A note on connected exceptives and approximatives*

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August 18, 2018

Abstract

Connected exceptives and approximatives may combine only with certain types of quantified expressions. This can be captured by assigning them meanings that indirectly regulate their distribution: only in combination with certain quantifiers do they lead to consistent truth-conditions (e.g., von Fintel 1993, Penka 2006). It is possible, however, to derive the same truth-conditions by parceling out the meanings previously assigned wholly to connected exceptives and approximatives between these expressions and an exhaustivity operator that associates with them (esp. Gajewski 2013, Spector 2014). This note provides new arguments for such an analysis. They rely on ellipsis as a diagnostic tool for structure and meaning.

1 Exceptives and approximatives

The distribution of connected exceptives like *but 'War and Peace'* and approximatives like *almost* is distinctly constrained. In particular, while they may modify (negative) universal quantifiers, they may not modify plain existential quantifiers:

(1) a. Every book but 'War and Peace' is worth reading.
b. No book but 'War and Peace' is worth reading.
c. #Some book but 'War and Peace' is worth reading.

(2) a. Almost every book is worth reading.
b. Almost no book is worth reading.
c. #Almost some book is worth reading.

A major breakthrough in our understanding of the behavior of connected exceptives and approximatives (subtractives for short) came with the discovery that we can explain their idiosyncratic distribution by recourse to the inferences they give rise to – if these are consistent, the subtractives are grammatical (see esp. von Fintel 1993 on connected exceptives). This note attends to the question of how these inferences should be derived compositionally. More specifically, on the basis of the behavior of subtractives in ellipsis contexts, we provide a new set of arguments for an analysis that takes the inferences

*Thanks to the audience at the 'Logic in Language and in Conversation' workshop in Utrecht (2016), as well as an anonymous reviewer, Danny Fox, Chris Kennedy, Nathan Klinedinst, and Marcin Morzycki for their valuable comments. This research has been supported by grants from Israel Science Foundation (1926/14) and Volkswagen Stiftung (VWZN3181).

governing the distribution of subtractives to arise from an interaction of two operators (esp. Gajewski 2008, 2013, Spector 2014, Hirsch 2016), rather than from the semantic contribution of subtractives alone. In other words, the note provides further support for the following point:

(3) *Subtractives and their semantics*:
The semantic inferences that govern the distribution of subtractives cannot be wholly encoded in the meaning of subtractives.

We introduce our assumptions about the inferences governing the distribution of subtractives in the following subsection, taking von Fintel's (1993) treatment of connected exceptives as our template.[1] Subsequently, we describe two approaches to deriving these inferences compositionally – the integrated and the distributed approach.

1.1 Truth-conditions

Universal quantification. On von Fintel's (1993) theory, the truth-conditions of exceptive sentences consist of two components which we will call Subtraction and Exhaustivity: Subtraction shifts the quantification in the sentence to one in which a set containing the excepted individual is subtracted from the domain of the quantifier; Exhaustivity, which is key in governing the distribution of connected exceptives, conveys that the subtracted set is the minimal set such that it can be subtracted and the resulting quantification be true. (Instead of 'Exhaustivity', you find 'Uniqueness' in von Fintel 1993, and 'Leastness' in Gajewski 2008.)

(4) $[\![\text{D P [but X] Q}]\!] = 1$ iff $\mathbf{D}(\mathbf{P}\backslash\mathbf{X})(\mathbf{Q}) \wedge \forall \text{X'}: \mathbf{X} \not\subseteq \text{X'} \rightarrow \neg\mathbf{D}(\mathbf{P}\backslash\text{X'})(\mathbf{Q})$

For example, the universal sentence in (1-a) has according to the above schema the truth-conditions in (5): every book that is not 'War and Peace' is worth reading (Subtraction), and for every set that does not contain 'War and Peace', it is false that every book that is not in it is worth reading (Exhaustivity). Together, these two inferences entail that 'War and Peace' is the only book not worth reading (as stated in the parentheses below (5)). The truth-conditions of (1-b) are provided in (6). (See von Fintel 1993, Gajewski 2008 for computation and further discussion.)

(5) $(\mathbf{book}\backslash\{\text{WP}\} \subseteq \mathbf{worth\_reading}) \wedge$ [Subtraction]
$\forall \text{X}: \{\text{WP}\} \not\subseteq \text{X} \rightarrow \neg(\mathbf{book}\backslash\text{X} \subseteq \mathbf{worth\_reading})$ [Exhaustivity]
$\big(\Leftrightarrow \mathbf{book} \cap \mathbf{not\_worth\_reading} = \{\text{WP}\}\big)$

(6) $(\mathbf{book}\backslash\{\text{WP}\} \cap \mathbf{worth\_reading} = \emptyset) \wedge$ [Subtraction]
$\forall \text{X}: \{\text{WP}\} \not\subseteq \text{X} \rightarrow \neg(\mathbf{book}\backslash\text{X} \cap \mathbf{worth\_reading} = \emptyset)$ [Exhaustivity]
$\big(\Leftrightarrow \mathbf{book} \cap \mathbf{worth\_reading} = \{\text{WP}\}\big)$

We can assign approximative sentences similar truth-conditions, given in (7), where we take X to be filled in by the context, or perhaps existentially closed (such truth-conditions

[1]Alternative analyses of subtractives have been proposed, some of which differ substantially from von Fintel's and its variants (e.g., Moltmann 1995, Horn 2011; see Gajewski 2008 for discussion). We cannot discuss them in this note for reasons of space, but the conclusions that we reach in the main text arguably extend to them as well.

are already hinted at in von Fintel 1993, Sect. 3).[2] Approximatives are in addition accompanied by a context-dependent inference that X is small, which we leave out from our representations for reasons of brevity. (Instead of 'Subtraction' and 'Exhaustivity', you find 'Proximal' and 'Negative' inference in Nouwen 2006 and elsewhere.)

(7) $[\![$[almost X] D P Q$]\!] = 1$ iff $\mathbf{D}(\mathbf{P}\backslash\mathbf{X})(\mathbf{Q}) \wedge \neg\mathbf{D}(\mathbf{P})(\mathbf{Q})$

For example, the universal sentence in (2-a) has according to the above schema the truth-conditions in (8): every book that is not in some set X is worth reading (Subtraction), and it is false that every book is worth reading (Exhaustivity). The truth-conditions of (2-b) are provided in (9).

(8) $(\mathbf{book}\backslash \mathrm{X} \subseteq \mathbf{worth\_reading}) \wedge$ [Subtraction]
$\neg(\mathbf{book} \subseteq \mathbf{worth\_reading})$ [Exhaustivity]

(9) $(\mathbf{book}\backslash \mathrm{X} \cap \mathbf{worth\_reading} = \emptyset) \wedge$ [Subtraction]
$\neg(\mathbf{book} \cap \mathbf{worth\_reading} = \emptyset)$ [Exhaustivity]

Existential quantification. In contrast to (negative) universal sentences, the existential sentences in (1-c) and (2-c) are predicted to have contradictory truth-conditions on the translations presented above. For example, as given in (10), it cannot hold that some book that is not 'War and Peace' is worth reading (Subtraction), but that no book is worth reading (a consequence of Exhaustivity). (Since {'War and Peace'} is not a subset of the empty set, one of the propositions in (10) that are negated is that some book - minus the empty set - is worth reading.)

(10) $\#(\mathbf{book}\backslash\{\mathrm{WP}\} \cap \mathbf{worth\_reading} \neq \emptyset) \wedge$ [Subtraction]
$\forall \mathrm{X}\colon \{\mathrm{WP}\} \not\subseteq \mathrm{X} \rightarrow \neg(\mathbf{book}\backslash \mathrm{X} \cap \mathbf{worth\_reading} \neq \emptyset)$ [Exhaustivity]

(11) $\#(\mathbf{book}\backslash \mathrm{X} \cap \mathbf{worth\_reading} \neq \emptyset) \wedge$ [Subtraction]
$\neg(\mathbf{book} \cap \mathbf{worth\_reading} \neq \emptyset)$ [Exhaustivity]

On the assumption that sentences with contradictory meanings along the lines of (10) and (11) are ungrammatical (see Gajewski 2002 and Chierchia 2013 for extensive discussion), the truth-conditions described above thus allow us to explain the distribution of subtractives, in addition to correctly deriving the readings of (negative) universal sentences with subtractives. But how are these truth-conditions arrived at compositionally?

1.2 Composition

There are two types of compositional approaches to deriving the above truth-conditions: the integrated and the distributed approach. They differ primarily in whether Exhaustivity is encoded in the meaning of subtractives. (We gloss over many details of the different proposals in the following. The reader is referred to the papers cited for specifics.)

[2] The truth-conditions could be modified to refer to scalar alternatives of modified quantifiers instead to a subtracted set (see, e.g., Penka 2006). Since we believe that such truth-conditions may be too weak on some natural assumptions about scalar alternatives (e.g., Katzir 2007), we opt for the formulation in the main text. In some cases not discussed in this paper (in particular, in the case of numeral quantifiers), though, the reference to scalar alternatives may be advantageous. None of the conclusions reached in the main text hinges on our choice, however.

Integrated approach. The first approach may appear more natural, at least given the surface form of subtractive sentences. It assumes that subtractives encode both Subtraction and Exhaustivity (e.g., von Fintel 1993 on connected exceptives, and Penka 2006 on approximatives). In other words, the mechanism governing the distribution of subtractives is taken to be part of their meaning.

(12) *Integrated approach to subtractives*:
Subtraction and Exhaustivity are wholly encoded in the meaning of subtractives.

According to this approach, *but* and *almost* may have the lexical entries given in (13) and (14), on which they combine with four arguments – a set to be subtracted X, a nominal predicate P, a quantifier D, and the main predicate Q – and return the conjunction of Subtraction and Exhaustivity (see esp. von Fintel 1993 for connected exceptives).[3] (We assume that the individual picked out in the connected exceptive is converted to a set containing it by an appropriate type-shifting operation.)

(13) $[\![\text{but}]\!] = \lambda \text{X}.\ \lambda \text{P}.\ \lambda \text{D}.\ \lambda \text{Q}.\ \underbrace{\text{D}(\text{P}\backslash\text{X})(\text{Q})}_{\text{Subtraction}} \wedge \underbrace{\forall \text{X'}\text{: X} \not\subseteq \text{X'} \rightarrow \neg \text{D}(\text{P}\backslash\text{X'})(\text{Q})}_{\text{Exhaustivity}}$

(14) $[\![\text{almost}]\!] = \lambda \text{X}.\ \lambda \text{D}.\ \lambda \text{P}.\ \lambda \text{Q}.\ \underbrace{\text{D}(\text{P}\backslash\text{X})(\text{Q})}_{\text{Subtraction}} \wedge \underbrace{\neg \text{D}(\text{P})(\text{Q})}_{\text{Exhaustivity}}$

On this approach, the sentences in (1) and (2) have the LFs in (15) and (16), where D stands for *every, no*, and *some*. These structures have precisely the truth-conditions described above. (In the case of approximatives, we assume that the first argument of *almost* is assigned its value by the context, though it could also be existentially closed.)

(15) $[_{\text{DP}}$ D [book [but 'War and Peace']]] [is worth reading]

(16) $[_{\text{DP}}$ [[almost X] D] book] [is worth reading]

Distributed approach. On the second approach, Exhaustivity is split off from the meaning of subtractives (e.g., Gajewski 2008, 2013, Spector 2014, Hirsch 2016; see Sadock 1981 for an early approach to *almost* along these lines).

(17) *Distributed approach to subtractives*:
Subtraction, but not Exhaustivity, is encoded in the meaning of subtractives.

Accordingly, *but* and *almost* may have the lexical entries in (18) and (19), which encode solely Subtraction. (One could further simplify the meaning of *but* to it taking solely the excepted element and the nominal predicate as arguments, cf. Gajewski 2013.)

(18) $[\![\text{but}]\!] = \lambda \text{X}.\ \lambda \text{P}.\ \lambda \text{D}.\ \lambda \text{Q}.\ \underbrace{\text{D}(\text{P}\backslash\text{X})(\text{Q})}_{\text{Subtraction}}$

(19) $[\![\text{almost}]\!] = \lambda \text{X}.\ \lambda \text{D}.\ \lambda \text{P}.\ \lambda \text{Q}.\ \underbrace{\text{D}(\text{P}\backslash\text{X})(\text{Q})}_{\text{Subtraction}}$

Exhaustivity is induced by a covert operator that c-commands the subtractive and associates with it (Gajewski 2008, 2013, Spector 2014, Hirsch 2016). A simplified meaning

[3] It is possible to analyze *almost* as an exclusively clausal operator (see, e.g., Penka 2006). Such an analysis can be spelled out in an intergrated or a distributed approach (see Penka 2006 for the former). The conclusions reached in the main text extend to it, as discussed in footnote 5.

of this operator, which has been independently argued to be responsible for generating scalar implicatures, is provided in (20): it combines with a sentence, and returns value True iff the sentence is true and every alternative to it that is not weaker than it is false.[4] (See Fox 2007 for a more sophisticated definition of *exh* and further discussion.)

(20) $[\![\text{exh S}]\!] = 1 \text{ iff } [\![\text{S}]\!] = 1 \wedge \forall\text{S'}\in\text{ALT(S)}\text{: } {}^\wedge[\![\text{S}]\!] \not\subseteq {}^\wedge[\![\text{S'}]\!] \rightarrow [\![\text{S'}]\!] = 0$

The sentences in (1) and (2) are assigned the structures in (21) and (22) on this approach. Crucially, in these structures, Exhaustivity is generated at the clausal level and thus outside the DP containing the subtractive.

(21) [exh [[$_{\text{DP}}$ D [book [but 'War and Peace']]] [is worth reading]]]

association with alternatives

(22) [exh [[$_{\text{DP}}$ [almost X] D book] is worth reading]]

association with alternatives

The interpretation of these structures depends on what alternatives *exh* quantifies over. We follow Gajewski's and Spector's assumptions: the alternatives are built on the alternatives to the subtracted element (in the case of connected exceptives) and the empty alternative to the subtractive (in the case of approximatives). For example, if D is *every* in (21) and (22), *exh* quantifies over the alternatives in (23) and (24), respectively.

(23) ALT([every book [but WP] is worth reading]) =
$\{$[Every book [but X] is worth reading] $\mid \mathbf{X} \subseteq \text{D}_\text{e}\}$

(24) ALT([[almost X] every book is worth reading]) =
{[[Almost X] every book is worth reading], [Every book is worth reading]}

Given these assumptions about the alternatives, we obtain meanings equivalent to those described in the preceding subsection. For illustration, the computations of the meanings of *Every book but 'War and Peace' is worth reading* and *Almost every book is worth reading* are provided in (25) and (26). Importantly, the alternatives that are negated by *exh* in (25), that is, the alternatives that are not weaker than the meaning of the sister of *exh*, are precisely those in which 'War and Peace' has not been subtracted from the domain of the quantifier.

(25) $[\![$[exh [every book [but WP] is worth reading]]$]\!]$ = 1 iff
$[\![$[every book [but WP] is worth reading]$]\!]$ = 1 $\wedge$
$\forall$S $\in$ ALT([every book [but WP] is worth reading]):
$({}^\wedge[\![$[every book [but WP] is worth reading]$]\!] \not\subseteq {}^\wedge[\![\text{S}]\!]) \rightarrow [\![\text{S}]\!]=0$ iff
$(\textbf{book}\backslash\{\text{WP}\} \subseteq \textbf{worth\_reading}) \wedge$

[4] We employ a definition of *exh* that may generate contradictions (cf. Krifka 1995, Chierchia 2013). If we would opt for a contradiction-free definition of *exh* (e.g., Fox 2007), we would need to use a further principle to rule out structures in which subtractives modify existential quantifiers (where the contribution of *exh* would be vacuous rather than contradictory). Such a principle has indeed been put forward: an occurrence of *exh* should not be vacuous. See Spector 2014 for further discussion of these issues with respect to approximatives, and Fox & Spector 2009 for a more general discussion.

$$\forall X\text{: } \{\text{WP}\} \not\subseteq X \rightarrow \neg(\textbf{book}\backslash X \subseteq \textbf{worth\_reading})$$

(26) $[\![$[exh [[almost X] every book is worth reading]]]$]\!]$ = 1 iff

$$(\textbf{book}\backslash X \subseteq \textbf{worth\_reading}) \wedge \neg(\textbf{book} \subseteq \textbf{worth\_reading})$$

Before we continue, it is worth pointing out that although all exceptives have a subtractive meaning identical to that of connected exceptives, some of them need not be exhaustified (though there may be a preference for them to be exhaustified). This may result in them having a broader distribution than *but*. We can observe this with *other than* exceptives, as shown in (27) (cf. Gajewski 2008, 2013).

(27) a. Some book other than 'War and Peace' is worth reading.
b. [[some book [other than 'War and Peace']] is worth reading]

Relatedly, there seem to be different constraints on how local the exhaustification has to be with respect to different subtractives: while it must be as local as possible in the case of connected exceptives (Gajewski 2013, Sect. 4), this does not hold for approximatives (Spector 2014). We cannot pursue here the question why this should hold, nor any other questions facing the distributed approach. Rather, we refer the reader to the papers cited above for some proposed answers and further discussion.

2 Ellipsis Puzzles

Are the two approaches to subtractives empirically distinguishable? Gajewski (2008) argued that the answer is positive for connected exceptives, and Spector (2014) did so for approximatives – both concluded that the data support the distributed approach. We present a new set of arguments from ellipsis licensing for the same conclusion: the behavior of subtractives in ellipsis contexts is compatible with the distributed but not the integrated approach.

2.1 Condition on Ellipsis

VP ellipsis is subject to the following condition:

(28) *Condition on VP Ellipsis*:
If a quantificational expression is interpreted in the antecedent VP, a semantically equivalent expression must be interpreted in a parallel position in the elided VP.

For illustration, the second sentence in (29) is unambiguous and conveys that you were required to read three books and not to read four books. This can be derived from the representation in (30), in which *exactly three books* is interpreted in both the antecedent and the elided VP. (We adopt the VP-internal subject hypothesis in our representations, which allows us to interpret object DPs in a VP-internal position.)

(29) John read exactly three books. To get an A, you really had to △.

(30) a. [John [λx [$_{\text{VP}}$ $\underline{\text{[exactly 3 books]}}$ [λy [x read y]]]]]
b. [□ [you [λx [$_{\text{VP}}$ $\underline{\text{[exactly 3 books]}}$ [λy [x read y]]]]]]

Crucially, the second sentence in (29) cannot convey merely that you were required to read three books but were not required to read four books, a more plausible meaning in natural contexts in which the more books you read, the better you do in an exam. This reading could be derived, say, by *exactly three books* taking scope above the modal, that is, outside the elided VP, as given in (31). This LF would, however, violate the Condition on VP Ellipsis, and is thus precluded. (See, e.g., Rooth 1992, Fiengo & May 1994, Heim 1996, Fox 2000, and others, for discussion and derivation of (28).)

(31) a. [John [λx [$_{\text{VP}}$ [exactly 3 books] [λy [x read y]]]]]

b. #[exactly 3 books] [λz [□ [John [λx [$_{\text{VP}}$ z [λy [x read y]]]]]]] *(violates (28))*

Furthermore, it is worth noting that the condition in (28) allows for some alternation in the morphology of the antecedent and elided VP, though not in their semantics. For example, it correctly admits sequences with a Negative Polarity Item *any* in the antecedent VP, as exemplified in (32). The sequence may have the representation in (33), where a plain indefinite occurs in a position parallel to that of *any* (e.g., Sag 1976). (See van Craenenbroeck & Merchant 2013 for an extensive discussion of admitted alternations.)

(32) John didn't read any book. Mary did △.

(33) a. [John [λx [neg [$_{\text{VP}}$ [any book] [λy [x read y]]]]]]

b. [Mary [λx [$_{\text{VP}}$ [a book] [λy [x read y]]]]]

2.2 Universal Quantifiers

With the above condition in mind, consider sequences (34) and (35):

(34) In the exam, John solved every exercise but the last one.
To get an A, he really had to △.

(35) In the exam, John solved almost every exercise.
To get an A, he really had to △.

The second sentence in (34) may convey that John was required to solve every exercise that is not the last one to get an A, and that he was not required to solve the last exercise (or it leaves it open whether he was required to solve the last exercise) – it need not convey that John was required not to solve the last exercise. In parallel, the second sentence in (35) may convey that John was required to solve close to every exercise, and that he was not required to solve every exercise (or it leaves it open whether he was required to solve every exercise) – it need not convey that John was required not to solve every exercise. In other words, the two sequences are felicitous in contexts in which solving every exercise may increase John's chances of getting an A. How does the availability of these readings fit in with the two approaches to subtractives?

Integrated approach. These interpretations of the sequences in (34) and (35) are unexpected on the integrated approach to subtractives. Due to the Condition on VP Ellipsis, the sequences must have, respectively, the representations in (36) and (37), on which the object DP modified by a subtractive is interpreted in the elided VP.

(36) a. [John [λx $[_{\text{VP}}$ [every exercise $\underline{\text{but the last one}}$] [$\lambda$y [x solved y]]]

b. [$\Box$ [John [λx $[_{\text{VP}}$ [every exercise $\underline{\text{but the last one}}$] [$\lambda$y [x solved y]]]

(37) a. [John [λx $[_{\text{VP}}$ [$\underline{\text{almost X}}$ every exercise] [λy [x solved y]]]

b. [$\Box$ [John [λx $[_{\text{VP}}$ [$\underline{\text{almost X}}$ every exercise] [λy [x solved y]]]

Since on the integrated approach subtractives encode both Subtraction and Exhaustivity, the sentences with ellipsis are predicted to only have the dispreferred interpretations, namely, that the requirement was $\underline{\text{not}}$ to solve every exercise:[5]

(38) $[\![[\Box\ [\text{John}\ [\lambda x\ [\text{every exercise but the last one}]\ [\lambda y\ [x \text{ solved } y]]]]]]\!] = 1$ iff

$$\Box\big((\mathbf{exercise}\backslash\{\mathrm{L}\} \subseteq \{x \mid \mathbf{solve}(\mathrm{J}, x)\}) \wedge \forall X\!: \{\mathrm{L}\} \nsubseteq X \rightarrow \neg(\mathbf{exercise}\backslash X \subseteq \{x \mid \mathbf{solve}(\mathrm{J}, x)\})\big)$$

$$\big(\Leftrightarrow \Box(\mathbf{exercise} \cap \{x \mid \mathbf{solve}(\mathrm{John}, x)\} = \{\mathrm{L}\})\big)$$

(39) $[\![[\Box\ [\text{John}\ [\lambda x\ [\text{almost X every exercise}]\ [\lambda y\ [x \text{ solved } y]]]]]]\!] = 1$ iff

$$\Box\big((\mathbf{exercise}\backslash\mathbf{X} \subseteq \{x \mid \mathbf{solve}(\mathrm{J}, x)\}) \wedge \neg(\mathbf{exercise} \subseteq \{x \mid \mathbf{solve}(\mathrm{J}, x)\})\big)$$

Distributed approach. The predictions of the distributed approach are different. The above sequences may be assigned the following representations, in which the subtractive in the elided VP does not require a local *exh* (as pointed out in the preceding section):[6]

(40) a. [$\underline{\text{exh}}$ [John [λx $[_{\text{VP}}$ [every exercise $\underline{\text{but L}}$] [λx [x solved y]]]]]]

b. [$\underline{\text{exh}}$ [$\Box$ [John [λx $[_{\text{VP}}$ [every exercise $\underline{\text{other than L}}$] [$\lambda$y [x solved y]]]]]]]

(41) a. [$\underline{\text{exh}}$ [John [λx $[_{\text{VP}}$ [$\underline{\text{almost X}}$ every exercise] [λy [x solved y]]]]]]

b. [$\underline{\text{exh}}$ [$\Box$ [John [λx $[_{\text{VP}}$ [$\underline{\text{almost X}}$ every exercise] [λy [x solved y]]]]]]]

The crucial feature of the distributed approach that allows it to assume such structures is that since *exh* occurs outside the antecedent VP, no condition need be imposed about its occurrence in the sentence containing the elided VP (as discussed by Fox 2004). Now, the interpretations of these structures correspond to the observed preferred readings of

[5] An integrated approach to *almost* that takes *almost* to be a clausal operator (e.g., Penka 2006) faces the same issues as the implementation in the main text: Since in ellipsis contexts an occurrence of *almost* in an antecedent VP at surface form necessarily affects the interpretation of the elided VP, a clausal operator analysis must provide for *almost* to be part of the antecedent VP for ellipsis licensing purposes in such cases. Accordingly, if *almost* in the antecedent VP encodes Exhaustivity, as assumed by Penka, this inference must be triggered in the elided VP as well.

[6] Although we assume that a subtractive is generated in the elided VP, this assumption is not necessary given the Condition on VP Ellipsis in (28). Instead of a DP modified by a subtractive, the elided VP could contain a DP with an appropriately restricted domain, as exemplified in (i). In (i), *D* and *D'* stand for resource domains, and the alternative negated by *exh* in the second sentence is derived by replacing *D* with *D'*. See Section 2.4 for an example in which an elided VP must contain an exceptive.

(i) a. [exh [John [λx $[_{\text{VP}}$ [almost X every D exercise] [λx [x solved y]]]]]]

b. [exh [$\Box$ [John [λx $[_{\text{VP}}$ [every D' exercise] [λy [x solved y]]]]]]] (where $\mathbf{D'} = \mathbf{D}\backslash\mathbf{X}$)

the sentences, as computed below. The meaning in (42) can be paraphrased as that the last exercise was the only one you were not required to solve.

(42) $[\![$[exh [□ [John [λx [$_{\text{VP}}$ [every exercise other than L] [λy [x solved y]]]]]]$]\!]$ = 1 iff

$$\Box\big(\textbf{exercise}\backslash\{L\} \subseteq \{x \mid \textbf{solve}(J, x)\}\big) \wedge \forall X\text{: } \{L\} \not\subseteq X \rightarrow \neg\Box\big(\textbf{exercise}\backslash X \subseteq \{x \mid \textbf{solve}(J, x)\}\big)$$

(43) $[\![$[exh [□ [John λx [$_{\text{VP}}$ [almost X every exercise] λy [x solved y]]]]]$]\!]$ = 1 iff

$$\Box\big(\textbf{exercise}\backslash X \subseteq \{x \mid \textbf{solve}(J, x)\}\big) \wedge \neg\Box\big(\textbf{exercise} \subseteq \{x \mid \textbf{solve}(J, x)\}\big)$$

In addition to the preferred interpretation of the above sequences, the sole interpretation derived on the integrated approach can also be derived on the distributed approach. This is achieved by parsing the second sentences as containing *exh* in the scope of the modal operator, as given in (44) and (45). The meanings of these structures correspond to those provided in (38) and (39).

(44) a. [<u>exh</u> [John [λx [$_{\text{VP}}$ [every exercise <u>but L</u>] [λx [x solved y]]]]]]

b. [□ [<u>exh</u> [John [λx [$_{\text{VP}}$ [every exercise <u>other than L</u>] [λy [x solved y]]]]]]]

(45) a. [<u>exh</u> [John [λx [$_{\text{VP}}$ [<u>almost X</u> every exercise] [λy [x solved y]]]]]]

b. [□ [<u>exh</u> [John [λx [$_{\text{VP}}$ [<u>almost X</u> every exercise] [λy [x solved y]]]]]]]

Trapping Exhaustivity. The distributed approach furthermore predicts that in certain configurations with subtractives an Exhaustivity inference has to be triggered both in the antecedent and the elided VP. In such cases, the predictions of the distributed and the integrated approach are indistinguishable. For example, we can trap *exh* in a VP by forcing it to occur in the scope of another quantifier in the VP, say, an attitude verb like *say*:

(46) John said that he solved every exercise but the last one.
To get a chance to retake the exam, he really had to △.

(47) John said that he solved almost every exercise.
To get a chance to retake the exam, he really had to △.

On a construal of the second sentences in (46) and (47) on which the *say*-VP is elided, the sentences convey that to get a chance to retake the exam, John was required to say that he did <u>not</u> solve the last exercise (every exercise, in the case of (47)). This is expected on the distributed approach since it can only assign (46) and (47) the representations below. (Note that the first sentence in (46) is unambiguous due to *exh* having to be as local as possible to the connected exceptive, as mentioned in the preceding section.)

(48) a. [John [λx [$_{\text{VP}}$ [x [say [<u>exh</u> [every exercise <u>but L</u>] λy [x solved y]]]]]]]

b. [□ [John [λx [$_{\text{VP}}$ [x [say [<u>exh</u> [every exercise <u>but L</u>] λy [x solved y]]]]]]]]

(49) a. [John [λx [$_{\text{VP}}$ [x [say [<u>exh</u> [<u>almost X</u> every exercise] λy [x solved y]]]]]]]

b. [□ [John [λx [$_{\text{VP}}$ [x [say [<u>exh</u> [<u>almost X</u> every exercise] λy [x solved y]]]]]]]]

These structures are necessitated by the Condition on VP Ellipsis, namely, if a quantificational element such as *exh* is interpreted in the antecedent VP, it must also occur in a parallel position in the elided VP. The interpretations of these structures correspond precisely to the observed readings of the sentences – the requirement was for John to say that he did <u>not</u> solve the last exercise (every exercise, in the case of (49)).

(50) $[\![$[$\square$ [John [λx [x [say [exh [every exercise but L] λy [x solved y]]]]]]]$]\!]$ = 1 iff

$\square\big(\mathbf{say}(\mathrm{J}, \mathbf{exercise} \cap \mathbf{not\_solve}(\mathrm{J}, \mathrm{x}) = \{\mathrm{L}\})\big)$

(51) $[\![$[$\square$ [John [λx [x [say [exh [almost X every exercise] λy [x solved y]]]]]]]$]\!]$ = 1 iff

$\square\big(\mathbf{say}(\mathrm{J}, (\mathbf{exercise}\backslash \mathrm{X}\subseteq\{\mathrm{x} \mid \mathbf{solve}(\mathrm{J}, \mathrm{x})\}\wedge\neg(\mathbf{exercise}\subseteq\{\mathrm{x} \mid \mathbf{solve}(\mathrm{J}, \mathrm{x})\})))\big)$

To sum up: The distributed approach, but not the integrated one, adequately accounts for the behavior of subtractives that modify universal quantifiers in ellipsis contexts.

2.3 Existential Quantifiers

Consider sequences (52)-(54). (The latter two sequences are modeled after examples in Johnson 2001 and Sag 1976, respectively.)[7]

(52) John read no book but 'War and Peace'. Mary did $\triangle$ however.

(53) I could find no solution except to use covert exhaustification, but Irene might $\triangle$.

(54) Although John will trust no one but the President, Bill will $\triangle$.

The second sentences in these sequences convey existential quantification over the domain of the antecedent quantifier from which, crucially, the invidividual picked out by the connected exceptive has been subtracted. For example, the meaning of the second sentence in (52) corresponds to the paraphrase in (55).

(55) Mary read some book other than 'War and Peace'.

A parallel state of affairs obtains with approximatives:

(56) I knew almost none of the bands playing. My friends did $\triangle$ however.

(57) Although I am a rabid fan of almost no team these days, I used to be $\triangle$.

As with exceptive sentences above, the second sentences in these sequences convey existential quantification over the domain of the antecedent quantifier from which some invidividuals have been subtracted. For example, the meaning of the second sentence in (56) can be paraphrased with (58): the bands over which the existential quantifier ranges

[7] Some speakers find these examples, and in fact all examples in which a negative quantifier antecedes a plain existential quantifier, marked. See van Craenenbroeck & Temmerman 2015 for discussion. The argument that we make in this subsection can be made just as well with a sequence in which the negative quantifer in the antecedent VP is replaced by a Negative Polarity Item, as in (i), which is preferred by some speakers to (52). However, since this sequence poses independent problems for the integrated approach, as discussed by Gajewski 2008, we stick to the examples with negative quantifiers. The same remark holds for the approximative sentences in (56) and (57).

(i) John didn't read any book but 'War and Peace'. Mary did $\triangle$ however.

are those that I did not know, that is, the bands that were not subtracted in the first sentence.

(58) My friends knew some of the bands that I did not know.

We focus on an example with a connected exceptive in the following since the reasoning proceeds in a completely analogous fashion for approximatives.

Integrated approach. The acceptability of the sequences in (52)–(57) is unexpected on the integrated approach to subtractives, as we show for (52) in the following. In order to see this, we need to spell out some assumptions about negative quantifiers and ellipsis that are necessitated by the integrated approach. Particularly, the integrated approach to subtractives is wedded to what may be called the integrated approach to negative quantifiers, on which *no* combines with two predicates and returns that their intersection is empty (e.g., Barwise & Cooper 1981).[8] Thus, sentence (52) has the following LF:

(59) [John [λx [$_{\text{VP}}$ [no book $\underline{\text{but WP}}$] [λy [x read y]]]]]

Although such an analysis faces non-trivial issues with negative quantifiers anteceding existential ones in ellipsis (cf. van Craenenbroeck & Temmerman 2015; see also footnote 8), let us for concreteness assume that a negative quantifier may antecede an existential one if the antecedent VP is semantically equivalent to the negation of the elided VP. Given this assumption, two parses are in principle possible for the second sentence in (52): one with a connected exceptive, provided in (60), and another one with an *other than* exceptive, provided in (61).

(60) #[John [λx [$_{\text{VP}}$ [some book $\underline{\text{but WP}}$] [λy [x read y]]]]]

(61) #[John [λx [$_{\text{VP}}$ [some book $\underline{\text{other than WP}}$] [λy [x read y]]]]]

Neither of these parses is adequate, however: on the parse in (60) the second sentence has a contradictory meaning, while on the parse in (61) the antecedent VP, provided in (59), is not semantically equivalent to the negation of the elided VP since the latter does not generate Exhaustivity. We are thus unable to explain the acceptability of (52), nor that of the other examples discussed above. Although our assumptions about negative quantifiers anteceding existential ones are very simplistic, more sophisticated variants would arguably run into the same problem – either an incorrect meaning would be predicted for the sentence containing the elided VP (if a connected exceptive is generated in the elided VP), or the required licensing relation between the antecedent and the elided VP would fail to obtain (if an *other than* exceptive is generated in the elided VP).

[8] A vexing issue for such an approach is the availability of so-called split scope readings (see Penka 2011 for a review). As a consequence, the integrated approach to subtractives faces an issue with sentences like (i) (modified from Penka 2011), which admit a split scope reading: the company does not have to fire anyone who is not John, though it does have to fire John. Importantly, this reading is distinct from the one on which the negative quantifier would take matrix scope.

(i) a. The company need fire no employees but John.
b. Possible reading: $\neg\Box$(The C fires someone that is not John) $\wedge$ $\Box$(The C fires John)

Distributed approach. On the distributed approach, no modification of the Condition on VP Ellipsis is required to account for the above data if we adopt what may be called the distributed approach to negative quantifiers: negative quantifiers consist of an existential quantifier that stands in a dependency relation with a c-commanding negation (see Penka 2011 for a review, and footnote 8 for further discussion). Accordingly, sequence (52) may be assigned the following representation:

(62) a. [<u>exh</u> [John [λx [NEG [$_{\text{VP}}$ [SOME book <u>but WP</u>] [λy [x read y]]]]]]]

b. [Mary [λx [$_{\text{VP}}$ [SOME book <u>other than WP</u>] [λy [x read y]]]]]

These structures satisfy the Condition on VP Ellipsis since *but* and *other than* are semantically equivalent (see also footnote 6). Moreover, the second sentence has the interpretation in (63), which corresponds to its observed reading.

(63) $[\![$[Mary [λx [[SOME book other than WP] [λy [x read y]]]]]$]\!]$ = 1 iff

$$(\mathbf{book}\backslash\{\text{WP}\}) \cap \{\text{x} \mid \mathbf{read}(\text{Mary, x})\} \neq \emptyset$$

To sum up: The distributed approach, but not the integrated one, adequately accounts for the behavior of subtractives that modify negative quantifiers anteceding existential ones in ellipsis contexts.

Trapping Exhaustivity. Negative quantifiers cannot in general antecede existential ones if they are c-commanded by another quantifier in the antecedent VP. This is exemplified in (64): the sentence with ellipsis cannot convey that Mary said that she solved some of the exercises; it can only convey that Mary said that she solved none of the exercises. Accordingly, we cannot construct trapping configurations parallel to those discussed for universal quantifiers, on which an exceptive would modify an existential quantifier in the scope of another quantifier in the elided VP.

(64) John said he solved none of the exercises because Mary did △.

Excursus: Negative quantifiers. The behavior of subtractives and that of negative quantifiers are remarkably similar in ellipsis contexts, *mutatis mutandis*, as just exemplified in (64): although this is possible in many other configurations, a negative quantifier may not antecede a mere existential quantifier (that is, an expression whose import corresponds to just one part of the import of a negative quantifier) when it is c-commanded by another quantifier in the antecedent VP – this is an instance of trapping, analogous to what we observed in the preceding section for subtractives. Unsurprisingly, then, the logic of the distributed approach to subtractives in ellipsis contexts put forward in this note parallels that of the distributed approach to negative quantifiers (see, esp., Johnson 2001 and van Craenenbroeck & Temmerman 2015 on negative quantifiers and ellipsis).

Abstracting away from the particulars of the two phenomena, we sketch out the logic behind the two approaches in the following. First: The semantic import of the expressions under discussion (subtractives and negative quantifiers) is split between two elements (let's call them the 'associate' and its c-commanding 'operator'). Second: It holds that the operator (*exh* in the case of subtractives and a negative operator in the case of negative quantifiers) whose associate (a subtractive and an existential quantifier, respectively) is dominated by a VP need not itself be dominated by the VP. Third: The associate may, accordingly, in ellipsis contexts antecede a semantically equivalent expression which does not give rise to the same inferences as the associate (the Exhaustivity inference and negation, respectively). This is represented schematically in (65), where *OP* stands for an operator and is optional in the second sentence, α stands for the associate, and α' for a potentially distinct expression with a meaning equivalent to that of α.

(65) [OP [... [$_{\text{Ant.VP}}$ ... α ...]]]. [(OP) [... $<$[$_{\text{Ell.VP}}$ ... α' ...]$>$]]. ($[\![\alpha]\!] = [\![\alpha']\!]$)

If, however, both the operator and the associate occur in the VP, as is the case in trapping configurations, both the antecedent and the elided VP will trigger the same inferences: the operator and the associate must both be generated at the ellipsis site to satisfy the conditions on ellipsis. This is represented in (66).

(66) [... [$_{\text{Ant.VP}}$ [QP [OP [... α ...]]]]]. [... $<$[$_{\text{Ell.VP}}$ [QP [#(OP) [... α' ...]]]]$>$].

It goes without saying that the different syntactic-semantic properties of the elements involved may lead to some distributional differences between subtractives and negative quantifiers in ellipsis contexts. We cannot study these here, and refer to the above cited authors for a thorough discussion of negative quantifiers in ellipsis contexts.

2.4 NP Ellipsis

Our final argument for the distributed approach to subtractives comes from the behavior of connected exceptives in NP ellipsis contexts. Consider sequence (67). (Parallel examples cannot be constructed for approximatives since *almost* does not occur in a position in which it may be affected by NP ellipsis.)

(67) While Mary aced every course but her electives, most boys only aced a few $\triangle$.
However, every boy <u>did</u> ace almost all of his electives.

The second sentence in (67) conveys the same meaning as the sentence in (68). In particular, it can be judged as true even if every boy aced (almost) all of their electives, as witnessed by the felicity of the final sentence. This is the case also in scenarios in which the majority of the boys' courses were electives.

(68) Most boys only aced a few courses other than their electives.

NP Ellipsis. The condition in (28) does not apply to NP ellipsis examples. Nonetheless, NP ellipsis is arguably subject to a similar condition, given in (69). (As with (28), this condition should fall out from any adequate theory of ellipsis, cf. Elbourne 2013.)

(69) *Condition on NP Ellipsis*:
An elided NP must be semantically equivalent to an antecedent NP up to identity of indices on bound variables. (Binders of variables in the elided NP must be in positions parallel to those of binders of variables in the antecedent NP.)

Integrated approach. The felicity of (67) is unexpected on the integrated approach to connected exceptives. The first sentence of the sequence has on that approach the form in (70), where the subject binds the pronoun contained in the connected exceptive.

(70) [Mary [λx [every [$_{\text{NP}}$ course <u>but x's electives</u>]] [λy [x aced y]]]]

We can assign two representations to the second sentence. On the one hand, we can satisfy the Condition on NP Ellipsis with a construal like (71) – but then we incorrectly predict the second sentence of the sequence to be ungrammatical: a connected exceptive would combine with an existential quantifier and trigger a contradictory Exhaustivity inference.

(71) #[most boys] [λx [only [a few [$_{\text{NP}}$ courses <u>but x's electives</u>]] [λy [x aced y]]]]

On the other hand, we can correctly capture the interpretation of the second sentence, which lacks an Exhaustivity inference, as in (72). This representation, however, fails to satisfy the Condition on NP Ellipsis: the antecedent NP, but not the elided NP, triggers Exhaustivity.

(72) #[most boys] [λx [only [a few [$_{\text{NP}}$ courses <u>other than x's electives</u>]] [λy [x aced y]]]]

Distributed approach. On the distributed approach, sequence (67) may be assigned the representation in (73). (We assume that semantic number is determined above the DP layer, e.g., Sauerland 2003, and thus does not factor into determining semantic equivalence between the antecedent and the elided NP. Other implementations are possible as well.)

(73) a. [<u>exh</u> [Mary [λx [every [$_{\text{NP}}$ course <u>but x's electives</u>]] [λy [x aced y]]]]]

b. [most boys] [λx [only a few [$_{\text{NP}}$ courses <u>other than x's elect.</u>] [λy [x aced y]]]]

Since *but* and *other than* expressions are assigned the same meaning, and since the bound variables in their complements are bound from parallel positions (*Mary, most boys*), the NP ellipsis in the second sentence is licensed. Moreover, the meaning of the second sentence, given in a simplified form in (74), corresponds to the observed reading of the sentence.

(74) ⟦[most boys] [λx [only a few courses other than x's el.] [λy [x aced y]]]⟧ = 1 iff

$$\text{card}(\mathbf{boys} \cap \{\text{x} \mid (\mathbf{course} \setminus \mathbf{elective\_of}(\text{x})) \cap \{\text{y} \mid \mathbf{ace}(\text{x, y})\} \neq \emptyset\}) \geq \tfrac{1}{2} \times \text{card}(\mathbf{boys})$$

To sum up: The distributed approach, but not the integrated one, adequately accounts for the behavior of connected exceptives within antecedent NPs in NP ellipsis contexts.

3 Conclusion

We argued against encoding the mechanisms governing the distribution of *but* and *almost* into their lexical meaning on the basis of their distribution in ellipsis contexts:

- A universal quantifier modified by a subtractive may antecede a universal quantifier with a subtracted domain that does not induce an Exhaustivity inference.
- A negative quantifier modified by a subtractive may antecede an existential quantifier with a subtracted domain that cannot induce an Exhaustivity inference.
- An NP modified by a subtractive that occurs in a (negative) universal quantifier may antecede an NP that occurs in an existential quantifier with a subtracted domain that cannot induce an Exhaustivity inference.

We showed that the distributed approach of Gajewski (2013) and Spector (2014), on which the distribution of subtractives is governed by a covert exhaustification operator that c-commands and associates with them, correctly predicts their behavior in ellipsis contexts: since Exhaustivity is not encoded in the meaning of subtractives on this approach, it does not have to figure in the meaning and representation of the pertinent antecedent constituents containing a subtractive (unless forced to do so, as in trapping configurations), and it thus does not have to be induced in the elided constituents either.

The analysis of the ellipsis data involving *but* and *almost* that we argued for in this note resembles the standard treatments of other types of alternations in ellipsis, in particular, alternations involving Negative Polarity Items (e.g., Sag 1976, Merchant 2013, Crnič 2017) and negative quantifiers (e.g., Johnson 2001, van Craenenbroeck & Temmerman 2015). Similarly to subtractives, other examples of alternations tend to be analyzed as involving elements in the antecedent and the elided constituents that have identical meanings, but whose distribution (or morphological realization) depends on potentially different operators associating with them higher in the structure.

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