Any, Alternatives, and Pruning

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Abstract

One assumption permeates many recent theories of NPI licensing, namely, that NPI licensing involves quantification over so-called subdomain alternatives to NPIs (e.g., Krifka 1995; Chierchia 2004, 2013; Crnič 2017, 2019). This note makes the modest point that this assumption need not be a primitive of these theories; rather, it can be derived from more general, independently argued-for principles (Katzir, 2014). This is desirable for theoretical reasons – one need not depart from a general theory of alternatives, pruning (e.g., Katzir 2007, 2014) – as well as, perhaps, empirical ones – pertaining to the distribution of NPIs in non-monotone environments (cf. Crnič 2014).

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Contents

1 Introduction

The idea that the distribution of *any*-DPs (and some other NPIs) should be described, and explained, with reference to the **covert resource domain of *any*,** originally stemming from Kadmon & Landman (1993), is picked up by many recent approaches to *any*-DPs (e.g., Krifka 1995; Chierchia 2004, 2013; Crnič 2017, 2019). These theories have much in common.

One commonality is that they assume that (covert resource domains of) *any*-DPs induce alternatives, and that there is a **covert alternative-sensitive operator** that quantifies over them (*Scal.Assert* and *Emph.Assert* in Krifka, *O* in Chierchia, and *even* in Crnič). If the operator yields a consistent meaning, *any* may be acceptable; if it does not, *any* is unacceptable (which explains the distribution of *any*). The theories are schematically represented in (1), where we abstract away from the nature of the operator and mark its associate with an F diacritic. (We focus on *any*-DPs in the following, though our conclusions may extend to other NPIs such as *ever* and *in weeks*. See Chierchia 2013 for a subdomain approach to these and other expressions.)

(1) [OP$_{\mathcal{C}}$ [... [any$_{D_F}$ NP] ...]]

The focus of this note is another commonality of these theories, namely, the answer that they usually provide to the question of **what alternatives the operator quantifies over.** They all assume that these include, at least, the so-called 'subdomain alternatives' to *any*-DPs, that is, alternatives that differ from the sister of the OP in that the domain variable of *any* in them denotes a subset of the denotation of the domain variable of *any* in the sister of the OP (see, e.g., von Fintel 1994 on covert resource domains). More to the point, they assume that all such alternatives are relevant and must feature in the output of the computation induced by OP (that is, they cannot be pruned). This is stated in (2), where F(XP) is the set of all the alternatives induced in the scope of OP by the associate of OP, and $\mathcal{C}$ is the set of relevant alternatives; OP quantifies over what is in the intersection of these two sets (see Section 2 for details). Ideally, this assumption would not have to be a primitive of these theories.

(2) **Common assumption about subdomain alternatives and pruning**

For any structure [OP$_{\mathcal{C}}$ [$_{XP}$... any$_D$ ...]] in which OP associates with D:

$\{[_{XP}\ldots \text{any}_{D'} \ldots] \mid [\![D']\!] \subseteq [\![D]\!]\} \subseteq \text{ALT}([_{XP} \ldots \text{any}_D \ldots]) \cap \mathcal{C}$

We show in the following that the assumption in (2) can indeed be replaced by a more general condition on pruning (Katzir, 2014), at least on the theory that takes the OP to be *even* (esp., Krifka 1995; Crnič 2017, 2019; see also Kadmon & Landman 1993; Lahiri 1998 for slightly different assumptions). This means that in order to capture the distribution of *any*-DPs, one does not have to depart from a general theory of alternatives and pruning (esp., Katzir 2007, 2014).

2 Background

2.1 Alternatives and pruning

Consider the pair of sentences in (3).

(3) a. John read some or all of the books.
b. #John lives in France or Paris.

While the first disjunction in (3) is impeccable, the second one is marked. Its markedness is standardly attributed to the disjuncts standing in an entailment relation, as stated in (4) (this is a violation of the so-called Hurford's constraint, due to Hurford 1974; see, e.g., Singh 2008; Chierchia et al. 2011; Katzir 2014, and references therein, for discussion).

(4) John lives in Paris $\Rightarrow$ John lives in France

The problematic entailment relation can be avoided in (3-a) by means of local exhaustification of the first disjunct, yielding the meaning in (5-a). This is not possible in the example in (3-b), that is, the first disjunct in (3-b) cannot convey the meaning in (5-b) (see, esp., Singh 2008 for a thorough discussion).

(5) a. John read some but not all of the books. (✓ from *John read some of the books*)
b. John lives in France but not in Paris. (✗ from *John lives in France*)

This asymmetry has been captured by a constraint on what alternatives may be pruned when in the process of exhaustification. Following the above-cited authors, we introduce two notions that will be helpful in spelling out this constraint. The first one is that of a formal alternative of an expression (see Katzir 2007 for details and motivation): an expression S' is a formal alternative to an expression S iff it is derived from S by a replacement of the lexical items in S with other lexical items or by a replacement of constituents of S with its subconstituents (deletions, contractions), as stated in (6). For illustration, some of the formal alternatives to the first disjuncts of the sentences in (3) are provided in (7)-(8) (we focus only on the formal alternatives built from the alternatives to *some* and *France*, respectively, for perspicuity). The focus alternatives mentioned above are a subset of the formal alternatives, restricted in that only the F-marked constituents vary across the alternatives.

(6) **Formal alternatives** (Katzir, 2007)

ALT(S) = {S' | S can be transformed into S' by a finite series of deletions, contractions, and replacements of lexical items with lexical items of the same category}

(7) ALT([John read some of the books]) =

{John read some of the books, John read all of the books}

(8) ALT([John lives in France]) =

{John lives in France, John lives in Paris, John lives in Asia, ...}

Some of the formal alternatives to a sentence can then be negated by exhaustification. In order to be able to be negated, the alternatives must be 'innocently excludable' (see Fox 2007 for discussion and motivation): an alternative to a sentence is innocently excludable given a set of alternatives if and only if it is in every maximal set of alternatives to the sentence whose joint negation is consistent with the sentence.

(9) **Innocent Exclusion** (Fox, 2007)
For any sentence S and a set of alternatives $\mathcal{A}$, IE(S,$\mathcal{A}$) = $\cap\{\mathcal{A}' \subseteq \mathcal{A} \mid \mathcal{A}'$ is a maximal set in $\mathcal{A}$ such that $\{\neg[\![S']\!] \mid S' \in \mathcal{A}\} \cup \{[\![S]\!]\}$ is consistent$\}$

Turning back to the Hurford disjunction examples in (3), if we consider all the formal alternatives to *John read some of the books* in determining the innocently excludable ones, as in (10), we obtain the following set of innocently excludable alternatives:

(10) IE(John read some of the books, {John read some of the books, John read all of the books}) = {John read all of the books}

In contrast, if we consider all the formal alternatives to *John lives in France* in which *France* is replaced in determining the innocently excludable ones, as in (11), we obtain the set that does not include *John lives in X*, where *X* picks out a French city or a region – namely, none of them is contained in the intersection of the maximal sets of alternatives that can be jointly negated while being consistent with *John lives in France*. On these assumptions, then, exhaustification of the first disjunct of *John lives in France or Paris* cannot yield a meaning that would fail to be entailed by the second disjunct (and thus satisfy Hurford's constraint). This is as desired.

(11) IE(John lives in France, {John lives in X | ⟦X⟧ is a place}) =
{John lives in Spain, John lives in Hungary, John lives in Asia, ...}

However, if we would consider, say, only *John lives in Paris* in determining innocent exclusion – that is, if we would prune all other formal alternatives from the set under consideration –, this alternative would end up being innocently excludable: *John lives in France but not in Paris* conveys a consistent meaning and all the alternatives considered are negated.

(12) IE(John lives in France, {John lives in France, John lives in Paris}) =
{John lives in Paris}

Importantly, then, such a restriction of alternatives must be precluded. Most directly, something like the following constraint must hold: only innocently excludable alternatives may be pruned (count as irrelevant) in exhaustification (see Katzir 2014 for discussion and extension beyond exhaustification; see Trinh & Haida 2015 for some potential problems for this assumption). We raise this constraint to a more general principle:

(13) **Constraint on pruning**
For any alternative-sensitive operator OP and its sister S, only the alternatives in IE(S, ALT(S)) may count as irrelevant, that is, be pruned from the domain of OP.

This can be enforced in grammar in different ways. **On Rooth's approach,** on which association with alternatives is mediated by a $\sim$ operator (see Rooth 1992 for details), a constraint on what alternatives can be irrelevant can be stated as follows.

(14) $[\![[[\sim C]\ XP]]\!]$ is defined only if
(i) $[\![C]\!] \subseteq$ ALT(XP), and
(ii) ALT(XP) $\setminus [\![C]\!] \subseteq$ IE(XP, ALT(XP)).

On a more direct approach, the constraint can be encoded into the meanings of alternative-sensitive operators *simpliciter*. In the case of exhaustification, Katzir (2014) and Bar-Lev & Fox (2017) achieve this by intersecting the domain of relevant alternatives directly with the set of innocently excludable formal alternatives, as given in (15).

(15) $[\![\text{exh}_{\mathcal{C}}\ S]\!] = 1$ iff (partial, see Section 3 for a full definition)
$\forall S' \in \text{IE}(S,\text{ALT}(S)) \cap \mathcal{C}$: $[\![S']\!] = 0$

In either way, we obtain the desired results: local exhaustification of the first disjunct may rescue the disjunction in the first sentence in (3) (if alternative *John read all of the books* is relevant), as given in (16), while this is not the case for the second sentence (as *John lives in Nantes*, etc., are not innocently excludable), as given in (17).

(16) a. [exh$_{\mathcal{C}}$ [John read some of the books]] [or John read all of the books]

b. $[\![$exh$_{\mathcal{C}}$ John read some of the books$]\!]$ = 1 iff John read some of the books $\wedge$ $\forall$S $\in$ {John read all of the books} $\cap$ $\mathcal{C}$: $[\![$S$]\!]$ = 0

(17) a. #[exh$_{\mathcal{C}}$ [John is from France]] [or John is from Paris]

b. $[\![$exh$_{\mathcal{C}}$ John lives in France$]\!]$ = 1 iff John lives in France $\wedge$ $\forall$S $\in$ {John lives in Spain, John lives in Asia, ...} $\cap$ $\mathcal{C}$: $[\![$S$]\!]$ = 0

2.2 The *even* approach to *any*

Following Crnič (2017, 2019), we assume that *any*-DPs are accompanied by a covert *even* operator quantifies over the alternatives built on the alternatives to the domain of *any* (see Lahiri 1998 for a derivation in which *even* associates with the determiner).

(18) [even$_{\mathcal{C}}$ [... any$_{D_F}$ ...]]

Even. *Even* is a focus-sensitive operator. This means that it quantifies over (a subset of) the focus alternatives to its sister. It follows from (13) that only the alternatives that are innoncently excludable can be pruned from the domain of *even*. Given our two implementations, we thus obtain the generalization in (19):

(19) **Consequence of the constraint on pruning**

For any structure [even$_{\mathcal{C}}$ S], where $\mathcal{C}$ is the set of relevant alternatives, *even* quantifies over every alternative in F(S)

a. Rooth: that is in $\mathcal{C}$ (plus $\mathcal{C}$ is constrained as in (14)).

b. Direct: except if the alternative is in IE(S,F(S)) but not $\mathcal{C}$.

On the second implementation, the meaning of *even* can be formulated as having the presupposition in (20). If the pertinent ordering is likelihood-based, we obtain the presupposition that the sister of *even* is less likely than all the relevant alternatives induced by the domain of *any*. Importantly, only innocently excludable alternatives that are irrelevant are pruned from the domain of *even*. For readability, we merely indicate in the following what alternatives are innocently excludable and may thus be pruned.

(20) $[\![\text{even}_{\mathcal{C}}\ \text{S}]\!]$ is defined only if

$$\forall \text{S'} \in \text{F(S)} \setminus (\text{IE(S,F(S))} \setminus \mathcal{C})\text{: S} \not\Leftrightarrow \text{S'} \rightarrow \text{S} <_c \text{S'}$$

If the alternatives over which *even* quantifies are (Strawson) entailed by the sister of *even*, then the presupposition of *even* will be almost trivially satisfied in every context. If the alternatives (Strawson) entail the sister of *even*, then the presupposition of *even* will be unsatisfiable. If neither holds, the presupposition of *even* will be contingent, and *any*-DPs will exhibit context sensitivity (e.g., Crnič 2019 for a recent review).

Example. Let us illustrate the application of *even* on an example where the focus alternatives stand in an entailment relation, and the sister of *even* is entailed by some of the focus alternatives – pruning is thus required in order for *even* to have a consistent presupposition. The example is in (21): *even* may not quantify over alternatives *John read seven books, John read eight books,* etc., since they entail the sister of *even* and are at most as likely as it (assuming an 'at least' semantics of numerals).

(21) Mary read five books. John even read six_F books.

The alternatives mentioned above are all innocently excludable – note that they may all be negated consistently with the sentence (John reading six but not seven books is a consistent proposition). This means that they may be pruned from *even*'s domain of quantification, as indicated in (22).

(22) a. $\mathcal{C} = \{\text{John read n books} \mid [\![\text{n}]\!] \leq 6\}$ (= pruning of the alternatives with n>6)

b. $\text{F(John even read six}_F\text{ books)} \setminus$
$\big(\text{IE(John even read six}_F\text{ books, F(John even read six}_F\text{ books))} \setminus \mathcal{C}\big) =$
$\text{F(John even read six}_F\text{ books)} \setminus \{\text{John read n books} \mid [\![\text{n}]\!] > 6\} = \mathcal{C}$

Alternatives to *any*-DPs. In view of the algorithm in (6), and the assumption that the domain of *any* is focused, the focus alternatives to *any*-DPs are those provided in (23): they consist of all *any* phrases in which the domain variable argument of *any* has been replaced with another domain variable. (We are treating domains as extensional for simplicity.)

(23) $\text{F([any}_{D_F}\text{ NP])} = \{\text{[any}_{D'}\text{ NP]} \mid [\![\text{D'}]\!] \in \text{D}_{(et)}\}$

Thus, no special restriction to subdomain alternatives is imposed by the theory of alternatives described in the previous section. Let us now see how this plays out.

3 Montone environments

3.1 Upward-monotone environments

Consider the ungrammatical sentence in (24).

(24) a. *John read any book.
b. [even$_{\mathcal{C}}$ [any$_{D_F}$ book [λx John read x]]]

The formal alternatives to the sister of *even* are provided in (25): they differ from it only in their domain argument variable. The innocently excludable alternatives are those provided in (26). Crucially, no subdomain alternative is in this set.[1]

(25) F([any$_{D_F}$ book [λx John read x]]]) =
$\{$[any$_{D'}$ book [λx John read x]]] | ⟦D'⟧ $\in D_{(et)}\}$

(26) IE([any$_{D_F}$ book [λx John read x]]], F([any$_{D_F}$ book [λx John read x]]])) =
$\{$[any$_{D'}$ book [λx John read x]]] | ⟦D'⟧∩⟦D⟧=∅$\}$

It follows from (13) that since none of the subdomain alternatives are innocently excludable, none of them can be pruned from the domain of *even*. And since all these alternatives entail the sister of *even*, they are at most as likely as it. This means that the scalar presupposition of *even* is necessarily unsatisfiable, and *any*-DP unacceptable. Thus, the constraint in (13) **precludes overgeneration** in upward-monotone environments. (An exception to this conclusion would be cases in which *any* would have a singleton resource domain, and one would per force only consider non-subdomain alternatives. We have to stipulate that this kind of domain restriction is not possible for *any*-DPs, in contrast to plain indefinites.)

(27) ⟦[even$_{\mathcal{C}}$ [any$_{D_F}$ book [λx John read x]]]⟧
⇒ ∀D': D' ⊆ D∩book → John read a book in D $<_c$ John read a book in D' ✗

[1] Take a subdomain alternative of S, S', in which the domain of *any* has a non-empty intersection with the domain of *any* in S. All subdomain alternatives whose domain does not contain one element of the domain of *any* in S' and S, x, may be negated consistently with S; negating also S' would result in a contradiction. Thus, S' is not in all maximal sets of alternatives that may be negated jointly with S (cf. Fox 2007).

3.2 Downward-monotone environments

Consider the grammatical sentence in (28).

(28) a. John didn't read any book.

b. [even$_{\mathcal{C}}$ [neg [any$_{D_F}$ book [λx John read x]]]]

The formal alternatives to the sister of *even* are provided in (29): as above, they differ from it only in their domain argument variable. The innocently excludable alternatives are provided in (30). No subdomain alternatives are this set: they are all entailed by the sister of *even*. However, all the non-subdomain alternatives are in this set, as given in (30) – all of them being false is compatible with the sentence being true.

(29) F([neg [any$_{D_F}$ book [λx John read x]]]) =

$\{$[neg [any$_{D'}$ book [λx John read x]]] $\mid$ $[\![$D'$]\!] \in D_{(et)}\}$

(30) IE([neg [any$_{D'}$ book [λx John read x]]], (29)) =

$\{$[any$_{D'}$ book [λx John read x]]] $\mid$ $[\![$D'$]\!] \not\subseteq [\![$D$]\!]\}$

Now, if no alternatives are pruned from the domain of *even* in (28), we obtain a contradictory presupposition since all the 'superdomain' alternatives – the alternatives in which the domain of *any* is a superset of the domain of *any* in the sister of *even* – entail the sister of *even*, and thus cannot be more likely than it.

(31) $\forall$D': D$\cap$book$\subset$D'$\cap$book $\rightarrow$ $\neg$John read a book in D$<_c\neg$John read a book in D' ✗

Thus, all the superdomain alternatives must be pruned from the domain of *even* in order to obtain a consistent meaning. Given that all of them are innocently excludable, as stated in (30), this manoeuvre respects (13). Thus, the constraint in (13) allows one to **avoid undergeneration** in downward-monotone environments. (Note that given the necessity of this pruning, sentence (28) instances a configuration with so-called **obligatorily irrelevant alternatives,** Buccola & Haida 2017.)

(32) **Obligatory irrelevance of superdomain alternatives**

For any sentence of the form, [even$_{\mathcal{C}}$ [neg [... any$_{D_F}$ ...]]]:

$\{$[neg [... any$_{D'}$ ...]] $\mid$ $[\![$D$]\!] \subset [\![$D'$]\!]\} \cap \mathcal{C} = \emptyset$

Now, on the one hand, if no other alternatives are pruned, we obtain a contingent presupposition: the sister of *even* does not entail all the alternatives (and is entailed by none); so it may (but need not) be less likely than them.

(33) $\forall$D': D$\cap$book $\not\subseteq$ D'$\cap$book $\rightarrow$ $\neg$John read a book in D$<_c$$\neg$John read a book in D'

On the other hand, if all non-subdomain alternatives are pruned, which again respects (13), we obtain an (almost) tautologous presupposition. This is provided in (34).

(34) $\forall$D': D'$\cap$book $\subset$ D$\cap$book $\rightarrow$ $\neg$John read a book in D$<_c$$\neg$John read a book in D' ✓

(Almost) every context satisfies the presupposition in (34), while only some contexts satisfy the presupposition in (33). The apparent preference for the resolution that yields (34) (that is, pruning of all non-subdomain alternatives) can be seen as a reflex of the **Principle of Charity:** given an ambiguous sentence that is defined (and true) on one reading and (false or) undefined on the other, one chooses the disambiguation that makes the sentence defined (and true) (see Gualmini et al. 2008, and references therein, and Meyer & Sauerland 2009 for a related principle; see von Fintel & Beaver 2015 for a discussion of the conditions on the resolution of different types of free variables in syntax).

3.3 Existential modal environments

Crnič (2014) notes that if one generates free choice inferences for occurrences of *any*-DPs in existential modal sentences, one may obtain an (almost) tautologous presupposition of *even*. More to the point, if the meanings of alternatives in the domain of *even* are those provided in (36) – where '$\Diamond$a' stands for the meaning of 'John is allowed to read book *a*' – the presupposition will be (almost) tautologous, as stated in (36). (As we will see below, the parse that generates the meanings in (36) is not the only one that yields almost tautologous presuppositions; certain parses that yield stronger meanings do as well.)

(35)
a. John is allowed to read any book.
b. [even$_{\mathcal{C}'}$ [exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D_F}$ book [λx John read x]]]]

(36) Assume the domain of D = {a,b,c} and the LF in (35).
a. Meaning of the sister of *even*: $\Diamond$a$\wedge\Diamond$b$\wedge\Diamond$c
b. Meanings of the alternatives in the domain of *even*:
$\Diamond$a$\wedge\Diamond$b, $\Diamond$a$\wedge\Diamond$c, $\Diamond$b$\wedge\Diamond$c, $\Diamond$a, $\Diamond$b, $\Diamond$c

(37)
a. Fact: for all p in (36-b), $\Diamond$a$\wedge\Diamond$b$\wedge\Diamond$c $\Rightarrow$ p
b. Consequence: for all p in (36-b), $\Diamond$a$\wedge\Diamond$b$\wedge\Diamond$c $<_c$ p

How can the above meanings derived? Following Fox (2007) and Chierchia (2013), and others, Crnič describes a derivation using exhaustification of the domain of *any* (building on Chierchia has a different implementation). One definition of the exhaustification operator is provided in (38) (Bar-Lev & Fox, 2017): it negates all the relevant innocently excludable alternatives, and asserts all the innocently includable alternatives. Innocent inclusion is defined in (39): an alternative is innocently includable if and only if it is in every maximal set of alternatives that can be jointly asserted with the sister of *exh* and the negation of all innocently excludable alternatives.

(38) $[\![\text{exh}_{\mathcal{C}}\ \text{S}]\!] = 1$ iff

(i) $\forall$S' $\in$ IE(S, ALT(S)) $\cap\ \mathcal{C}$: $[\![\text{S'}]\!] = 0$, and

(ii) $\forall$S' $\in$ II(S, ALT(S)): $[\![\text{S'}]\!] = 1$.

(39) **Innocent Inclusion** (Bar-Lev & Fox, 2017)
For any sentence S, II(S, ALT(S)) = $\cap\{\mathcal{A} \subseteq$ALT(S) | $\mathcal{A}$ is a maximal set in ALT(S) such that $\{[\![\text{S'}]\!] \mid \text{S'}\in\mathcal{A}\} \cup \{[\![\text{S}]\!]\} \cup \{\neg[\![\text{S'}]\!] \mid \text{S'}\in\text{IE(S, ALT(S))}\}\}$.

The set of formal alternatives to the sister of *exh* in (35) is provided in (40) (we are ignoring the alternatives in which elements outside of the *any*-DP are replaced with their alternatives for readability). Note that, unlike in the case of the focus alternatives to the sister of *even*, a universal quantifier alternative is featured in the set of formal alternatives to the sister of *exh*.[2] These universal quantifier alternatives are innocently excludable if their domain overlaps with the domain of *any* and consists of at least two elements (otherwise the size of the domain does not matter). Also innocently excludable are the alternatives in which the domain of *any* is replaced by a domain with which it has an empty intersection. Different choices of relevant alternatives, $\mathcal{C}$, will yield different exhaustification outcomes.

(40) ALT([$\Diamond$ [any$_D$ book [λx John read x]]]) =
{[$\Diamond$ [every D' book [λx J read x]]]], [$\Diamond$ [any$_{D'}$ book [λx J read x]]]] | $[\![\text{D'}]\!]\in\text{D}_{(et)}$}

(41) IE([$\Diamond$ [any$_D$ book [λx John read x]]], (40)) =
{[$\Diamond$ [every D' book [λx J read x]]]], [$\Diamond$ [any D" book [λx J read x]]]] |
$[\![\text{D'}]\!]\cap[\![\text{D}]\!]\neq\emptyset \rightarrow \text{card}([\![\text{D'}]\!]\cap[\![\text{book}]\!])\geq 2$, $[\![\text{D"}]\!]\cap[\![\text{D}]\!] = \emptyset$}

[2]This is necessarily so in order to avoid overgeneration, say, in simple episodic sentences, where one would obtain a universally quantified meaning absent the universal quantifier alternatives. See Singh et al. 2013; Bar-Lev & Margulis 2014; Meyer 2016 for discussion of cases lacking a universal (conjunctive) alternative.

Now, given the constraint in (13), all and only these alternatives can be pruned. What set of relevant alternatives, $\mathcal{C}$, will yield the state of affairs described in (36)? Are there other sets of relevant alternatives that would result in the sister of *even* entailing all the alternatives in the domain of *even*?

Parses 1. In order to obtain precisely the (Strawson) entailment between the sister of *even* in (35) and its alternatives that is sketched in (36), all of the innocently excludable alternatives must be pruned, that is, the domain of *exh*, $\mathcal{C}$, must be empty. We describe the outcome of this for the sister of *even* and one subdomain alternative:

(42) Assume D = {a, b, c} and $\mathcal{C} = \emptyset$.

$[\![$[exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D_F}$ book [λx John read x]]]$]\!]$ = 1 iff $\forall$S $\in$ II([$\Diamond$ [any$_D$ book [λx John read x]]], ALT([$\Diamond$ [any$_D$ book [λx John read x]]])): $[\![$S$]\!]$ = 1 iff $\Diamond$a $\wedge$ $\Diamond$b $\wedge$ $\Diamond$c

(43) Assume D' = {a, b} and $\mathcal{C} = \emptyset$.

$[\![$[exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D'}$ book [λx John read x]]]$]\!]$ = 1 iff $\forall$S $\in$ II([$\Diamond$ [any$_{D'}$ book [λx John read x]]], ALT([$\Diamond$ [any$_{D'}$ book [λx John read x]]])): $[\![$S$]\!]$ = 1 iff $\Diamond$a $\wedge$ $\Diamond$b

In line with our above assumptions, the set of focus alternatives to the sister of *even* is as provided in (44). Given the choice $\mathcal{C} = \emptyset$, we obtain the set of innocently excludable alternatives in (45). (Note that this set parallels the one we obtained for downward-monotone examples; this is unsurprising given that free choice inferences induce a Strawson downward-monotone environment with respect to the domain of *any*, as discussed in Crnič 2017, 2019.)

(44) F([exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D_F}$ book [λx John read x]]]) =
{[exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D'}$ book [λx J read x]]]] | $[\![$D'$]\!]$$\in$D$_{(et)}$}

(45) IE([exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D_F}$ book [λx John read x]]], (44)) =
{[exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D'}$ book [λx J read x]]]] | $[\![$D$]\!]$$\not\subseteq$$[\![D']\!]$}

In order to get a consistent meaning, all the superdomain alternatives to the sister of *even* must be pruned, as given in (46), which is licensed by (13) since they are all innocently excludable. If, moreover, all the other non-subdomain alternatives are pruned, as given in (47), again respecting (13), we obtain precisely the state of affairs described in (36), where the presupposition of *even* is almost tautologous.

(46) Choice 1: $\mathcal{C}'$ = {[exh$_{\mathcal{C}}$ [$\Diamond$ [any$_{D'}$ book [λx J read x]]]] | $[\![$D'$]\!]$$\cap$$[\![D]\!]$ $\neq$ $[\![$D'$]\!]$}

(47) Choice 2: $\mathcal{C}' = \{[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{J read x}]]]] \mid [\![\text{D'}]\!] \subseteq [\![\text{D}]\!]\}$

The parses that give us consistent or even almost tautologous results are summarized in (48). However, they are not the only ones that do so.

(48) $[\text{even}_{\mathcal{C}'}\ [\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D}\ \text{book}\ [\lambda x\ \text{John read x}]]]$

Parse1.1: $\mathcal{C} = \emptyset$, $\mathcal{C}' = \{[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{J read x}]]]] \mid [\![\text{D'}]\!] \cap [\![\text{D}]\!] \neq [\![\text{D'}]\!]\}$

Parse1.2: $\mathcal{C} = \emptyset$, $\mathcal{C}' = \{[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{J read x}]]]] \mid [\![\text{D'}]\!] \subseteq [\![\text{D}]\!]\}$

Parses 2. Consider the set of alternatives in (49): they are all innocently excludable – in fact, they are just the set of innocently excludable alternatives in (41). (The considerations below trivially extend to any subset of (49), though presumably not every such set may count as relevant. See, e.g., Crnič et al. 2015; Bar-Lev 2018 for further constraints on pruning.)

(49) $\mathcal{C} = \{[\Diamond\ [\text{every D' book}\ [\lambda x\ \text{J read x}]]]],\ [\Diamond\ [\text{any D'' book}\ [\lambda x\ \text{J read x}]]]] \mid$

$[\![\text{D'}]\!] \cap [\![\text{D}]\!] \neq \emptyset \rightarrow \text{card}([\![\text{D'}]\!] \cap [\![\text{book}]\!]) \geq 2,\ [\![\text{D''}]\!] \cap [\![\text{D}]\!] = \emptyset\}$

Given this choice of excludable alternatives for *exh* (or any subset of these), all the subdomain alternatives would induce the same negated inferences (= the same as those induced by the sister of *even*) since they all have the same set of formal alternatives as the sister of *even*, and the sets of innocently excludable alternatives to the subdomain alternatives are a superset of those to the sister of *even* (they include the subdomain alternatives that to do not overlap with the respective subdomain though they do overlap with the domain of *any* in the sister of *even*). Thus, all the subdomain alternatives would be entailed by the sister of *even* (since they are all entailed by the sister of *even*, none of them is innocently excludable). We provide the meaning of the sister of *even* and one subdomain alternative:

(50) Assume D = {a, b, c} and $\mathcal{C}$ = (49).

$[\![[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D}\ \text{book}\ [\lambda x\ \text{John read x}]]]]]\!] = 1$ iff $\forall S \in \mathcal{C}$: $[\![S]\!] = 0 \wedge \forall S \in \text{II}([\Diamond\ [\text{any}_{D}\ \text{book}\ [\lambda x\ \text{John read x}]]], \text{ALT}([\Diamond\ [\text{any}_{D}\ \text{book}\ [\lambda x\ \text{John read x}]]]))$: $[\![S]\!] = 1$ iff

$\neg\Diamond(a \wedge b) \wedge \neg\Diamond(a \wedge c) \wedge \neg\Diamond(b \wedge c) \wedge \neg\Diamond d \wedge \Diamond a \wedge \Diamond b \wedge \Diamond c$

(51) Assume D' = {a, b} and $\mathcal{C}$ = (49).

$[\![[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{John read x}]]]]]\!] = 1$ iff $\forall S \in \mathcal{C}$: $[\![S]\!] = 0 \wedge \forall S \in \text{II}([\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{John read x}]]], \text{ALT}([\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{John read x}]]]))$: $[\![S]\!] = 1$ iff

$\neg\Diamond(a \wedge b) \wedge \neg\Diamond(a \wedge c) \wedge \neg\Diamond(b \wedge c) \wedge \neg\Diamond d \wedge \Diamond a \wedge \Diamond b$

The non-subdomain alternatives to the sister of *even* lack some of the inferences that the exhaustification of the sister of *even* induces. In particular, while the alternatives whose domains of *any* do not overlap with that of *any* in the sister of *even* get negated in the sister of *even*, they are entailed by those alternatives. Accordingly, they are clearly innocently excludable since their negation is entailed by the sister of *even*. An illustration of this is provided in (52).

(52) Assume D = {a, d} and $\mathcal{C}$ = (49).
$[\![$[exh$_\mathcal{C}$ [◊ [any$_D$ book [λx John read x]]]$]\!]$ = 1 iff ∀S ∈ $\mathcal{C}$: $[\![$S$]\!]$ = 0 ∧ ∀S ∈ II([◊ [any$_D$ book [λx John read x]]], ALT([◊ [any$_D$ book [λx John read x]]])): $[\![$S$]\!]$ = 1 iff
¬◊(a∧c) ∧ ¬◊(b∧c) ¬◊(a∧c) ∧ ¬◊(b∧d) ∧ ¬◊(c∧d) ∧ ◊a ∧ ◊d

This means that we obtain the same set of innocently excludable alternatives as on the first parse(s) discussed above, provided in (54).

(53) F([exh$_\mathcal{C}$ [◊ [any$_D$ book [λx John read x]]]) =
{[exh$_\mathcal{C}$ [◊ [any$_{D'}$ book [λx J read x]]]] | $[\![$D'$]\!]$∈D$_{(et)}$}

(54) IE([exh$_\mathcal{C}$ [◊ [any$_D$ book [λx John read x]]], (53)) =
{[exh$_\mathcal{C}$ [◊ [any$_{D'}$ book [λx J read x]]]] | $[\![$D$]\!]$⊈$[\![$D'$]\!]$}

The difference is now that pruning of superdomain alternatives is not necessary anymore in order to satisfy the presupposition of *even*: they do not entail the sister of *even* and may thus be more likely than it (they are, in fact, incompatible with the sister of *even*). However, since they innocently excludable, they may be pruned, in line with the constraint in (13). The same holds for all the non-subdomain alternatives, as indicated above. In the case of pruning of all the non-subdomain alternatives, the presupposition of *even* is again almost tautologous.

(55) [even$_{\mathcal{C}'}$ [exh$_\mathcal{C}$ [◊ [any$_D$ book [λx John read x]]]
Parse2.1: $\mathcal{C}$ = (49), $\mathcal{C}'$ = {[exh$_\mathcal{C}$ [◊ [any$_{D'}$ book [λx J read x]]]] | $[\![$D'$]\!]$∈D$_{(et)}$}
Parse2.2: $\mathcal{C}$ = (49), $\mathcal{C}'$ = {[exh$_\mathcal{C}$ [◊ [any$_{D'}$ book [λx J read x]]]] | $[\![$D'$]\!]$⊆$[\![$D$]\!]$}

Precluded parses? There is a host of other possible choices for what alternatives may be relevant in exhaustification (and consequently for *even*). We describe one representative choice of alternatives that would be problematic (Naomi Francis, p.c.). Consider the set in (56) (or any set with a non-empty intersection with it).

(56) $\mathcal{C} = \{[\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{J read x}]]]\ |\ [\![D']\!] \subset [\![D]\!]\}$

While this choice of alternatives would not exclude any alternative in the sister of *even* – the intersection of $\mathcal{C}$ and the set of innocently excludable alternatives give the sister of *even* is empty. However, it would affect the exhaustification of the alternatives. We describe the outcome of this for the sister of *even* and one subdomain alternative:

(57) Assume D = {a, b, c} and $\mathcal{C}$ = (56).
$[\![[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_D\ \text{book}\ [\lambda x\ \text{John read x}]]]]\!] = 1$ iff $\forall S \in \mathcal{C}$: $[\![S]\!] = 0 \wedge \forall S \in \text{II}([\Diamond\ [\text{any}_D$ book $[\lambda x$ John read x$]]]$, ALT$([\Diamond\ [\text{any}_D$ book $[\lambda x$ John read x$]]]))$: $[\![S]\!] = 1$ iff
$\Diamond a \wedge \Diamond b \wedge \Diamond c$

(58) Assume D' = {a, b} and $\mathcal{C}$ = (49).
$[\![[\text{exh}_{\mathcal{C}}\ [\Diamond\ [\text{any}_{D'}\ \text{book}\ [\lambda x\ \text{John read x}]]]]\!] = 1$ iff $\forall S \in \mathcal{C}$: $[\![S]\!] = 0 \wedge \forall S \in \text{II}([\Diamond\ [\text{any}_{D'}$ book $[\lambda x$ John read x$]]]$, ALT$([\Diamond\ [\text{any}_{D'}$ book $[\lambda x$ John read x$]]]))$: $[\![S]\!] = 1$ iff
$\neg\Diamond c \wedge \Diamond a \wedge \Diamond b$

Now, given this selection of the relevant alternatives for *exh*, all the alternatives to the sister of *even* are excludable: the non-subdomain alternatives for the same reason as above; the subdomain alternatives since their negation is entailed by the sister of *even*. The super-domain alternatives must be pruned, as above; the presupposition of *even* is contingent if no other alternatives are pruned. Another inference accompanying *even* may play a role here: the additive presupposition (see, e.g., Francis 2018 for a recent discussion), or something slightly weaker, as given in (59). Given the additive presupposition, not all non-subdomain alternatives may be pruned here, given that this would yield an additive presupposition that would contradict the assertion of the sentence. (Note that all the subdomain alternatives on the previous parses were entailed by the sister of *even*, thus making the additive presupposition easily accommodatable.)

(59) $[\![\text{even}_{\mathcal{C}}\ S]\!] \Rightarrow \exists S' \in F(S) \setminus (\text{IE}(S,F(S)) \setminus \mathcal{C})$: $S \not\Rightarrow \neg S'$

Choice of parse. As in the case of occurrences of *any*-DPs in downward-monotone environments, multiple parses of existential modal sentences with *any*-DPs have consistent presuppositions (some of them are contingent, some of them are almost tautologous). Again, the choice between may be influenced by independent principles, such as the Principle of Charity, which would prioritize parses with almost tautologous presuppositions. (See Menéndez-Benito 2010 for detailed arguments to the effect that existential modal sentences with *any*-DPs generate certain exclusivity inferences, in addition to the free choice ones.)

4 Non-monotone environments

All the examples above in which *any*-DPs were acceptable had parses that resulted in a presupposition that is almost tautologous: all the alternatives were entailed (asymmetrically) by the sister of *even*. Now, *any*-DPs may also occur in non-monotone environment. In these cases, they induce contingent presuppositions (Crnič, 2014). Consider the sentences in (60) and their LFs in (61).

(60) a. Exactly 2 presidents in the US history won any armed conflict.
b. ?Exactly 20 presidents in the US history won any armed conflict.

(61) [even$_{\mathcal{C}}$ [exactly 2/20 presidents λx any$_{D_F}$ conflict λ y [x won y]]]

Importantly for our purposes here, all the domain alternatives to the sister of *even* in (61) that have a distinct meaning are in principle innocently excludable:

(62) F([exactly 2/20 presidents λx any$_{D_F}$ conflict λ y [x won y]]) =
{[exactly 2/20 presidents λx any$_{D'}$ conflict λ y [x won y]] | $[\![$D'$]\!]$$\in$D$_{(et)}$}

(63) IE([exactly 2/20 presidents λx any$_{D_F}$ conflict λ y [x won y]], (62)) =
{[exactly 2/20 presidents λx any$_{D'}$ conflict λ y [x won y]] | $[\![$D'$]\!]$$\cap$$[\![$book$]\!]$$\neq$$[\![D]\!]$$\cap$$[\![$book$]\!]$}

Given the constraint in (13), any subset of these alternatives may in principle be pruned. Unlike in the above cases, no matter what the choice of relevant alternatives is, the presupposition of *even* will be contingent. This means that one should in principle be able to accommodate a domain of *even* that would yield a presupposition that is satisfied in the context. This is desirable for (60-a). Consider the choice of alternatives in (64). Intuitively, both alternatives distinct from the sister of *even* in (64) (in the second and third row) are practically entailed by the common ground, or at least extremely likely on what we know, what is normal, etc; less so for the sister of *even*. Thus, free pruning of the alternatives in the domain of *even* may be desirable in this case. (It may well be that it is not necessary, which depends on the domain of *any*.)

(64) exactly 2 presidents won an armed conflict in the set of all wars
$<_c$ exactly 2 presidents won an armed conflict in the set of difficult wars
$<_c$ exactly 2 presidents won an armed conflict in the set of world wars

A concern about overgeneration arises, however. Namely, we saw in (60-b) that *any*-DPs are not always felicitous in non-monotone environments. Specifically, can we accommodate a domain of *even* that would lead to a plausible presupposition of *even* in the infelicitous examples as well? If this were possible (and easy), the Principle of Charity would dictate that the sentence should be felicitous. Such an accommodation does not seem tenable, though. Intuitively, given that 20 presidents winning an armed conflict is an exceedingly high number of presidents, the bigger the set of armed conflicts, the more likely it is that exactly that number of presidents won them. Thus, free pruning of alternatives does not obviously lead to overgeneration (see Crnič 2014 for further discussion). (It may help with more intermediate cases, say, in *Exactly 10 presidents won any armed conflict*. It may be useful to investigate this experimentally.)

(65) exactly 20 presidents won an armed conflict in the set of all wars
 ?$\geq_c$ exactly 20 presidents won an armed conflict in the set of easy wars
 ?$\geq_c$ exactly 20 presidents won an armed conflict in the set of 20th c. wars

Many further predictions about the behavior of focus particles, in addition to the area of NPIs, arise from the constraint in (13). None of these can be discussed here. The hope is that the constraint, or something like it, survives a more careful scrutiny, allowing us to avoid sui generis stipulations about the alternatives to *any*-DPs and their pruning. Of course, one would also like to understand why such a constraint should hold.

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