaust all options.

3.3 *Shenme* has *referential vagueness* in modal contexts

As reported by Li (1992) and Lin (1998), *shenme* appears in modal contexts — and receives a reading that is referentially vague, as mentioned earlier. *Any*, on the other hand, is impossible in this reading. We designated the reading earlier with 'some or other', but here we use 'but I don't know what' to bring more accurately the non-knowing aspect of it:

(18) Yuehan zuotian haoxiang mai-le shenme/*renhe shu.
John yesterday probably buy-PREF NPI/*FCI book
'John probably bought some/#any book yesterday (and I don't know what book it was).'

(19) I Ariadne isos/bori na agorase xthes kanena/#opjodhipote vivlio.
the Ariadne maybe/might SUBJ bought.3SG yesterday NPI/#FCI book
'Ariadne maybe bought some/#any book yesterday (and I don't know what book it was).'

(20) I Ariadne malon/prepei na agorase xthes kanena/#opjodhipote vivlio.
the Ariadne probably/must SUBJ bought.3SG yesterday NPI/#FCI book
'Ariadne probably bought some/#any book yesterday (I don't know what book it was).'

In Greek, we give examples with both modal verbs and adverbs (which could also co-occur). Importantly, *any* is odd in this context, as we see. The reading of referential vagueness is a reading "where the speaker does not have a particular individual in mind, is not sure about it" (Giannakidou et al. 2014:12), or if she simply feels that identity doesn't matter. As Alonso-Ovalle and Menéndez-Benito (2013) put it, the speaker is ignorant about 'knowing who', and Haspelmath says that "with non-specific phrases, whose referents are not identifiable in principle, the question of identifiability by the speaker does not even arise." (Haspelmath 1997:45). All this is true for FCIs too— but in addition FCIs have exhaustive variation, which *kanenas* and *shenme* were shown to lack; recall the imperative example (see Giannakidou and Yoon 2016 for the same pattern with Korean *rato*-NPIs).

With referential vagueness, we have a mere requirement that there be SOME variation, as shown in the definition of referential vagueness that we adopt (Giannakidou and Quer 2013):

(21) *Referential vagueness: presupposition of SOME variation*

(i) A sentence containing a referentially vague indefinite α will have a truth value iff:

$\exists\, w_1, w_2 \in W$: $[\![\alpha]\!]^{w1} \neq [\![\alpha]\!]^{w2}$; where α is the referentially vague indefinite.

(ii) The worlds w_1, w_2 are epistemic alternatives of the speaker: $w_1, w_2 \in$ M(speaker), where M(speaker) is the speaker's belief state, the worlds compatible with what she believes/knows.

(iii) The speaker does not know which value is the actual value. (vagueness, ignorance)

Referential vagueness, as we see, expresses the epistemic indeterminacy of the speaker regarding the value of α. The epistemic state of the speaker is modeled standardly as a set of worlds M (speaker) compatible with what the speaker knows or believes in the base world w. The speaker

is in a state of referential vagueness if she has at least two possibilities in mind as values for α. Referential vagueness is thus a *minimal c*hoice, not exhaustive choice. If the speaker has this minimal choice, she cannot know which value is the actual one, and this captures the 'ignorance' effect — though we do not, strictly speaking, talk about ignorance since speakers have choices between possibly known values. Referential vagueness is more accurately understood as indeterminacy of reference rather than ignorance, which implies complete lack of knowledge. Most importantly, it is distinct from free choice which imposes exhaustive variation (i.e. replacing the existential quantifier with a universal in the definition above). Space prevents us from expanding here, and further technical details are not crucial anyway.

To go back to our initial examples (18), (19), and (20), if *any* and *shenme* are both [+∑] and nothing else, we cannot explain why *any* is odd but *shenme* (and *kanenas*) are fine. The difference again reveals a contrast in requiring (*any*) or not (*shenme*) to exhaust all values.

3.4 *Shenme* does not allow subtrigging

In veridical simple past sentences, both *any* and *shenme* are ungrammatical (as observed with all NPIs). However, *any* improves when modified by a relative clause – a phenomenon known as *subtrigging* (LeGrand 1975). In subtrigging, *any* is interpreted again exhaustively (see some classic discussion in Dayal 1997, Giannakidou 2001, Horn 2005). *Shenme* and *kanenas*, crucially, are unacceptable, and we add the *rato*-NPI which shows the same behavior.

(22) John bought any book *(that he could find).

(23) *Yuehan mai-le (ta neng zhao-dao de) shenme shu.
John buy-PERF he can find-PERFREL NPI book
Intended: 'John bought any book he could find.'

(24) *O Janis aghorase kanena vivlio (pou vrike stin aghora).
the John bought.3SG NPI book REL found.3SG in-the market
Intended: 'John bought any book that he found on the market.'

(25) *Con-un ku-ka palkyenha-n etten-chayki-rato sa-ss-ta.
John-TOP he-NOM found-REL NPI.book buy-PST-DECL
Intended: 'John bought any book that he found.'

Thus, *kanena, rato*-NPI and *shenme* form a class of NPIs that do not get subtrigged, unlike *any*. They contrast also with the exhaustive *renhe* in Mandarin and *opjodhipote* in Greek, which can undergo subtrigging in veridical contexts as expected:

(26) Yuehan mai-le *(ta neng zhao-dao de) renhe shu.
John buy-PERF he can find-PERF REL FCI book
'John bought any book he could find.'

(27) O Janis aghorase opjodhipote vivlio *(vrike stin aghora).
the John bought.3SG FCI book found.3SG in-the market
'John bought any book that he found on the market.'

Hence, the subtrigging diagnostic reveals another difference between the *shenme* NPI class and *any* that doesn't follow from the [+∑] analysis.

3.5 *Shenme* cannot be used in supplementary contexts

Exhaustive NPIs and FCIs exhibit supplementary use (Horn 2005); but non-exhaustive NPIs do not. Regardless of what the proper analysis is, it suffices to see the asymmetry between

exhaustive *any/renhe* and FCIs, on the one hand, and non-exhaustive NPIs *kamia/shenme* and *rato*-NPIs, on the other.

(28) Pick a card, any card! [English]

(29) Pare mia karta, opjadhipote/#kamia karta! [Greek]
take.IMP.2SG one card, FCI/#NPI card
'Take a card, any card!'

(30) Tiao yi-zhang ka ba, renhe/#shenme ka! [Mandarin]
pick one-CL card PART FCI/#NPI card
'Pick a card, any card!'

(6) Khatu-lul hana kolla-la, etten-khatu-na/#etten-khatu-rato. [Korean]
card-ACC one pick-IMP FCI.card/#NPI.card
'Pick a card, any card.'

Shenme, kamia, rato-NPIs again form a natural class, opposing *renhe* and [+∑] bearing *any*.

3.6 *Shenme* is fine with universal modal verbs

Exhaustive NPIs and FCIs are known to be implausible with universal modal verbs (Giannakidou and Quer 2013, Menéndez-Benito 2010); but *shenme* and Greek NPIs are fine in these contexts (recall also the examples in 3.3.):

(7) a. #Ariadne must marry any lawyer. [English]

b. #I Ariadne prepi na pandrefti opjondhipote dikigoro. [Greek]
the Ariadne must SUBJ marry FCI lawyer
Intended: 'Ariadne must marry any lawyer.'

c. #Ta bixu dei jia gei renhe lvshi. [Mandarin]
she must necessarily marry for FCI lawyer
Intended: 'She must marry any lawyer.'

(8) I Ariadne prepi na pandrefti kanena dikigoro. [Greek]
the Ariadne must SUBJ marry NPI lawyer
'Ariadne must marry a lawyer (to get out of financial trouble; I don't know who).'

(9) Ta bixu dei jia gei shenme lvshi cai neng [Mandarin]
she must necessarily marry for NPI lawyer then can
jiejue jingjishangde kunnan.
solve financial trouble
'She must marry some lawyer to get out of financial trouble (I don't know who).'

The same pattern is attested with *rato*-NPIs (Giannakidou and Yoon 2016):

(10) Maria-nun {amwu/etten}-pyenhosa-hako-rato kyelhonhay-yahan-ta. [Korean]
Maria-TOP NPI.lawyer marry-must-DECL
'Maria must marry some lawyer (to get out of financial trouble; I don't know who).

The literature agrees that the reason why *any*, *renhe* and FCIs are not allowed with universal modals is that they license an exhaustive reading which is implausible (Menendez-Benito 2010,

Giannakidou and Cheng 2006; Giannakidou and Quer 2013, Giannakidou and Yoon 2016 for why it that; the precise details are not crucial to our argument). In contrast, *kanena/shenme/rato* are grammatical, receiving existential interpretation: the sentences with the NPIs are true in a context where the family is in dire financial situation, and Ariadne (or Maria) must save the family by marrying a rich guy, e.g., a lawyer.

The contrastive behaviors of exhaustive NPIs, and the *shenme/kanenas* NPIs can be replicated with epistemic universal modals. Consider the context in which the speaker is talking with John, noticing that he is well informed about Mary's illness:

(11) a. #She must have talked to any doctor. [English]

b. #Prepi na milise me opjondhipote giatro. [Greek]
must SUBJ talk with FCI doctor
Intended: 'She must have talked to any doctor.'

c. #Ta kending he renhe yisheng tan-guo-le. [Mandarin]
she must with FCI doctor talk-COML-PERF
Intended: 'She must have talked to any doctor.'

(12) a. She must have talked to a doctor. [English]

b. Prepi na milise me kanenan giatro. [Greek]
must SUBJ talk with NPI doctor
'She must have talked to a doctor (I don't know who).'

b. Ta kending he shenme yisheng tan-guo-le. [Mandarin]
she must with NPI doctor talk-COML-PERF
'She must have talked to some doctor (I don't know who).'

We see again that *any*, *renhe* and FCIs are implausible given that hospitals have many doctors and that, in order to be informed about someone's illness, you don't need to talk with *all* doctors. The NPI statements, on the other hand, simply say that Mary talked to some doctor unspecified to the speaker. This is the weaker, referentially vague reading.

3.7 Summary

In summary, our *shenme* specific and cross-linguistic data show that *any* and *shenme* do not belong to the same class of NPIs. We put together a number of tests, and found *shenme* to pattern with non-exhaustive NPIs in Greek and Korean, receiving the reading of referential vagueness, which is presupposition of *non*-exhaustive variation. The [+∑] analysis of CL cannot predict the differences we identified here. Notice also that, in Mandarin, we did find an item that behaves like [+∑] bearing *any— renhe.* In the next section, we offer one more argument against a unifying analysis of *shenme* and *any* based on child language data.

4 An argument from language acquisition: dependent variable

Lin (2015) hypothesizes that if *any* and *shenme* represent the same kind of NPI, it is highly likely to observe similar developmental pathways during the acquisition. However, corpus data collected from spontaneous child speech in the CHILDES database (MacWhinney 2009) show the opposite. Consider first the graph below, in which the distribution of *any* and *shenme* in child language development is presented (adapted from Lin 2015: Chapter VI: Figure 11 and 12). Darker colors stand for stronger negative environments.

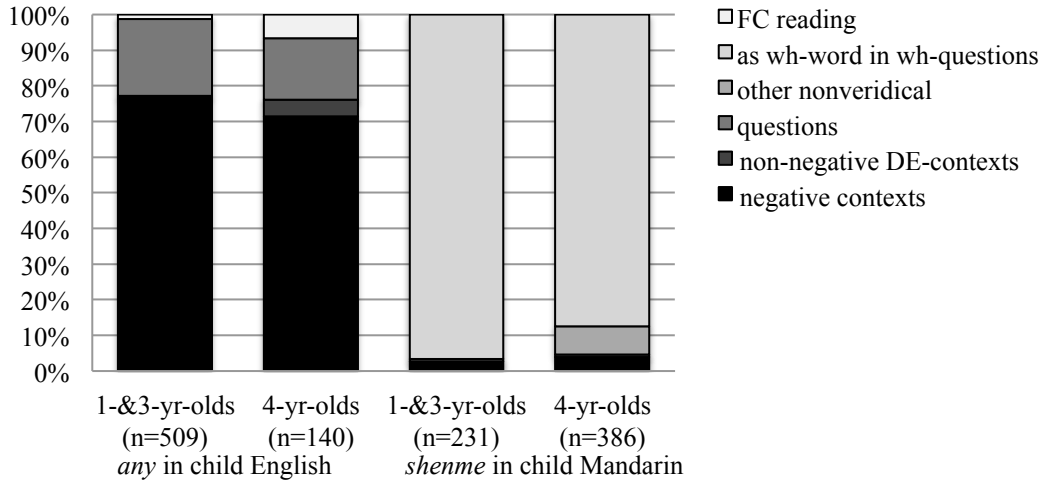

Figure 2: Distribution of *any* and *shenme* in child language development

The graph demonstrates that in both child English and child Mandarin two distinct stages are attested in the acquisition of the NPIs, both with age four as a watershed.[7] For *any*, it is found that children start out using it either in the scope of a sentential negation or in polar questions while also using it in non-negative nonveridical contexts besides polar questions (e.g. in conditionals) approximately after the age of four. After this age, children are also capable of using *any* as having a free choice interpretation.[8] Mandarin children's acquisition of *shenme*, on the other hand, exhibits a different learning pattern: they start out using *shenme* almost only in *wh*-questions as expressing a question meaning but switch to a broader analysis of the NPI such that they also use *shenme* in a variety of nonveridical contexts that are not *wh*-questions later on.

According to Lin et al. (2014) and Lin (2015), the learning pathway of *shenme* can be explained if along with *kanenas*, *shenme* is an NPI that contains a *dependent* variable. Cheng and Giannakidou (2013) and Giannakidou and Cheng (2006) already claimed that Mandarin FCIs, including *renhe* have dependent variables (of type *i*). Lin and Lin et al. generalize this position to argue that the Mandarin NPI *shenme* also contains dependent variables (of the type *e*).

What does it mean for a variable to be dependent? This question is discussed in detail in Giannakidou (1998, 2011) and Giannakidou and Quer (2013), and we offer only a brief outline

here. The discussion of dependent variable, it must be noted, starts with work by Farkas (1998) on distributive reduplicated indefinites in Romanian. A dependent variable, broadly speaking, is one whose assignment function is constrained. A useful example to understand the idea is the gender presupposition on pronouns suggested by Heim (2008). *He* and *she*'s assignments are constrained to domains with only male or female values.

Anaphoric variables are also constrained in that they must identified with an antecedent — but unlike Heim's gender presupposition, the anaphoric variable's constraint requires that there be a higher element to 'license' the variable. (Progovac 1994 in fact treats NPIs as syntactic anaphors.). Reinhart and Reuland 1993, in the same spirit, offer an account where Conditions A and B govern the well-formedness and interpretation of reflexive predicates, and this in turn constrains the possible assignments of values to variables. Their approach is among the first to motivate semantic and syntactic constraints working together to restrict and predict distribution. Likewise, a distributive variable (*The boys ate two cookies each*) is constrained by the need to have a plural antecedent: **John ate two cookies each* (see Henderson 2012, Farkas 1998, and Pereltsvaig 2008); and a controlled subject (as recently argued in Grano 2011) is also dependent and in need to be licensed by a higher subject.

In all these cases, the dependent variable creates a *semantico-syntactic* dependency at the logical form, and establishes a syntactic dependency ('licensing') that is motivated semantically. Framing the discussion of (at least some) NPIs in this context, as Giannakidou 1997, 1998 suggested, allows us to reduce a portion of polarity phenomena in language to constraints on how variables are interpreted, which we know are operative in grammar anyway. Giannakidou defines the dependent variable relevant for the NPI as *non-deictic,* i.e. the variable cannot be interpreted as a free variable (Giannakidou 2011):

(13) Dependent *non-deictic* variable

A variable x_d is dependent iff the x_d cannot be interpreted as a free variable.

The non-deictic dependency is reflected in the 'logical form' by designating above the dependent variable as w_d. Another avenue would be to represent the dependent vs. non-dependent contrast as belonging to different systems. In such framing, the idea of colored variables (as suggested e.g. in Gardent and Kolhase 1996) may be useful, but for space reasons, we will not further discuss other options here.

In a classic Heim-style analysis, the dependent non-deictic variable cannot be closed under *text level* existential closure, or it cannot introduce a discourse referent (which is closer to what Giannakidou 1998 proposed). Such variables will not be able to be used in veridical sentences because they cannot receive a value there; they would have to be interpreted as free variables or by text level closure, since there is no operator. Under negation, existential closure can apply. Generally, a dependent variable of this kind is restricted to contexts where there is an operator it can be bound by, or can be in the scope of. This explains why a dependent variable always appears to be narrow scope and the item containing it is anti-specific. We cannot further expand here, the reader is referred to the cited works for details.

Question word variables, crucially, are also dependent non-deictic: they occur only as bound by the Q operators and are never free. They cannot be interpreted as free variables. Thus, once we acknowledge dependent variables as a class, the transition from question word to NPI seems simple. In fact, within this framework, such transitions are predicted to be common — and this indeed appears to be the case as they characterize the broad class of *wh*-indeterminates.

In contrast to Chierchia and Liao, the dependent variable analysis accounts for the NPI-status of *shenme — and* its transition from a question word to an NPI at the same time. The extension from *shenme* as question word to dependent variable NPI is also evident in its acquisitional path, as we showed. Lin argues for an acquisitional process in which children start

with a narrow assumption that *shenme* is a question word but switch to a reanalysis of it being a broad NPI due to the presence of a dependent variable later on. When children make this initial analysis of *shenme* as a question word, *they have already acquired that it contains a dependent variable*. After this initial binary classification (a variable can be either dependent or non-dependent, cf. Giannakidou 2011), children proceed to extend the distribution of the dependent variable to other contexts in which it can be bound, namely all kinds of nonveridical contexts.

It is not clear to us that the Chierchia and Liao system can explain the observed transition in acquisition of *shenme*. In their system, the two features WH and [+∑] do not correlate: i.e. *shenme*'s [u-WH] does not necessarily entail that it must also be an NPI (which means bearing [+∑] or vice versa. The extension of *shenme* from a *wh*-word to a broad NPI in acquisition would therefore merely be a coincidence, rather than a predicted outcome.

5. Conclusion

In this work, we considered Chierchia and Liao's position that *shenme* is a [+∑] bearing exhaustive NPI like *any.* The [+∑] is posited axiomatically within their system, but we set out to test whether it is empirically justified for *shenme*. We established six diagnostics, i.e. properties that [+∑]-bearing NPIs such as *any* exhibit, and we found contrasting behavior of *shenme* in every single case. *Any* and *shenme,* therefore, cannot be the same kind of NPI. In all the diagnostics, *shenme* was shown to pattern with the non-exhaustive NPIs identified in the literature, such as Greek *kanenas* and Korean *rato*-NPIs. We conclude therefore that the *no variation* position— namely that "with NPIs and FCIs we *have* to exhaustify" (Chierchia 2013:8, emphasis in the original) — has no empirical grounding, and that the Chierchia and Liao proposal that *shenme* has [+∑] cannot be maintained without compromising empirical adequacy.

A Chierchia theorist might try to downplay the implication of our findings by holding on to [+∑] — as expected, since it characterizes axiomatically all NPI and FCI classes in that

system — while conceding that *shenme/kanenas/rato*-NPIs might behave differently *because of other factors*. But if we acknowledge other factors, then we have given up the no variation position, indeed as we are arguing we need to do. Crucially, Chierchia and Liao posit no other factors in NPI-*shenme* and *any:* as NPIs, they both have [+∑] and *nothing else*. If the account can be augmented with constraints that derive the observed properties of *shenme* (referential vagueness and dependent variable), that would mean either giving up [+∑] for *shenme*— which is precisely what we are arguing for — or counteracting it by additional rules which would render [+∑] inactive, thus begging the question of why posit it in the first place. In either case, the Chierchia and Liao [+∑] and *nothing else* position can clearly not be maintained.

More conspicuously, the study of the NPI exhibited by *kanenas, shenme* and *rato*-NPIs shows that constraints on the interpretation of variables play a broader role in grammar, since they appear to be decisive in a number of polarity items crosslinguistically. We think this is a good result for syntax-semantics. As for polarity in particular, the difference between the *any*-type and the *shenme*-type of NPI shows that no empirically adequate understanding of NPIs can be achieved if we assume a non-existent unifying property of *all* NPIs — ignoring thereby the class of non-exhaustive NPIs, or trivializing the differences between these and the exhaustive NPIs and FCIs.

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[1] Liao (2011) presents also examples such as the following:

(i) Xiaohua youqian de Zhangsan bu qu, pianpian qu-le ge shenme gongren.
Xiaohua rich DE Zhangsan not marry, unsuitably marry-PERF CL what laborer
'Xiaohua didn't want to marry Zhangsan, who was rich, but, inappropriately, married *some* laborer.'
(Liao 2011, p. 80)

We thank one of the reviewers for bringing this case to our attention. Two things are noteworthy about (i). First, Liao gives a translation of *shenme* with *some* and not *any,* and this is in agreement with what we are arguing here that the reading of *shenme* is not equivalent to *any.* Second, Liao points out that the sentence is veridical. Is this a problem for the generalization that the NPIs appear in nonveridical contexts? Crucially, this example reminds us of the well-known cases of NPIs (e.g. *any)* appearing in positive contexts such as below. These data are known at least since Linebarger (1980):

(ii) I regret that he has any friends.

(iii) I am glad we got any tickets at all. (from Kadmon and Landman 1993)
Negative expectation: I expected that it would be hard or impossible to find tickets.

Giannakidou (2006) discusses these cases in the context of 'rescuing' by a global negative inference (implicit negation). She argues that rescuing by a possibly contextual negative inference is a secondary mode of licensing, applicable to all NPIs (though NPIs may differ on the degree to which they undergo rescuing). Just like in English (iii), in the Mandarin (ii), it is clear that the speaker does not approve Xiaohua having married some unremarkable and not rich laborer. So, there is implicit negation in the context, just like with *any* and *at all*; we therefore

take (i) to suggest that some implicit negation licensing happens with *shenme* too. For a recent experimental study showing that implicit negation licensing is distinct from regular licensing, see Xiang et al. (2016).

[2] Because null O is posited axiomatically without argument, it has been criticized in the literature as *ad hoc* (see Geurts 2009, 2013, Giannakidou and Quer 2013 for more discussion). We will not add to the criticism here, but it important to remember that, *ceteris paribus*, a theory that does not add to the data empirically unmotivated devices should be preferred, the criterion being that it is more faithful to what is actually the case.

[3] The above is adapted from Chierchia and Liao (2015: (59)). Logically speaking we expect a type of indefinite that has a negative ∑-feature, an option not included in CL. To provide a complete picture of how their system looks like, we add a column headed by "[-∑]-only".

[5] A reviewer suggests that it is hard to distinguish the meaning of *renhe* and *shenme* in conditionals. But as we just illustrated, it is still possible to find a way to show, via the indiscriminative reading test, that *renhe* behaves on a par with *any,* but *shenme* does not. The reviewer suggests further that if we add *dou,* the difference is neutralized:

(i) Ruguo ni you shenme wenti, dou keyi lianxi wo.
if you have NPI question DOU can contact me
'If you have any questions, you can contact me.'

(ii) Ruguo ni you renhe wenti, dou keyi lianxi wo.
if you have FCI question DOU can contact me
'If you have any questions, you can contact me.'

We agree with the reviewer that it is hard to detect a difference if *dou* is used. Following Cheng and Giannakidou (2006), Cheng (2009), and Xiang (2008), we treat *dou* as a maximality operator, and argue that the addition of *dou* must be held accountable for creating the *any*-like reading. We thank the reviewer for this insight.

[6] Lin (1998) claims that in imperatives, *shenme* is only grammatical with the quantifier *dian* (lit. 'a little bit'). However, as the following example illustrates, an imperative with *shenme* is also possible in the absence of *dian*.

(i) Ni qu mai ben shenme shu kan ba.
you go buy CL NPI book read PART
'Go to buy a book (some book or other) to read!'

[7] The reader is referred to Lin et al. (2014) and Lin (2015) for an elaborate explanation of the attested learning pathways under a conservative widening learning hypothesis.

[8] Two diagnoses are employed to judge whether *any* has a free choice interpretation: paraphrasing *any* by *whatever* or *whichever* and substituting *any* with another weak NPI *ever*.