# Exhaustification, *but*-Exceptives, and *Any*[1]

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**Abstract.** This paper proposes an exhaustification-based approach to the limited distribution of the *but*-exceptive á la Chierchia (2006, 2013) and shows that there is a total analogy between the weak NPI *any* and the *but*-exceptive. The core of the proposal is that just like *any*, *but* triggers a set of alternatives that is built on the subsets of the domain of quantification.

**Keywords:** exceptives, exhaustification, NPIs, domain alernative.

## 1. Introduction

In this paper, I intend to show that the limited distribution of the *but*-exceptive, within the exhaustification-based approach á la Chierchia (2006, 2013) and others, may be captured with exactly the same mechanism that captures that of NPIs. To the extent that this attempt is on the right track, it may be seen as an improvement of Gajewski's (2013) exhaustification-based analysis of the *but*-exceptive and provides further support for his claim that the license of the *but*-exceptive may be seen as an instance of NPI licensing.

Some terminologies used in the following discussion are introduced: the term 'host' refers to the determiner that heads the nominal projection that the *but*-exceptive is attached to (e.g, *every* in (1b)); 'associate' (e.g., *student* in (1b)) refers to the common noun (or noun phrase) which together with the *but*-exceptive semantically serves as the 'restriction' of the head determiner ; the term 'exception set' is reserved for the denotation of the complement of *but*. Here I simply assume that there exists some shifting operation that turns the complement of *but* set-denoting.

(1) a. D (host) NP (associate) *but* DP (exception set); *but* DP = *but*-EP; NP *but* DP = restriction

b. Every student but Mary smokes.

[1] I would like to thank the audience in *Sinn und Bedeutung* 20 at Tubingen and Jon Gajewski for valuable suggestions. This project is supported by Taiwan Minister of Science and Technology via the grant MOST 104-2410-H-007-063-.

## 1.1. The distribution of the *but*-exceptive

Intuitively, a *but*-exceptive serves to subtract some elements out of a set so that quantification over this set may hold. For instance, (2a/3a) says that the quantification in question over the set of students with respect to the property of smoking may hold if Mary is excluded (see (2b) and (3b)); crucially, both examples are true only if Mary is a student and she bears a different value from other students with respect to the property of smoking.

(2) a. Every student *but Mary* smokes.
 b. Mary is a student,
 Mary does not smoke, and
 Every student who is not Mary smokes.

(3) a. No student *but Mary* smokes.
 b. Mary is not a student,
 Mary smokes, and
 none of the students that are not Mary smoke.

There however seems to be more in the semantic components of *but* than just being a *minus* sign. As observed in many research (von Fintel 1993; Moltmann 1995; Lappin 1996; and others), not all quantificational determiners may host a *but*-exceptive (see (4)); the consensus from these literature is that only universals (e.g., *every*, *all*) and negative universals (e.g., *no*) may host a *but*-exceptive.[2]

(4) All/No/*Most/*Some/*Few/*At most 2/*Fewer than 2 students *but Mary* smokes.

*Any* hosts a *but*-exceptive in both its NPI and FCI incarnations, as shown in (5)-(6). Note however that not all environments where *any* is licensed are hospitable to *any*. . . *but*. . . ; in the so called Strawson Downward-Entailing (henceforth, SDE) environments (see (7); see von Fintel (1999)), *any*, but not *any*. . . *but*. . . , is licensed.

(5) Chris didn't see any student (*but Mary*).

(6) Bill may pick any flavor of ice cream (*but toffee*).

(7) a. Only Alan talked to any students (**but Mary*).

[2] Other exceptive markers such as *except* seem to have a freer distribution than *but*; several examples that involve the occurrence of *except* hosted by *some* have been reported in Peters and Westerståhl (2006) and García-Álvarez (2008). Nevertheless, as far as I am aware of, the consensus in the literature is that the *but*-exceptive can only occur with quantifiers that carry a universal or negative universal quantificational force.

b. Chris is surprised/sorry that Alan talked to any students (**but Mary*).

c. The most senior faculty who talked to any students (**but Mary*) got promoted.

## 1.2. The *Leastness* of the exception set

Most research on the exceptives have been centered on the co-occurrence restriction on the *but*-exceptive (Hoeksema 1987, 1996; von Fintel 1993; Moltmann 1995; Lappin 1996; Gajewski 2008, 2013; a.o.). Among them[3], von Fintel (1993) suggests that the co-occurrence restriction may be captured if it is assumed that *but* imposes a requirement of uniqueness and minimality on the exception set; the exception set should be the unique minimal one that makes the quantification in question true (see (8)).

(8) $[\![$ [[ D N *but* DP ] VP ] $]\!]$=1 iff:

a. $[\![$ D $]\!]$($[\![$ N $]\!]$-{$[\![$ DP $]\!]$})($[\![$ VP $]\!]$), and

b. for all S such that $[\![$ D $]\!]$($[\![$ N $]\!]$-S)($[\![$ VP $]\!]$), {$[\![$ DP $]\!]$}$\subseteq$S

Left Downward-Entailing (henceforth, LDE) quantifiers like *every* and *no* guarantee the uniqueness and the minimality of the exception set; for instance, if Mary is a student and all students other than Mary smoke, then the singleton set containing Mary is the unique minimal set that renders universal quantification true with respect to the property of smoking. On the other hand, the leastness cannot be guaranteed by a non-LDE quantifier like *some*; if some student who is not Mary smokes, then existential quantification is still true without Mary being excluded. The failure to satisfy the leastness requirement with *some* results in contradiction in the truth conditions of *some student but Mary smokes*; hence, the presence of a *but*-exceptive with *some* is ungrammatical.

von Fintel's (1993) analysis, however, as pointed out by Gajewski (2008), makes the wrong prediction in the case of the NPI *any*. The NPI *any* hosts a *but*-exceptive; nevertheless, there exists abundant evidence (e.g., Ladusaw 1979; Carlson 1980; a.o.) that suggests that *any* in its NPI incarnation carries an existential quantificational force. To solve this problem, Gajewski (2008) suggests that the *leastness* should be severed from the lexical meaning of *but*: *but* simply serves to subtract elements in the exception set from the domain of quantification, and *leastness* is guaranteed by a sentential operator LEAST. Gajewski's (2008) idea is sketched as in (9); the reader are referred to Gajewski (2008, 2013) for technical details.

(9) a. LF of (5): [① LEAST [② NEG [ *any student but Mary* [1[ Chris saw $t_1$]]]]]

b. $[\![$ *but* $]\!]$=$\lambda X_{<e,t>}. \lambda Y_{<e,t>}$. Y-X

[3]Due to the space limit, reviews and comparison of these proposals are out of the scope of this paper.

c. $[\![ ② ]\!] =1$ iff ({x: Chris saw x}∩({y: y is a student}-{Mary})=∅;
$[\![ ① ]\!]=1$ iff:
i) ({x: Chris saw x}∩({y: y is a student}-{Mary})=∅, and
ii) ∀S[{x: Chris saw x}∩({y: y is a student}-S)=∅ →{Mary}⊆S]

1.3. The perspective and the roadmap

As Gajewski (2008, 2013) points out, LEAST should be seen as a pragmatic strengthening operator, just as the exhaustivity operator in Chierchia (2006), Chierchia et al. (2012) and others. Hence, it would be desirable if *leastness* with the *but*-exceptive can be subsumed under the phenomena that have received explanation within the exhaustification-based approach. An account that aims to achieve this goal is proposed by Gajewski (2013), based on which he further suggests that an analogy can be drawn between the *but*-exceptive and NPIs. In this account, *but* triggers a set of highly-structured alternatives which recursive application of exhaustification operates on. Empirically adequate as it is, this postulation however drives *but*-exceptive apart from NPIs and hence renders the connection between these two less clear than it is intended to be.

Building on von Fintel's (1993) and Gajewski's (2008; 2013) insight, I intend in this paper to show that within the exhaustification-based approach, there is indeed a total analogy between between NPIs and the *but*-exceptive. Specifically, I would like to suggest that the distribution of the *but*-exceptive may be captured by exactly the same mechanism that captures that of NPIs such as *any* in Chierchia (2006, 2013). Along with the previous wisdom, the only additional assumption needed to achieve this goal is that just like *any*, *but* triggers an alternative set that looks into the 'domain alternatives', namely, the subsets of the domain of quantification. To the extent that the proposal is on the right track, it may be seen as an improvement of Gajewski's (2013) analysis and lends further support to his claim that The *but*-exceptive may be seen as an NPI of some kind.

The rest of the discussion is structured as follows. To make this paper self-sufficient, I review Chierchia's (2006; 2013) account of NPIs in Section 2. The proposal is laid out in Section 3. Section 4 discusses how in addition to *every*, *no*, and *some*, the proposal may be extended to cases that involve structurally more complicated quantifiers. The conclusion is in Section 6.

## 2. Exhaustification and the Distribution of NPI *Any*

One widely received wisdom on the limited distribution of NPIs such as *any* and *ever*, which may be traced back to Fauconnier (1975a, b), Ladusaw (1979), von Fintel (1999) and others, is that these items are only grammatical in enviomnments that support a downward-entailing inference (an inference from a set to its subset) of some sort. Along with such an entailment-based approach to NPI licensing, Chierchia (2006, 2013), building on Krifka's (1995) idea, suggests an alternative-based semantics to cash out the DE constraint on the distrubution of these items.

In Chierchia's (2013) system, The NPI *any* is an existential quantifier *per se*; in addition to its quantificational force, *any* triggers a set of domain alternatives, i.e., alternatives that are built on the subsets D′ of the quantificational domain D of *any*. In a toy model in which D contains only three students John, Bill and Mary, the set of subdomains based on which the alternatives triggered by *any* are built is just like what is illustrated in (11).

(10) a. $[\![\ any_{D}\ ]\!]=\lambda P_{<e,t>}.\ \lambda Q_{<e,t>}.\ \exists x{\in}D[P(x) \text{ and } Q(x)]$

b. $\textsc{alt}(any_{D})=\{\lambda P_{<e,t>}.\ \lambda Q_{<e,t>}.\ \exists x{\in}D'[P(x) \text{ and } Q(x)]\text{: } D'{\subseteq}D\}$

(11) $D=\{J, B, M\}; \{D'\text{: } D'{\subseteq}D\}=\left\{\begin{array}{c}\{J,B,M\}\\ \{J,B\},\{J,M\},\{B,M\}\\ \{J\},\{B\},\{M\}\\ \varnothing\end{array}\right\}$

An operator EXH, whose semantic contribution is similar to that of *only*, then operates on this set of alternatives; this operator serves to exclude all the alternatives that are not entailed by its prejacent (i.e., the proposition expressed by its sister at LF).

(12) $[\![\ \textsc{exh}\ ]\!]^{w}=\lambda p_{<s,t>}.\ p(w) \text{ and } \forall q[q{\in}\textsc{alt}(p) \text{ and } q(w) \rightarrow p{\subseteq}q]$

Whether a polarity item like *any* can be licensed depends on whether the result of exhaustification gives consistent truth conditions. Consider (13a), where *any* is ungrammatical. The prejacent of EXH says that there is a student x in D such that Chris saw x; after exhaustification, the derived truth conditions further say that in none of the proper subdomains of D did Chris see a student. These truth conditions however are contradiction, for if Chris saw some student in D, there must be some subdomain D′ of D that contains some student that Chris saw. Given that exhaustification does not give consistent truth conditions, (13a) is ungrammatical. In the following, $S_w$ stands for the extension of *student* in the world of evaluation w.

(13) a. * Chris saw *any* student.

b. LF of (13a): [EXH [$any_{D}$ *student* [ 1 [ *Chris saw* $t_1$ ]]]]

c. $\exists x{\in}D[x{\in}S_w \text{ and Chris saw } x]\text{, and } \forall D'[\exists x{\in}D'[x{\in}S_w \text{ and Chris saw } x] \rightarrow D{\subseteq}D']$

*Any* is grammatical in the scope of a downward-entailing operator like negation. In this case, appending the operator EXH above the DE operator whose scope contains *any* gives consistent truth conditions. In (14a), the prejacent of EXH entails all the other alternatives; if there is no student in D that Chris saw, then in none of the subdomains D′ of D did Chris see any students. Given that exhaustification does not lead to contradiction, *any* is licensed in (14a)

(14) a. Chris didn't see *any* students.

b. LF of (14a): [ EXH [ NEG [ $any_D$ *student* [ 1 [ *Chris saw* $t_1$]]]]]

c. $\neg\exists x\in D[x\in S_w$ and Chris saw x]

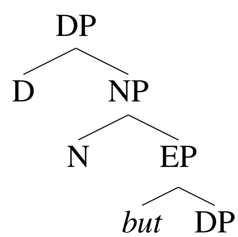
## 3. Exhaustification and the *but*-Exceptive

The wisdom we have learned from von Fintel and Gajewski is that i) the complement of *but* should denote the unique minimal exception set that makes the quantification in question established, and ii) the *leastness* of the exception set should not be encoded in the lexical meaning of *but*. In the following, I would like to show how the mechanism sketched above that captures the distribution of NPIs can be extended to that of the *but*-exceptive.

### 3.1. *but* and domain alternatives

Along with Moltmann (1995), Lappin (1996), and Gajewski (2008, 2013), I assume that the exceptive phrase together with the restrictor N forms a constituent (see (15)).

(15)




*but* subtracts the exception set from the intersection of the quantificational domain D and the extension of N. Just like *any*, the alternative set triggered by *but* sees the subdomains of the doamin of quantification D; it triggers a set of alternatives that are built on the subsets of D and the subsets of the exception set.

(16) a. $[\![\ but_D\ ]\!]=\lambda P_{<e,t>}.\ \lambda Q_{<e,t>}: P\subseteq D\cap Q.\ D\cap Q\text{-}P$

b. $\text{ALT}(but_D)=\{[\lambda P'_{<e,t>}.\lambda Q_{<e,t>}.\ D'\cap Q\text{-}P']: D'\subseteq D \text{ and } P'\subseteq P\ \}$

And just like *any* and other polarity items, the presence of a *but*-exceptive requires the presence of the operator EXH; EXH operates on the alternative set triggered by *but* and excludes all the alternatives that are not entailed by its prejacent. Assuming our toy model, where D contains only three students John, Bill, and Mary, the alternative set triggered by *but* for the noun phrase *student* *but Mary* is illustrated as in (17); the NP *student but Mary* denotes the alternative in the square.[4]

(17) ALT(*student* $but_D$ *Mary*)= $\left\{ \begin{array}{c} \{J, B, M\} - \varnothing, \boxed{\{J, B, M\}\text{-}\{M\}} \\ \{J, B\} - \varnothing, \{J, M\} - \varnothing, \{B, M\} - \varnothing \\ \{J, M\} - \{M\}, \{B, M\} - \{M\} \\ \{J\} - \varnothing, \{B\} - \varnothing, \{M\} - \varnothing, \{M\} - \{M\} \end{array} \right\}$

Interestingly, after simplification, (17) looks exactly like (11), the set of subdomains based on which the alternative set triggered by *any*. The difference between the case of the NPI *any* and that of the *but*-exceptive is that in the case of *any* quantification operates on D, the maximal element in this set, whereas in the case of the *but*-exceptive, quantification operates on the difference of D and the exception set (as indicated by the square in (18)).

(18) (17)= $\left\{ \begin{array}{c} \{J, B, M\} \\ \boxed{\{J, B\}}, \{J, M\}, \{B, M\} \\ \{J\}, \{B\}, \{M\}, \\ \varnothing \end{array} \right\}$

3.2. *every/no* vs. *some*

*Every* and *no* host a *but*-exceptive; intuitively, the quantificatioan in question holds only if the exception set (in (19a) and (21a), the singleton set that contains Mary) is excluded from the associate (in (19a) and (21a), the extension of *student*). With the lexical meaning of *but* and the assumptions on domain exhaustification laid out above, the LF and the truth conditions of (19a) are represented in (19b) and (19c).

(19) a. Every student *but Mary* smokes.
b. LF of (19a): [EXH [[*every* [ *student* [$but_D$ *Mary*]]] smokes]]
c. $\forall x[x \in (S_w \cap D\text{-}\{M\}) \rightarrow x \text{ smokes}]$ and
$\forall D' \subseteq D \forall P' \subseteq \{M\}[\forall x[x \in (S_w \cap D'\text{-}P') \rightarrow x \text{ smokes}] \rightarrow (D' \cap S_w\text{-}P') \subseteq (D \cap S_w\text{-}\{M\})]$

With the toy model assumed above, where John, Bill and Mary are the only students, the prejacent in (19b) asserts that all the students who are not Mary, namely John and Bill, smoke. As illustrated

[4]Strictly speaking, (17) should include alternatives such as {J, B}-{M}, those alternatives that are formed by the difference of some subset D′ of D and some subset P′ of the exception set P such that D′ and P′ do not overlap. Nevertheless, for such alternatives, there is always another one that is formed by the diffeence of some $D'' \subseteq D$ and some $P'' \subseteq P$ such that $P'' \subseteq D''$; for instance, {J, B}-{M} is equivalent to {J, B, M }-{M}. Therefore, for simplicity, I ignore such alternatives in the illustration.

in (20), since *every* is LDE, exhaustification over the domain alternatives triggered by *but* excludes all the alternatives that are not a subset of {J, B} and hence excludes as well those that contain Mary (as indicated by ~~strikethrough~~). Given that the prejacent entails all the other alternatives that are not excluded, exhaustification in (19a) yields a consistent result. Hence, a *but*-exceptive is grammatical with *every*.

(20)
$$\left\{ \begin{array}{c} \cancel{\{J, B, M\}} \\ \boxed{\{J, B\}}, \cancel{\{J, M\}}, \cancel{\{B, M\}} \\ \{J\}, \{B\}, \cancel{\{M\}}, \\ \varnothing \end{array} \right\}$$

The co-occurrence of the negative universal *no* and the *but*-exceptive may be captured in the same way. Along with the assumptions above, the LF and the truth conditions of (21a) may be represented as in (21b) and (21c). With the toy model given above, these truth conditions may be illustrated with (20) as well: the prejacent in (21b) asserts that neither John nor Bill smokes, and exhaustification excludes all the alternatives that contains Mary. Just like *every*, *no* is LDE, given that all the alternatives not excluded are entailed by the prejacent, exhaustification yields a consistent result. Hence, the *but*-exceptive is grammatical with *no*.

(21) a. No student *but Mary* smokes.

b. LF of (21a): [EXH [[*no* [ *student* [$but_D$ *Mary*]]] smokes]]

c. $\neg\exists x[x \in (S_w \cap D\text{-}\{M\})$ and x smokes], and
$\forall D' \subseteq D \forall P' \subseteq \{M\}[\neg\exists x[x \in (S_w \cap D'\text{-}P')$ and x smokes] $\rightarrow$
$(D' \cap S_w\text{-}P') \subseteq (D \cap S_w\text{-}\{M\})]$

The existential quantifier *some* does not host a *but*-exceptive (see (22a)). With the assumptions laid out above, the LF and the derived truth conditions of (22a) may be represented as in (22b) and (22c).

(22) a. *Some student *but Mary* smokes.

b. LF of (22a): [EXH [[*some* [ *student* [$but_D$ *Mary*]]] smokes]]

c. $\exists x[x \in (S_w \cap D\text{-}\{M\})$ and x smokes], and
$\forall D' \subseteq D \forall P' \subseteq \{M\}[\exists x[x \in (S_w \cap D'\text{-}P')$ and x smokes] $\rightarrow$
$(S_w \cap D\text{-}\{M\}) \subseteq (S_w \cap D'\text{-}P')]$

The derived truth conditions of (22a), however, are contradiction for exactly the same reason why those of (13a) (see (13b)) are. With the toy example assumed above, the truth conditions (22c) may be illustrated as in (23): the prejacent in (22b) asserts that there is some student who is not Mary, namely John or Bill, smokes. Since *some*, unlike *every* and *no*, is left upward-entailing, all alternatives that are not a superset of the set containing John and Bill are excluded after exhaustification. Nevertheless, excluding all these alternatives leads to contradiction, for if John or Bill smokes, then either the singleton set that contains John or the one that contains Bill may make the existnential quantification true. The *but*-exceptive hence is ungrammatical with *some*.

(23)
$$\left\{ \begin{array}{c} \{J, B, M\} \\ \boxed{\{J, B\}}, \cancel{\{J, M\}}, \cancel{\{B, M\}} \\ \cancel{\{J\}}, \cancel{\{B\}}, \cancel{\{M\}}, \\ \varnothing \end{array} \right\}$$

## 4. More Complicated Cases

### 4.1. *Exactly n*

*Exactly n NP* is non-monotonic and does not host a *but*-exceptive. Intuitively, *exactly two students smoke* says that two students smoke and no more than two students smoke. In various proposals (Landman 1998; Krifka 1999; Kennedy 2013; a.o.), the negative implication of an *exactly n NP* has been seen as a product of some pragmatic mechanism; the particle *exactly* is taken to be a signal of the obligatory application of such an mechanism. Landman (1998) suggests that semantically *exactly n NP* means the same as *n NP* but comes with an additional requirement that it be strengthened by an implicature-generating mechanism; Kennedy (2013) on the other hand suggests that *exactly* in *exactly n NP* may be seen as a 'slack regulator'. For the purpose of this paper, I will simply assume the semantics in (24) for *exactly n NP*, though this semantics may be implemented with any of the proposals mentioned in these references.

(24) $[\![\ \textit{exactly n N VP}\ ]\!]$=1 iff $|\ [\![N]\!] \cap [\![VP]\!]\ |$=n

With the assumptions laid out above, now consider (25a) and its LF. Assuming the toy model in which D contains only three students John, Mary and Bill, the prejacent of EXH in (25a) asserts that either John or Bill, but not both, smokes. *but* triggers a set of domain alternatives; given that *exactly n* is non-monotonic (e.g., that exactly one of John, Mary and Bill smokes neither entails nor is entailed by that exactly one of John and Bill smokes), all the domian alternatives that are not the prejacent are excluded.[5] The result of exhaustification is illustrated in (26).

(25) a. * Exactly one student *but Mary* smokes.
b. LF: [EXH [ *exactly 1* [*student* [$\textit{but}_{\text{D}}$ *Mary*]] *smokes*]]

[5]The domain alternative ∅ need not be excluded, since this alternative cannot render the relevant quantification true.

(26)
$$\left\{ \begin{array}{c} \cancel{\{\text{J, B, M}\}} \\ \boxed{\{\text{J, B}\}}, \cancel{\{\text{J, M}\}}, \cancel{\{\text{B, M}\}} \\ \cancel{\{\text{J}\}}, \cancel{\{\text{B}\}}, \cancel{\{\text{M}\}}, \\ \varnothing \end{array} \right\}$$

Exhaustification in (26), however, results in contradiction: if the prejacent, namely that exactly one of John and Bill smokes, is true, then either {J} or {B} renders quantification by *exactly one* true; nevetheless, these two domain alternatives are excluded after exhaustification. Hence, the *but*-EP is ungrammatical in (26).

The above account for the incompatibility between the *but*-exceptive and *exactly n*, however, seems to encounter challenges in a scenario in which the set of students in the context of utterance is equivalent to the union of the exception set and the set of students that smoke; for instance, a scenarion in which with our toy model, both John and Bill are students that smoke. In such a scenario, exhaustification in (27a) gives the result in (27b): all the domain alternatives other than {J, B} that have more than one members are excluded; those that have only one member (or none) need not be excluded since they do not make quantification by *exactly two* true.

(27) a. * Exactly two students *but Mary* smoke.

b.
$$\left\{ \begin{array}{c} \cancel{\{\text{J, B, M}\}} \\ \boxed{\{\text{J, B}\}}, \cancel{\{\text{J, M}\}}, \cancel{\{\text{B, M}\}} \\ \{\text{J}\}, \{\text{B}\}, \{\text{M}\}, \\ \varnothing \end{array} \right\}$$

At first glance, there seems no offending exclusion in (27b), and hence we may wrongly predict that the *but*-EP is grammatical in (27a). A closer look, neverhteless, suggests that the analysis laid out above is still on the right track: the prejacent in (27a) says that John and Bill are all and the only students that smoke; after exahsutification, the derived truth conditions further say that: (i) it is not the case that exactly two of John, Bill and Mary smoke, (ii) it is not the case that exactly two of John and Mary smoke, and iii) it is not the case that exactly two of Bill and Mary smoke. The prejacent together with (i) entails that Mary smokes. This however contradicts (ii) as well as (iii): if Mary smokes in this context of utterance, both (ii) and (iii) should be false. The proposed analysis then correctly predicts that even in such a special case, the *but*-EP with *exactly n* still cannot be licensed.

Intrim summary: the proposal, without relying on any further stipulations, correctly predicts that the *but*-EP is incompatible with *exactly n* across the board; in the case of *exatly n* . . . *but* . . . , there is always some domain alternative the exclusion of which leads to contradiction in the truth conditions.

## 4.2. *Fewer than n* and *At most n*

*fewer than n* and *at most n* are LDE; for instance, *fewer than two students smoke* entails that *fewer than two linguistics students smoke*, and *at most one student smokes* entails that *at most one linguistics student smokes*. Nevertheless, unlike the LDE quantifiers *every* and *no*, they do not host a *but*-EP (see (28)).

(28) a. * Fewer than two students *but Mary* smoke.
b. * At most one student *but Mary* smokes

These two modified numeral expressions have received great attention in the literature (Hackl 2000; Nouwen 2010; Schwarz et al. 2012; Kennedy 2013, 2015; and others). One idea that has been suggested (Hackl 2000; Schwarz et al. 2012; Kennedy 2015) is that the meaning of these expressions encodes maximality and inferiority (see (29)); for instance, *fewer than two students smoke* is true iff the maximal number of students who smoke is smaller than 2; *at most one student smokes* is true iff the maximal number of students who smoke is smaller than or equal to 1.

(29) a. $[\![$ *fewer than n N VP* $]\!]$=1 iff $max(\{\text{n}' : |\, [\![N]\!] \cap [\![VP]\!] \,| \geq \text{n}'\}) < \text{n}$
b. $[\![$ *at most n N VP* $]\!]$=1 iff $max(\{\text{n}' : |[\![N]\!] \cap [\![VP]\!]| \geq \text{n}'\}) \leq \text{n}$
(for any set of numbers N′, $max$(N′)=$\iota$n[n∈N′ and for all n′ such that n′∈N′, n′≥n])

With these assumptions, one may assign (30a) the LF in (30b). After exhaustification over the domain alternatives triggered by *but*, the truth conditions in (30c) are derived.

(30) a. * Fewer than two students *but Mary* smoke.
b. LF of (30a): [EXH [[*fewer than two* [*students but$_D$ Mary*]] *smoke*]
c. *max*({n: n of {J, B} smokes })<2, and
for all X such that X$\not\subseteq${J, B}, *max*({n: n of X smokes })≥2

Given that *fewer than n* is LDE, with our toy model, all the domain altrnatives that are subsets of {J, B} are excluded (see (31)). The result of exhaustification, however, is contradiction: the truth conditions in (30c) (see also (31)) say that the maxinmal of number of n such that n of {M} smokes is greater than or equal to 2, and this can never be true. The *but*-exceptive is therefore ungrammatical in (30a).

(31) {
~~{J, B, M}~~
[{J, B}], ~~{J, M}~~, ~~{B, M}~~
{J}, {B}, ~~{M}~~,
∅
}

The incompatibility of the *but*-exceptive with *at most n* is accounted for in the same way. With the LF in (32b), the truth conditions in (32c) are derived. These truth conditions are contradiction, however, for the same reason why those in (30c) are: after exhaustification over the domain alternaives, (32c) says that the maxinmal number of n such that n of {M} smokes is greater than 2, and this can never be true. The *but*-exceptive is thus ungrammatical in (32a).

(32) a. * At most one student *but Mary* smokes.
b. LF of (32a): [EXH [[*at most one* [*student* $but_D$ *Mary*]] *smokes*]
c. *max*({n: n of {J, B} smokes }) $\leq$ 1, and
for all X such that X $\not\subseteq$ {J, B}, *max*({n: n of X smokes }) $>$ 1

4.3. Issues with *NULL*

The account proposed above for the incompatibility between the *but*-exceptive and the modified numeral expressions encounters challenges when it comes to 'zero': *exactly zero*, *fewer than one*, *at most zero* are ostensibly equivalent to *no*, and the proposal laid out above, without further implementation, predicts that the *but*-EP is grammatical with these expressions. (33) shows that this prediction is not borne out.

(33) a. * <u>Fewer than one</u> student *but Mary* smokes.
b. * <u>Exactly zero</u> students *but Mary* smoke.
c. * <u>At most zero</u> students *but Mary* smoke.

It is worth to point out that these expressions differ from *no* not only in hosting the *but*-EP; as pointed out in Gajewski (2011), these expressions, unlike *no*, fail to license strong NPIs such as *in days/weeks/years*.

(34) a. * <u>Exactly zero</u> students have visited me *in years*.
b. * <u>Fewer than one</u> student has visited me *in years*.
c. * <u>At most zero</u> students have visited me *in years*

*No* and *zero*, as already pointed out in several research, seemingly differ semantically in nature.

(35) a. No/*Zero students like SEMANTICS, either. (Gajewski 2011)
b. No/*Zero occasion(s) did he mention my help. (Deprez 1999)
c. She drank no/*zero martinis, not even weak ones. (Postal 2004)

The facts in (34) and (35) suggest that an account for (33) requires a better understandng of 'zero'. Gajewski (2011) suggests that the facts in (34) and (35) may be explained if it is assumed that the grammar merely sees *zero* as just like another number and hence treats an expression like *exactly zero* just as *exactly 64*. It might be interesting to see how my proposal may be implemented with this idea to account for (33), though this has to be left for future study.

## 5. The *but*-exceptive and *any*

The NPI *any* hosts the *but*-EP, as shown in (5). The discussion above already suggests that there is a total analogy between the NPI *any* and the *but*-exceptive: both trigger an alternative set built on the subdomains of the domain of quantification. Under the proposal laid out above, licensing the NPI *any* in *any... but ...* is simply a by-product of licensing the *but*-EP. With the composition rules in (36) and the LF in (37a), the truth conditions in (37c) are derived for (5). Given that exhaustification gives a consistent result, the *but*-EP, as well as the NPI *any*, is licensed in (5).

(5) Chris didn't see any students (*but Mary*).

(36) a. *Standard definition of application for* ALT *function*:
$[\![ \alpha ]\!]^{ALT}=[\![ \beta ]\!]^{ALT}([\![ \gamma ]\!]^{ALT})$
b. *Set tolerant application:*
Where A is a set of functions whose domains include the members of B,
A(B)=$\{\alpha(\beta)$: $\alpha\in$A and $\beta\in$B$\}$ (Rooth 1985; Gajewski 2011; a.o.)

(37) a. LF of (5): [EXH [NEG [ $any_D$ [*student* $but_D$ *Mary* [1 [ *Chris saw* $t_1$]]]]]
b. $[\![ any_D ]\!]^{ALT}([\![$ *student* $but_D$ *Mary* $]\!]^{ALT})$=
$\{\lambda Q_{<e,t>}.\ \exists x[x\in(D'\cap S_w\text{-}P')$ and x smokes]: $D'\subseteq D$ and $P'\subseteq\{M\}\}$
c. TC: $\neg\exists x[x\in(D\cap S-\{M\})$ and Chris saw x], and
$\forall D'\subseteq D\forall P'\subseteq\{M\}[\neg\exists x[x\in(D'\cap S-P')$ and Chris saw x] $\rightarrow$
$(D'\cap S-P')\subseteq(D\cap S-\{M\})]$

We however have seen that *any ... but...* is not grammatical everywhere *any* is; as shown in (7), in the so called 'Strawson Downward-Entailing' environments, *any*, but not *any... but ...*, is grammatical.

(7) a. Only Alan talked to any students (**but Mary*).
b. Chris is surprised/sorry that Alan talked to any students (**but Mary*).
c. The most senior faculty member who talked to any students (**but Mary*) got promoted.

Note that these SDE environments are presuppositional (see. e.g., von Fintel (1999)); for instance, *only Alan talked to any students* presupposes that someone talked to some student.[6] In these environments, a DE inference is valid only on the grounds where the presupposition of the conclusion is satisfied. The contrast between (5) and (7) then suggests that it is the presuppositions in these SDE environments that block the license of the *but*-EP; while the license of the *any* is not subject to the presuppositional content, that of the *but*-EP is.

There are two routes that can be taken to cash out this contrast. One may follow Gajewski and Sharvit (2012) and assume that the presuppositional meaning normally undergoes exhaustification alongside the assertive meaning; while the license of the *but*-EP is subject to exhaustification over the assertative meaning as well as that over the presuppositional meaning, only the former plays a role in the license of the weak NPI *any*. On the other hand, following Gajewski (2011) and Chierchia (2013), one may assume that exhaustification, in some cases (e.g., for the purpose of licensing strong NPIs such as *in days/weeks/years*, *not... until* and *either*), has to operates on the assertive meaning enriched with the presupposition and, in some cases, the scalar implicature (i.e., the conjunction of the assertive meaning and the presupposition or the scalar implicature in question)). Under either possibility, the *but*-EP is ungrammatical in (7) becuase the presupposition of the prejacent of EXH leads to contradiction in the truth conditions (see (38)) when exhaustification applies.

(38) a. LF of (7a): [ EXH [ *only* [ [ $any_D$ *student* $but_D$ *Mary*]$_1$ [ 1 [ $Alan_F$ talked to $t_1$ ]]]]]

b. presuppositional meaning of the prejacent:
$\exists x \exists y[\ y \in (D \cap S_w - \{M\})$ and x talked to y]
assertive meaning of the prejacent:
$\neg \exists x[x \neq$ Alan and $\exists y[\ y \in (D \cap S_w - \{M\})$ and x talked to y]]

The FCI *any* hosts a *but*-EP (see (6)). The nature of the FCI incarnation of *any* has been of much debate. In one view (e.g., Dayal 1998), the FCI *any* has been seen as a lexical item independent of the NPI *any* and has been taken to be a universal quantifier. Under this view, it is expected that a *but*-EP is grammaical with the FCI *any*. In another view (e.g., Chierchia 2006, 2013; Giannakidou 2001) the FCI and NPI incarnations of *any* stem from the same lexical item; the unversal quantificational force of the FCI *any* is due to some mechanism triggered by other operators in the given environment. Under such a view, to account for the grammaticality of the *but*-EP hosted by the FCI *any*, it is only required that exhaustification over the alternatives triggered by *but* occurs above whatever mechanism that gives rise to the universal quantification force. Due to the space limit, I simpy refer the reader to the references cited above.

[6] Likewise, *be surprised/sorry* and the superlative *-est* trigger presuppositions as well: *Chris is surprised that Alan talked to any student* presupposes that Alan talked to some student; *The most senior faculty member who talked to any tudents got promoted* presupposes that there is some faculty member x such that x talked to some student and there is some degree d such that x is d-senior (see von Fintel (1999)).

(6) Bill may pick any flavor of ice cream *but toffee*.

## 6. Conclusion

In this paper, I have shown that there is a total analogy between the weak NPI *any* and the *but*-exceptive. Couched on the exhaustification-based approach á la Chierchia (2006, 2013) to NPI licensing, I have suggested that the *but*-exceptive, just like the NPI *any*, triggers a set of alternatives that are built on the subdomains of the domain of quantification; the license of the *but*-exceptive, just like that of *any*, is subject to the result of exhaustification over the domain alternatives. To the extent that the proposal is on the right track, the analysis suggested provides even stronger support for Gajewski's (2013) claim that the *but*-exceptive should be seen as an instance of strong NPIs.

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