The myth of exhaustivity for *all* NPIs

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1 Introduction

In some recent works on negative polarity, *exhaustivity* is taken to be the single defining property that characterizes all negative polarity (NPI) and free choice (FCI) paradigms. This view is perhaps most clearly expressed in the claim in (1):

(1) *Exhaustivity-for-all hypothesis*: "in contrast to ordinary or plain indefinites, with NPIs and FCIs we have to exhaustify" (Chierchia 2013: 8; emphasis in the original)

For Chierchia (and works following him) exhaustification is proposed as an axiom of polarity: it is claimed to be the defining ingredient in *all* NPI/FCI classes. My goal in this paper is to show that is a mistake.

I present three NPI paradigms in three typologically distinct languages— Greek, Korean, and Mandarin Chinese— that have been described in the literature as *non*-exhaustive, and which contrast empirically in a number of significant ways with the presumably exhaustified NPI *any*. My first conclusion will therefore be that the exhaustivity-for-all position is empirically unjustified as a general theory of polarity. My second conclusion will be that when we actually consider what it means to exhaustify, a Chierchia style implementation based on his two covert devices of O(nly) and $[+\Sigma]$ is undesirable for a number of reasons. First, these devices are posited ad hoc without empirical evidence, and while O bears the onus of exhaustification, it is itself *not* sufficient to derive the licensing of NPIs in nonveridical environments, *any* included. Chierchia's theory stipulates licensing only in downward entailing contexts and relies solely on the checking of $[+\Sigma]$ — regressing, in essence, to a Klima (1964) syntactic position, deemed unsatisfactory since its inception. Application of O(nly) alone cannot constrain the distribution in the appropriate way, and it cannot predict the correct set of licensers for *any*, namely

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nonveridical expressions. Overall, I will show that the Chierchia-style account fails to predict even the distribution of *any*, the very item it is designed for.

Though the idea that there is a single source of all polarity may appeal to our reductionist sense that it would be a good thing to have one criterion for all NPIs, my goal here is to show that the reductionist move is not supported by evidence. Worse, *exhaustivity-for-all* goes *against* all available evidence. The only way to maintain it, in view of the numerous contrasts we will see in section 4, would be to complicate the system by adding composition external rules as *dei ex machina* (see, e.g., Chierchia & Liao 2015); and even these additions end up accounting for a very limited set of data.

Overall, I will argue, (1) ends up functioning as the Procrustean bed of polarity: as in the myth of Procrustes, who forced travelers to fit into his iron bed, and who stretched or trimmed those who did not (an operation the traveller is never reported to have survived), (1) forces us to cut or stretch the data to fit. Such a Procrustean criterion serves the analyst of polarity phenomena just as poorly as Procrustes' bed did those travelers.

I begin, in section 2, by presenting the paradigms of NPIs to be discussed (including, of course, *any*). I then present, in section 3, the Chierchian implementation of (1) and discuss its foundational analytical shortcomings. In section 4, we see that Greek, Mandarin and Korean NPIs differ from *any* with respect to six widely known diagnostics and this is a contrast within the NPI class that is not predicted by any existing accounts based on (1). Finally, the Chierchian analysis falls short of explaining even the distribution of *any* which, as is well known, appears in a broad spectrum of nonveridical contexts, and in implicitly negative contexts where there is no negative or nonveridical operator in the structure to license it.

2 Two kinds of NPIs in nonveridical contexts

I start with a basic description of three NPIs: *any* (Klima 1964; Ladusaw 1980; Linebarger 1980; among numerous others), Greek *kanénas* (Giannakidou 1997, 1998, 2011), and Mandarin *shenme* (Li 1992; Lin 1996, 1998; J. Lin 2015; J. Lin et al. 2014; Giannakidou & J. Lin 2016). I give indicative examples below:

(2) a. Nicholas didn't see **anybody**. (English)
b. *Nicholas saw **anybody**.

(3) *(Dhen) ídhe **kanénan** o Jánis.
not saw NPI.ACC the Janis.NOM
'Janis didn't see anybody.' (Greek)

(4) a. Yuehan zuotian mei-you mai **shenme** shu.
Yuehan yesterday not-have buy NPI book
'Yuehan didn't buy any books yesterday.' (Mandarin)
b. *Yuehan zuotian mai-le **shenme** shu.
Yuehan yesterday buy-PERF NPI book

In (2)-(4), *any*, *kanénas* and *shenme* are sensitive to the presence of negation; without it, they are ungrammatical. *Shenme*, in addition, belongs to the class of *wh-indeterminates*, and can be used also as a question word as in (5):

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

NPIs, including wh-indeterminates, generally appear not only in the scope of negation, but also in the scope of operators that are not negative but merely *non-veridical*, e.g., in questions, with modal verbs and adverbs, and in imperatives. In such contexts, *any* receives the so-called *free choice* reading, which I indicate in (6) and (7) with *whatsoever*. The Greek NPIs *kanénas* and *típota* lack this reading; for the *whatsoever* reading, the FCI *otidhípote* is used instead:

(6) Sta genéthliá tou, o Jánis borí na fái {*otidhípote*/**#típota**}.
in-the birthday his, the John can SUBJ eat FCI/NPI
'On his birthday, John may eat anything whatsoever.'

(7) Fére {*otidhípote*/**#típota**} sto párti tou.
bring.IMP.2SG FCI/NPI the party his
'Bring anything whatsoever to his party.'

Lacking free choice, the NPI is interpreted as a weak indefinite with a narrow scope anti-specific reading, noted first in Giannakidou (1997) and rendered as *some or other*. The narrow scope reading correlates with the NPI status.

(8) O Nikólas borí na milísi me {**kanénan**/*opjondhípote*} fititi.
the Nicholas may SUBJ talk with NPI/FCI.DET student
'Nicholas may talk to {some student or other/any student whatsoever}.'

(9) Míla me {**kanénan**/*opjondhípote*} fititi.
talk.IMP.2SG with NPI/FCI.DET 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 only a non-free choice reading (Giannakidou 1997, 1998; Giannakidou & Quer 2013, Giannakidou & Yoon 2016) in modal contexts, unlike *any*, as we see. Korean *rato*-NPIs and Mandarin *shenme* align with *kanénas* and appear with the same non-free choice reading in modal contexts (cf. Lin 1996; J. Lin 2015; Giannakidou & Lin 2016):

(10) Yuehan haoxiang mai-le **shenme** shu.
John probably buy-PERF NPI book
'John probably bought some book or other (I don't know which book).'

The non-free choice reading conveys referential indeterminacy, ignorance of the speaker about the exact identity of the book. This is labeled *referential vagueness*

in Giannakidou & Quer (2013). 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). With referential vagueness, the speaker considers alternatives. But, as Haspelmath says, "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). Other labels have been used for this type of alternative-inducing but not free choice indefinite such as 'low referential' (Partee 2008), 'epistemic' (Alonso-Ovalle & Menéndez-Benito 2013), 'modal' (Alonso-Ovalle & Menéndez-Benito 2010), 'irreferential' (Jayez & Tovena 2007), 'extremely non-specific' (Farkas 1997), or, generally, 'ignorance' indefinite. These indefinites are typically used to create rhetorically weak statements, and have been argued to have a presupposition of minimal, *not* exhaustive variation (Giannakidou and Quer 2013, Giannakidou &Yoon 2016).

Referentially vague indefinites need not be NPIs (Spanish *algun* is not, for example). But NPIs with dependent variables, such as the Greek, Mandarin and Korean NPIs, are typically interpreted as referentially vague (Giannakidou & Yoon 2016). NPIs of this kind are actually quite common across languages, and have been identified in Dutch (Hoeksema 1999), Salish (Matthewson 1998), Albanian (Xherija 2014), Bengali (*ka*-indefinites, Ullah 2016). For more references, see Giannakidou (2011). English appears to lack this type of NPI. *Ever* seems to be the closest equivalent to it, which also lacks free choice.

To see why the referentially vague reading, in contrast to free choice, is not exhaustive, consider the cases below with exceptive continuations:

(11) Borí na mas ídhe **kanénas**.
can SUBJ us saw NPI-person
'Someone (no idea who) could have seen us.' NPI: *referentially vague*
OK: But not John! He can hardly see in the dark.

(12) Borí na mas ídhe *opjosdhípote*.
can SUBJ us saw FCI-person
'Anybody (whatsoever) could have seen us.' *any*, FCI: *free choice*
But not John! He can hardly see in the dark.

The exceptive is odd with the FCI and *any*, but the Greek NPI allows it. The stronger rhetorical force of free choice conflicts with the exceptive. The Greek NPI, on the other hand, creates a weaker statement that is compatible with the exceptive. This, along with the earlier data, allows us to see that in the same contexts an NPI like *any* receives an exhaustive interpretation, and contrasts with the Greek type of NPI, which we can think of as a "non-exhaustive" NPI.

The main question of this paper is whether it makes sense, given this basic difference, to treat the non-exhaustive NPI as exhaustified. The Chierchian thesis (1) says that we have to. But then the differences in interpretation that we just pointed out, in the same contexts, cannot follow. The other stance is to deny that the Greek NPI is exhaustified. In this view, we give up (1), and we have two kinds of NPIs: exhaustified and non-exhaustified, as I have been suggesting since Giannakidou 1994, 1995, 1997 (when the Greek data were first presented in full). But denying

exhaustification for a subclass of NPIs undermines the very goal of the reductionist enterprise— it is therefore no surprise that (1) based accounts typically either ignore the Greek, Mandarin and Korean NPI data, or downplay their relevance for *any* by denying their status as NPIs "proper". In the extreme case, the Greek NPI type is indeed treated as exhaustified, as in Chierchia & Liao's (2015) proposal for *shenme*. When this happens, the result is a system that explains a remarkably small number of data with a remarkably large number of stipulations— and one needs to wonder whether going down that path is better than giving up the idea of (1). In Giannakidou & Lin (2016) the exhaustive analysis for *shenme* is refuted, and I will borrow some of the empirical points in section 4.

If one looks at the distribution of both the *any*-type and the type exemplified by the Greek, Mandarin and Korean NPI, one finds no empirical basis for treating the latter as not proper. The only reason one might think of *any* as "more proper" or more "stereotypical" than *kanénas*, *shenme* and the *rato*-NPI is historical accident: the NPI literature started with, and focused for many years on *any* (since Klima's (1964) seminal work); it was only in the mid-nineties that the Greek and Mandarin NPIs facts became known, approximately at the same time (Giannakidou 1994, 1995, 1997; Lin 1996, 1998).

Thirty years of English-based polarity doctrine may have created the illusion that only *any* deserves the moniker of proper NPI; but treating the newly discovered NPIs as "not proper" represents nothing but a highly normative stance; especially given that both *any* and the Greek, Mandarin and Korean NPIs *appear in the same contexts, namely nonveridical contexts*. These include, crucially, modal contexts, imperatives, and questions, which are not negative and not downward entailing (DE). In the Chierchian tradition, there is a strong tendency to ignore this similarity of distribution, and to focus instead on *any* in negative contexts (including DE). This narrow focus misleads us into believing that this is the only relevant set of data, thereby continuing to treat *kanénas*, *shenme*, and *rato*-NPIs as exceptional in being licensed by nonveridicality. This ends up damaging our understanding of the very sensitivity of *any*, and stands in the way of an accurate understanding of what kinds of polarity sensitivities exist out there and should be accounted for.

As a general pattern, we find NPIs in nonveridical contexts — including, to use Zwarts' (1995) terminology, *minimally* negative (i.e. DE) and *classically* negative contexts (i.e. anti-additive and anti-morphic), as well as non-negative contexts such as questions, modals, imperatives (Bernardi 2002; Hoeksema 2008; Giannakidou 1998, 2001, 2006, 2011; Zwarts 1995; and others).The Greek, Mandarin, and Korean NPI, as well as the *any*-NPI type appear in nonveridical contexts. Since the individual distributions have been exemplified in previous works, we need not review them in detail here. Surprisingly, sometimes nonveridicality is seen *in opposition* to negation and DE, but, as can be seen, and is stressed in Giannakidou (1997, 1998), negative and DE functions are merely proper subsets 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] (from Giannakidou & Lin 2016), I list representative distributions of the NPIs at hand: English *any*, Mandarin *shenme*, Greek *kanénas*, Korean NPI, and FCIs such

as Greek *otidhípote*‘anything’.

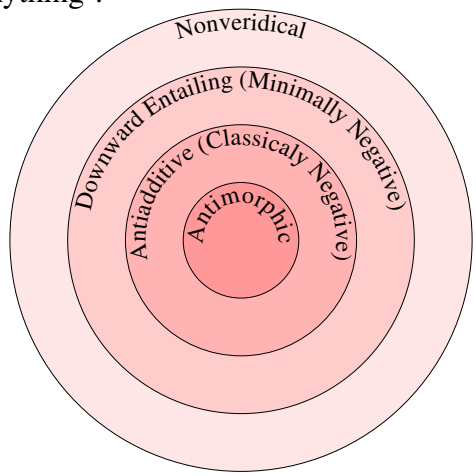

Figure 1: The Giannakidou/Zwarts Negative/Nonveridical Hierarchy of polarity contexts

The similarity in distribution is overwhelming. NPIs and FCIs appear in the same nonveridical environments; the only difference between *kanenas, shenme, rato*-NPI, and *any*/FCIs is that the latter get free choice interpretation in non-negative contexts. For more data illustrating the non-free choice readings of *shenme* see Cheng and Giannakidou (2013). Crucially, what we retain from Table 1 is that *any* is not different in distribution than the Greek, Korean and Mandarin NPIs, hence a successful theory of *any* must account for its appearance in all of the above. The (1)-based accounts are loudly silent on this issue, and continue to deny that non-veridicality is relevant for *any*.

Environments	*any*	*shenme*	*kanénas*/ *rato* NPI	Greek FCI: *otidhípote*
Negation, Negative Quantifier	OK	OK	OK	*
Questions	OK	OK	OK	OK
Antecedent of conditional	OK	OK	OK	OK
Restriction of *every/all*	OK, FC	OK	OK	OK
DE quantifiers (e.g. *few*)	OK	OK	OK	OK
Modal verbs (e.g. *may*)	OK, FC	OK	OK	OK
Nonveridical verbs (e.g. *hope*)	OK, FC	OK	OK	OK
Imperatives	OK, FC	OK	OK	OK
Habituals	OK, FC	OK	OK	OK
Before-clauses	OK	OK	OK	OK
Future	OK	OK	OK	OK
Affirmative past	*	*	*	*

Table 1: Distributions of *any*, *shenme*, *kanénas*, *rato*-NPI, and *otidhípote*(FCI); FC means ‘free choice reading is possible’

3 Exhaustification and licensing Chierchia-style

Chierchia's program is initiated in his 2006 article published in *Linguistic Inquiry*, inspired by Kadmon & Landman's (1993) *domain widening*, and Krifka's (1995) semantics of *any* (see also earlier works by Fauconnier (1974) and Horn (1972) on pragmatic scales). Unlike Chierchia, neither Kadmon & Landman nor Krifka propose their theories as general theories for *all* NPIs; rather, they suggest them with reference to *any* (and Krifka offers also an account of English minimizers). Krifka, in addition, acknowledges *two* versions of *any*, emphatic and non-emphatic. There are additional voices in the recent literature claiming that not all uses of *any* are scalar (Duffley & Larivée 2010; Giannakidou 2011).

Chierchia posits (scalar or domain) alternatives for *any*, and stipulates two additional devices: (a) a phonologically null counterpart of ONLY (O) and (b) a syntactic $[+\Sigma]$ (appearing also as $[\sigma]$) feature on the NPI. As Geurts (2009) and Giannakidou & Quer (2013) point out, no independent evidence of the existence of these devices is provided. Moreover, O and $[+\Sigma]$ do not follow from the use of alternatives; all standard theories of focus (Rooth 1985, 1992; Beaver & Clark 2008 and references therein) posit alternatives for focus, but exhaustification does not characterize all uses of alternatives: it is added only when the focus particle *only* (or some equivalent) is present in the sentence. The syntactic additions of O and $[+\Sigma]$ whenever we have alternatives are thus deviations from the standard theory of focus, and their acceptance must rest entirely on how successful they are at capturing the distribution of polarity items. Chierchia (2006) defines O(NLY) as follows:

(13) a. $O_C(q) = q \wedge (\forall p)\Big[\big(p \in C \wedge p\big) \implies q \subseteq p\Big]$
(O is a mnemonic for ONLY: q and its entailments are the only members of C that hold)
b. $||\phi||_S = O_C\big(||\phi||\big)$, where $C = ||\phi||^{\text{ALT}}$

O is posited to be a syntactic object like the focus particle ONLY: when O(NLY) applies to a proposition p, only p and its entailments are true, and all alternatives not entailed by p are false. This works well with negation, but delivers a contradiction in the positive sentence. Consider first negation:

(14) a. O [There aren't any cookies in the kitchen.]
b. ALT-D = $\{D' \mid D' \subseteq D\}$; $D =$ cookies in the kitchen
c. ALT-p = {there aren't <u>cookies in the cupboard</u>, there aren't <u>cookies on the shelf</u>, there aren't <u>cookies on the table</u> }

Application of O is felicitous because all propositions based on the smaller subdomains are entailed by (14a). Scale reversal is good because the assertion entails the negation of all the (smaller) alternatives. Now notice that this is exactly the reasoning we find with Krifka's (1995) SCALAR.ASSERT, but without covert ONLY:

(15) Scalar NPI triggers SCALAR.ASSERT (Krifka 1995)
a. ASSERT$(\langle B, F, A\rangle)(c) = c \cap B(F)$ if and only if $B(F)$ is assertable w.r.t. c and the speaker has reason not to assert any other alternatives

to $B(F)$, and some other alternative is assertable and would make a difference in c.

b. ASSERT$(\langle B, F, A\rangle)(c)$ =SCALAR.ASSERT$(\langle B, F, A\rangle)(c)$ if and only if the alternatives are informationally ordered with respect to each other

c. SCALAR.ASSERT$(\langle B, F, A\rangle)(c) = \{i \in c \mid B(F)$ holds in c and all stronger [**not entailed**; clarification mine] alternatives are negated$\}$

This schema is Krifka's rendition of Fauconnier's SCALE PRINCIPLE: a scalar NPI triggers informational ordering and exhaustification (via c). SCALAR.ASSERT is a pragmatic operator, and not a syntactic object like Chierchia's O. Exhaustification, therefore, does not *per se* necessitate endorsing a silent ONLY — it can be done without it, in a classical neo-Gricean style (for more elaboration on this, and arguments beyond polarity, see Geurts 2009, 2010).

In a positive sentence, application of ONLY creates a contradiction:

(16) a. *O [There aren't any cookies in the kitchen.]

b. ALT-p = {there aren't <u>cookies in the cupboard</u>, there aren't <u>cookies on the shelf</u>, there aren't <u>cookies on the table</u> }

The propositions in ALT-p are not entailed, and must therefore be false, by O. This leads to a contradiction: the sentence says that there are cookies in the kitchen but not in any of the subdomains of the kitchen. This type of explanation originates, to my knowledge, in Kadmon & Landman (1993): application of O (exhaustification, widening) is 'pointless' (Chierchia 2006), and leads to contradiction.

However, NPIs are *licensed*; they are not merely felicitous or infelicitous. And as pointed out already in Ladusaw (1980), Giannakidou (2011) and Giannakidou & Quer (2013), it would be surprising if contradiction alone were to suffice to rule out the unlicensed, therefore ungrammatical NPIs. Chierchia acknowledges this insufficiency: "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* (17a), where it is claimed to have an uninterpretable syntactic feature $[+\sigma]$ (Chierchia 2006: 559). The $[+\sigma]$ requires that *any* be in the syntactic agreement (or checking) domain of a negative or DE operator. The $[+\sigma]$ is a syntactic feature, and the grammaticality of *any* depends on checking of $[+\sigma]$, as reflected in the lexical entry Chierchia supplies:

(17) a. Lexical entry for *any*

i. $||\text{any}_\text{D}|| = \lambda P \lambda Q \lambda w[\exists w' \exists x \in \text{D}_{w'}(\text{P}_{w'}(x)) \wedge \text{Q}_w(x)]$

ii. ALT$(||\text{any}_\text{D}||) = \{\lambda P \lambda Q \lambda w[\exists w' \exists x \in \text{D}_{w'}(\text{P}_{w'}(x)) \wedge \text{Q}_w(x)] \ : \ D' \subseteq D \wedge D'$ is large$\}$

iii. *Any* has an uninterpretable feature $[+\sigma]$

b. $||\phi||_S = \mathscr{E}_C\big(||\phi||\big)$, where $C = ||\phi||^{\text{ALT}}$

The analysis of *any* involves both O and the syntactic feature $[+\sigma]$. O exhaustifies, and interacts with the lexical meaning (alternatives) to give an interpretation

to sentences that *any* appears in. But the interpretation delivered by O, crucially, does not suffice to restrict the presence of *any* to the nonveridical environments that we saw in Table [1]. In the non-negative (thus non-scale reversing) of these, e.g., questions, modals, or generics, the O rationale won't work. *Any cat hunts mice* should, by O, deliver a contradiction. Modals or questions should behave like positive sentences too. O, further, cannot predict when *any* is interpreted as free choice or without, as is typically the case with negation and in questions.

But if O does not suffice to restrict the presence of *any* to nonveridical environments, then it simply *fails* to derive the licensing of *any*. Chierchia's use of O does not supply a semantic theory of licensing; instead, he falls back to a syntactic feature, $[+\sigma]$; this feature (compare $+/-$ ANAPHORIC in Binding Theory) has to be checked, but Chierchia never tells us what checking is or, more crucially, what the full set of checkers is. (He claims they are negative or DE, but, again, a mere look at Table [1] shows that they are more extended.) By relying on $[+\sigma]$ and without an accurate semantic description of the licensers, Chierchia's theory is thus just a variant of Klima's, and represents a regression in our ability to understand polarity item distributions. It is, like Klima (1964), a **syntactic** theory of polarity licensing, not a semantic or pragmatic one, despite Chierchia's claim to the contrary. Not only does the theory not work without the magic $[+\sigma]$ feature, it only works *because* of it. The lexical semantics (alternatives, O) does no work in licensing, any more than the meaning of the pronominal part of a reflexive pronoun does in the Binding Theory in configurational theories like Chomsky (1986).

Chierchia & Liao (2015; CL) further develop the syntactic part for *shenme*, and posit an interplay between two syntactic features: the $[\Sigma]$ (changed from Chierchia's earlier $[\sigma]$) and a *wh*-feature [WH]. NPI-hood means having the $[+\Sigma]$ feature, and *shenme*, as well as other wh-indeterminates are argued to have it. To explain its use as a question word, which *any* lacks, *shenme* is claimed to also have an unconstrained wh-feature ([u-WH]). CL is not a full account of *shenme*; in fact, only a glaringly small number of *shenme* data are considered, so it is by no means a theory of *shenme* (see Giannakidou & Lin (2016), for more detailed critique; I will not go into further detail here). I would like to emphasize, however, that one basic flaw of the CL system is that the wh-feature and $[+\Sigma]$ are only accidentally related. On the other hand, if NPIs are dependent variables as Giannakidou (1998), J. Lin 2015, and Cheng & Giannakidou (2013) have argued for Greek and Mandarin, then wh-words, as dependent variables, become prime material for NPI-hood, and this explains why wh-indeterminates are so often used as NPIs.

To summarize: despite proclamations to the contrary, what actually *licenses* NPIs in the Chierchia system is not exhaustification or the (domain) alternatives, but the $[+\Sigma]$ syntactic feature. O is simply not enough to deliver grammaticality and get the correct distribution in nonveridical contexts. O is thus, from the licensing perspective, unnecessary or redundant. Chierchia's account of NPI-*licensing* is syntactic, merely replacing Klima's [+affective] feature with $[+\Sigma]$.

4 *Any* versus Greek/Mandarin-style NPIs: no universal readings

The Chierchia account is designed with the main goal to predict *any*. Curiously, *any* itself is never characterized as exhaustive; it simply comes with alternatives.

Exhaustification comes from O, the application of which is triggered by *any*, though how this exactly happens remains murky. O itself, as we saw, is not enough to predict distribution, this is done by $[+\Sigma]$. In this picture, it is hard to see what exactly it means to be exhaustified (O? $[[+\Sigma]$]? Both?), and what the empirical prediction is about the behavior of supposed exhaustified NPIs. As described in the previous section, the theory tells us that NPIs should be good with negation and bad without it; but *any* appears in non-negative contexts, as we very well know. How is an exhaustified NPI supposed to be interpreted in these contexts? The null hypothesis is that it will be interpreted like *any*. So, let us take a look. In the non-negative contexts, *any* produces the hallmark reading of free choice:

(i) *Any* has free choice readings with modals, conditionals, and imperatives.

(ii) *Any* can be subtrigged with a relative clause in an otherwise veridical sentence. In this case, again, free choice readings arise.

(iii) *Any* has supplementary uses, akin to FCIs.

(iv) *Any* and FCIs are implausible with universal modal verbs.

If (1) is right, the null hypothesis is that NPIs should behave on a par with *any* with respect to the above. But we see next that *kanena/shenme/rato* have the opposite behavior with respect to the above criteria. Much of the data that I will present here are borrowed from Giannakidou & Quer (2013), Giannakidou & Yoon (2016) and Giannakidou & Lin (2016) — and I am reproducing them with gratitude to my co-authors for their native speaker judgments.

4.1 No indiscriminative readings in conditionals

If-clauses are good environments for both NPIs and FCIs. *Any* and FCIs trigger the so-called *indiscriminative*, *just any* reading (see Haspelmath 1997; Duffley & Larivée 2010), and here is a variant of an example due to Horn (2006):

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

Shenme/*kanénas*/*rato*-NPIs cannot convey the indiscriminative reading, while the NPI *renhe* — which arguably has free choice usage (Cheng & Giannakidou 2013) — and Greek FCIs can. Examples from Mandarin (19), Greek (20) and Korean (21) can be found below:

(19) Ruguo ni neng he {**renhe**/***shenme**} ren shui, na ni hai zhenshi bu tai tiaoti.
if you can with FCI/NPI person sleep the you yet really not very selective
'If you can sleep with any person, then you are not very selective.'[1]

[1] If we add *dou*, the difference disappears (thanks to Lisa Cheng for noticing this):

(20) An kimásai me {*opjondípote*/***kanénan**}, den íse polí epilektikí.
if sleep.2SG with FCI/NPI, not be.2SG very selective
'If you sleep with (just) anybody you are not being very selective.'

(21) Ney-ka manyak {*amwu-hako-na*/#**amwu-hako-rato**}
you-NOM hypothetically FCI/RVI
cal-swuiss-tamyen, ne-nun acwu kkatalop-cinan-ta.
with-sleep-can-COND you-TOP very selective-NEG-DECL
'If you can sleep with any person, then you are not very selective.'

The lack of the indiscriminative reading with the referentially vague NPIs does not follow from (1) or the existing accounts based on (1).

4.2 Non-exhaustive imperatives

Kanénas/*rato*-NPIs/*shenme* are acceptable in imperatives[2]. Crucially, their interpretation contrasts with that of FCIs (Giannakidou & Quer 2013; Giannakidou & Yoon 2016):

(22) Fáe **kanéna** glikó!
eat.2SG.IMP NPI cookie
'Eat a cookie! (some or other)'

(23) Fáe *opjodhípote* glikó!
eat.2SG.IMP 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). By contrast, with the *rato*-NPIs, *shenme* or *kanénas* we have non-exhaustified invitations to eat a cookie. In a context where some cookies are

(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 NPI question DOU can contact me
'If you have any questions, you can contact me.'

Following Giannakidou & Cheng (2006), Cheng (2009), and Xiang (2008), Giannakidou & Lin (2016) treat *dou* as a maximality operator, therefore responsible for the universal reading here.

[2]Lin (1998) claims that in imperatives, *shenme* is only grammatical with the quantifier *dian* (lit. 'a little bit'). However, Giannakidou & Lin (2016), provide examples of *shenme* without *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!'

off limits (say, the ones to the left of the table because they are reserved) only the NPI versions are good. This is illustrated in the examples above from Giannakidou & Lin (2016).

(24) Fáe {*#opjondípote*/***kanéna**} glikó; alá óchi aftá giatí íne gia tin
eat FCI/NPI cookie but not these because are for the
Mary.
Mary
'Eat a cookie (#any cookie); but not these ones because they are for Mary.'

(25) Chi dian **shenme** binggan ba; dan bie chi na-xie yinwei tamen shi
eat CL NPI cookie PART but not eat that-CL because they be
liu gei Mali de.
reserved for Mary PART
'Eat some cookies (#any cookies); but not those ones as they are for Mary.'

But, of course, *any cookies (whatsoever)* is problematic :

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

Unlike *any*, *shenme*/*kanénas*/*rato*-NPIs are fine if we exhaust all options; it is impossible to derive the difference from the existing O-plus-$[+\Sigma]$ analysis.

4.3 Existential readings in modal contexts

Referentially vague NPIs appear in modal contexts with purely existential readings. *Any*, as can be seen, is impossible in this reading:

(27) I Ariádne {*ísos*/*borí*} na agórase hthes
the Ariadne maybe/might SUBJ bought.3SG yesterday
{**kanéna**/#*opjodhípote*} vivlío.
NPI/FCI book
'Ariadne may have bought {*some*/#*any*} bookyesterday.' (Greek)

(28) I Ariádne {*málon*/*prépi*} na agórase hthes
the Ariadne probably/must SUBJ bought.3SG yesterday
{**kanéna**/#*opjodhípote*} vivlío.
NPI/FCI book
'Ariadne probably bought {*some*/#*any*} book yesterday.' (Greek)

(29) Yuehan zuotian haoxiang mai-le {**shenme/*renhe**} shu.
John yesterday probably buy-PERF NPI/FCI book
'John probably bought {*some*/#*any*} book yesterday.' (Mandarin)

(30) Ariadne-nun ecey eccemyen
Ariadne-TOP yesterday maybe
{**amwu-chayki-rato**/#*amwu-chayki-na*} sa-ulswuiss-ta.
RVI/#FCI-separate-book buy-might-DECL

'Ariadne maybe bought {*some*/#*any*} book yesterday.' (Korean)

(31) Ariadne-nun ecey ama {**amwu-chayki-rato**/#*amwu-chayki-na*}
Ariadne-TOP yesterday probably RVI/#FCI-separate-book
sa-ssulkesi-ta.
buy-might-DECL
'Ariadne probably bought {*some*/#*any*} book yesterday.' (Korean)

The pattern is therefore quite consistent: the Greek, Mandarin and Korean NPIs are weak indefinites that retain existential readings in the modal contexts, whereas *any* is odd in the contexts requiring such a reading. Again, the Chierchia system does not offer us a way to handle this contrast.

But if we assume that the NPIs have referential vagueness, then all we need to say is that they are existentials invoking alternatives, but these alternatives are not exhaustified. The presupposition is that there be *some* variation, not exhaustive variation (Giannakidou and Quer 2013, Giannakidou and Yoon 2016):

(32) *Referential vagueness: presupposition of non-exhaustive variation*

a. A sentence with a referentially vague indefinite α will have a truth value if and only if: $\exists w_1, w_2 \in W : [\![\alpha]\!]^{w_1} \neq [\![\alpha]\!]^{w_2}$; where α is the referentially vague indefinite.

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

c. 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, $\mathscr{M}$(speaker), compatible with what she knows or believes in the base world w. Referential vagueness is satisfied if there is a choice between at least two possibilities — it is a *minimal* choice, **not** exhaustive choice. If the speaker has a 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, as in Giannakidou (1998, 2001), or in any other theory of free choice).

Space prevents us from expanding here, and further technical details do not matter. What is indeed important is that the referential vagueness analysis of Greek, Mandarin and Korean NPIs allows us to see that we can have alternatives *without* exhaustification, thereby allowing the prediction that some NPIs do not need to be exhaustified. The existing Chierchia-based accounts cannot predict such NPIs because exhaustification is posited axiomatically whenever we have alternatives.

4.4 No subtrigging

In veridical simple past sentences, all NPIs are ungrammatical. However, *any* improves with a relative clause — a phenomenon known as *subtrigging* (LeGrand 1975). In this case, *any* is interpreted again universal-like (see discussions in Dayal 1998; Giannakidou 2001; Horn 2006). However, *kanénas*, *rato*-NPIs and *shenme*, cannot be subtrigged:

(33) a. *John bought any book. (English)
b. John bought any book that he found.

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

(35) *O Jánis aghórase **kanéna** vivlío *(pu vríke stin aghorá).
the John bought.3SG NPI book REL found.3SG in-the market
Intended: 'John bought any book that he found on the market.' (Greek)

(36) *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.' (Korean)

Thus, *kanénas*, *rato*-NPIs and *shenme* contrast with *any*. Notice, likewise, the contrast with FCIs, which can undergo subtrigging in veridical contexts as expected:

(37) 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.' (Mandarin)

(38) O Jánis aghórase *opjodhípote* vivlío (vríke stin aghorá).
the John bought.3SG FCI book found.3SG in-the market
'John bought any book that he found on the market.' (Greek)

Hence, the subtrigging diagnostic reveals another difference between the *shenme* NPI class and *any* that doesn't follow from the Chierchian analysis. Notice that the Mandarin relative clauses contain a modal, but even that does not help.

4.5 No supplementary use

Any and FCIs exhibit supplementary use (Horn 2006); but non-exhaustive NPIs do not. Regardless of what the proper analysis is, it suffices to see the asymmetry between *any* and the Greek, Korean and Mandarin NPIs:

(39) Pick a card, *any* card! (English)

(40) Pare mia karta, {*opjadhípote*/#**kamía**} karta!
take.IMP.2SG one card, FCI/NPI card
'Take a card, any card!' (Greek)

(41) Tiao yi-zhang ka ba, {*renhe*/#**shenme**} ka!
pick one-CL card PART FCI/NPI card
'Pick a card, any card!' (Mandarin)

(42) Khatu-lul hana kolla-la, {*etten-khatu-na*/#**etten-khatu-rato**}!
card-ACC one pick-IMP FCI.card/NPI.card
'Pick a card, any card!' (Korean)

It is again difficult to imagine how this contrast can follow from the existing Chierchian analysis.

4.6 Referentially vague NPIs are fine with universal modal verbs

Finally, FCIs are known to be implausible with universal modal verbs (Giannakidou & Quer 2013; Menéndez-Benito 2010); but Greek, Korean and Mandarin NPIs are fine in these contexts:

(43) a. #Ariadne must marry *any* lawyer. (English)
b. #I Ariádne prépi na pandreftí *opjondhípote* dikigóro.
the Ariadne must SUBJ marry FCI lawyer
Intended: 'Ariadne must marry any lawyer.' (Greek)
c. #Ta bixu dei jia gei *renhe* lvshi.
she must necessarily marry for FCI lawyer
Intended: 'She must marry any lawyer.' (Mandarin)

(44) I Ariádne prépi na pandreftí **kanéna** dikigóro.
the Ariadne must SUBJ marry NPI lawyer
'Ariadne must marry a lawyer, some lawyer of other.' (Greek)

(45) Ta bixu dei jia gei **shenme** lvshi.
she must necessarily marry for NPI lawyer
'She must marry a lawyer, some lawyer of other.' (Mandarin)

(46) Maria-nun **{amwu/etten}-pyenhosa-hako-rato** kyelhonhay-yahan-ta.
Maria-TOP NPI.lawyer marry-must-DECL
'Maria must marry a lawyer, some lawyer of other.' (Korean)

Notice, importantly, the use of supplementary *some or other* — which is intended to again bring about the contrast in meaning with *any*. Menéndez-Benito (2010), Giannakidou & Cheng (2006), Giannakidou (2001), Giannakidou & Quer (2013), and Giannakidou & Yoon (2016) offer accounts of how the exhaustive reading of FCIs may be derived, but the precise details are not crucial here. All we need to see is the empirical contrast between *kanénas*/*shenme*/*rato*-NPIs which are grammatical, and *any*. The contrastive behaviors of *any* and the *shenme*/*kanénas* NPI have been replicated with epistemic universal modals (see Giannakidou & Quer (2013) and Giannakidou & Yoon (2016) for the relevant data).

To summarize then, we found that empirically NPIs such as *any* which are supposed to trigger alternatives and exhaustification via O, and have $[+\Sigma]$, and FCIs

(also exhaustive, or as Chierchia & Liao (2015) put it, conveying the information to "not prune" alternatives) contrast sharply in nonveridical non-negative contexts with the Greek, Mandarin and Korean NPIs with respect to six widely used diagnostics. The exhaustivity-for-all hypothesis in (1), as formulated in the existing theories, is unable to predict the differences we identified. The problem is that (1) necessitates alternatives to be exhaustified, but the data presented here, in particular the resistance of Greek, Mandarin and Korean NPIs to obtain free choice readings, suggest that we must allow for the possibility that alternatives are not exhaustified (referential vagueness).

5 Conclusions: reductionism vs. empirical adequacy

The overarching conclusion from our discussion in this paper is that the *exhaustivity-for-all* hypothesis in (1) cannot be maintained. The number of empirical asymmetries between putatively $[+\Sigma]$-bearing NPIs, and the Greek, Korean and Mandarin NPIs is simply too large to ignore— and the non-exhaustified, non-free choice readings of Greek, Korean and Mandarin NPIs tell us that, for a significant number of NPIs, it is unreasonable to assume exhaustification. The reductionist position, thus, as stated in (1) and implemented in the current theories inspired by (1), cannot be maintained without abandoning empirical adequacy.

A reductionist theorist might, of course, respond by saying that exhaustification works, but other factors produce the empirical differences between the two NPI classes observed here. What other factors? In Chierchia (2013) and Chierchia & Liao (2015) a number of stipulations are given to derive the differences between *any* and FCIs but to my knowledge, there is no explanation within the existing system about the numerous differences within the NPI classes presented here. If the Greek, Mandarin and Korean NPIs trigger alternatives, O, and have $[+\Sigma]$, there is simply no way to predict their distinctive behavior from *any* we observed. Now, if the Chierchian theorist believes that there are additional constraints, the onus is on them to show us what exactly these constraints are; and I can honestly not see how they can avoid admitting that O doesn't always apply, or that not all NPIs contain $[+\Sigma]$ — which is exactly what the referential vagueness position says (Giannakidou & Yoon 2016, and Giannakidou & Lin 2016). The reductionist position in (1) posits exhaustification whenever we have alternatives, but the Greek, Korean, and Mandarin data (along with the many other languages I mentioned at the beginning) show us that it is possible to have NPIs with alternatives without exhaustifying them.

In further support of this conclusion, consider Israel's (1996, 2011) attenuating NPIs. Israel distinguishes between two types of NPIs: (a) the familiar minimal value NPI which is rhetorically strong (e.g. minimizers, *any*, *one*-containing NPIs), and (b) NPIs that have high values and are *attenuating*: *He didn't read much*, vs. **He read much*. In both cases we have a correlation between an informational value given by the NPI, alternatives ordered along a scale, and an interaction with negation; but the attenuating NPI draws on a high value, and it is not at all obvious that the exhaustification account developed for the (a) type of NPI can derive the attenuating NPI or handle the observed empirical difference between the two types. The existing Chierchia accounts, in any case, remain silent about the attenuating

type of NPI, as they generally underplay NPIs that do not conform strictly to the *any*-guidelines.

Which brings us back to *any*: is the O-plus-$[+\Sigma]$ analysis an adequate and complete analysis of *any*? If it were, if it explained problems that other theories didn't, or if it explained them better, maybe then we could accept it as the desirable analysis for at least this type of NPI. Sadly, there is no reason to think this is the case. One can compile a long list of problems, but I will only mention here three.

First, the distribution of *any* spans a large number of nonveridical, non-negative contexts, where the logic of improvement with negation that characterizes the Kadmon & Landman, Krifka, and Chierchia systems, described in Section 3, won't work. Chierchia (2013) does stipulate additional ad hoc rules that do not follow from the meaning, to take care of the *any* with e.g. imperatives and modals. But these rules derive free choice, so they don't help with the non-free choice readings of the Greek, Mandarin, and Korean NPIs. In Chiechia & Liao (2015), more rules are added to account for strikingly small set of data. Overall, the system built around (1) resorts to a proliferation of ad hoc rules and the need to posit them would lead most researchers to the conclusion that a system that didn't need them was superior to the Rube Goldberg contraption that the O-plus-$[+\Sigma]$ analysis ends up constructing around itself.

Second, within nonveridical contexts, the major licensing environment of questions remains problematic for the O-plus-$[+\Sigma]$ system. It is hard to see how questions emerge as excellent environments for both kinds of NPIs, while exhaustivity does not play a role in NPI-licensing in questions, as shown by Hoeksema (2008).

Third, it is entirely unclear how the Chierchia account would handle the well-known contexts involving what appears to be implicit negation, and which may arise even with positive predicates. These cases are prominent in the polarity literature (since, among others, Linebarger 1980). We can illustrate the problem with emotive factive predicates such as *be grateful* and *be glad*:

(47) The thing I am most grateful for is that **anyone** is asking any questions[3].

(48) I am glad she has **any** friends (at all).

Among other things, the urgent question that the Chierchian analysis must answer here is the following: what is the negative, DE or nonveridical operator that checks the $[+\Sigma]$ feature on *any* in (47)-(48)? Emotive factives (positive and negative) are not negation nor are they nonveridical; under such predicates we should therefore not expect NPIs on the Chierchian account. We could, of course, augment it with my theory of two modes of licensing (Giannakidou 2006), which naturally would be welcome. But doing so is admitting that the exhaustivity account has failed to generate the results it needs to. Moreover, there is an empirical contrast again between *any* and the Greek/Mandarin/ Korean NPI in that the latter tend to not be licensed (Giannakidou 1997, 2006) by implicit negation, as (49) illustrates:

(49) *I Ariádne metániose pu ípe **típota**.
the Ariadne regretted that said.3SG anything
Intended: 'Ariadne regretted that she said anything.'

[3] J. J. Abrams, *Entertainment Weekly* 54, Nov. 20, 2015

Why should this contrast exist? The elements of Chierchia's system shed no light on this cross-linguistic contrast. Worse, even if we were to claim that *glad* in (48) bears the requisite $[+\Sigma]$ checking feature, the exhaustivity account wrongly predicts that (48), analyzed as in (50), should be a contradiction:

(50) I am glad that ONLY (she has **any** friends).

(51) ALT-p = {she has Dutch friends, she has short friends, she has tall friends}

ONLY requires that all the ALT-p propositions be false: but, in fact, I cannot be glad she has friends, but not be glad, for every possible subset of friends, that she has such friends. This is indeed a contradiction, and Chierchia's system wrongly predicts that (48) should therefore be ill-formed.

Given all the above, the overall conclusion of our discussion must be that the *exhaustivity-for-all* hypothesis (1), as formulated in Chierchia's work, is not just unable to handle the Greek, Korean and Mandarin type of NPIs — it appears to be unable to handle the distribution of *any* itself.

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