The dynamics of negative concord

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Abstract

Concord describes a natural language phenomenon in which a single logical meaning is expressed syntactically on multiple lexical items. The canonical example is negative concord, in which multiple negative expressions are used, but a single negation is interpreted. Formally similar phenomena have been observed for the redundant marking of distributivity and definiteness. Inspired by recent dynamic analyses of these latter two phenomena, we extend a similar dynamic analysis to negative concord. We propose that negative concord items introduce a discourse referent (like an existential), but then test that no discourse referent has been introduced in any assignment. These apparently contradictory requirements are licensed with split scope around negation: introduction occurs below negation; the test appears above it. The analysis successfully predicts that negative concord items must be licensed by a sufficiently local negative operator. We further show that modulation of what is at-issue can account for cases in which NC items themselves carry negative force.

1 Introduction

Concord describes a natural language phenomenon in which a single logical meaning is expressed syntactically on multiple lexical items. The canonical example is negative concord, in which multiple negative expressions are used, but a single negation is interpreted. In some dialects of English, (1) negates the proposition that Mary saw something (Labov, 1972). Similarly, in Russian and Italian, the negative quantifier 'nothing' (*nichego*/*niente*) is only grammatical in object position in the presence of the negation 'not' (*ne*/*non*).

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(1) Mary didn't see nothing.
'Mary didn't see anything.' (some English dialects)

(2) Marija ne videla nichego.
Mary not saw nothing
'Mary didn't see anything.' (Russian)

(3) Maria non ha visto niente.
Mary not AUX seen nothing
'Mary didn't see anything.' (Italian)

NC items are distinguished by apparently context-dependent semantic properties; in some contexts, as in the ones above, NC items seem to be subsidiary to the presence of a negative operator (*n't*/*ne*/*non*) that contributes negation. In such environments, it is compositionally simplest to assign NC items a non-negative denotation; either as a low scoping existential (Ladusaw, 1992; Zeijlstra, 2004) or a wide scoping universal (Szabolcsi, 1981; Giannakidou, 2000). In other contexts, however, the NC item is the only marker of negation, such as in fragment answers to questions, as in (4) and (5). These uses of NC items are parallel to the behavior of *nothing* in Standard English, which contributes negative force itself.

(4) Chto Marija videla? Nichego.
what Mary saw? nothing
'What did Mary see? Nothing.' (Russian)

(5) Cosa ha visto Maria? Niente.
what AUX seen Mary? nothing
'What did Mary see? Nothing.' (Italian)

NCIs are also characterized by distributional properties. In their 'redundant' use (as in (1)–(3)), NC items are restricted to negative environments; precisely, they must be licensed by a sufficiently local negative operator. Sentences (6) and (7) are ungrammatical without preverbal negation.

(6) * Marija videla nichego.
Mary saw nothing (Russian)

(7) * Maria ha visto niente.
Mary AUX seen nothing (Italian)

Analytically, a successful theory of negative concord is a compositional analysis that explains these properties. I) Why do NC items sometimes appear to carry negative force themselves and at other times appear innocently redundant? II) What can serve as a licensor of NC, and why do (many instances of) NC items require such a licensor?

In this article, we provide a fully compositional analysis of negative concord in which interpretation and licensing is explained via the semantics. The analysis is inspired by recent work on distributivity and definiteness, in which similar concord behavior has been observed. For both distributivity and definiteness, recent analyses have converged on a semantic theory in which a postponed presupposition checks properties about the discourse referents introduced by the construction. We extend an analogous semantic analysis to negative concord. We hypothesize that

concord (in all guises) is a split-scope phenomenon, consisting of the dynamic introduction of a discourse referent and a cardinality test on that referent. Scope-taking plus dynamic semantics allows us to consider properties of objects that emerge via interaction with other logical operators.

2 Concord

2.1 Concord, more generally

Beyond negative concord, a variety of other patterns in spoken language also display concord-like behavior. For example, in what has occasionally been called 'distributive concord' (Oh, 2006; Cable, 2014; Rushiti, 2019), multiple words with distributive marking may appear innocently in the same sentence, with a single distributive meaning, as in examples (8)-(10), from three unrelated languages. (In American Sign Language, the distributive morpheme is spelled out as reduplication across an area of space.)

(8) Chikijujunal ri tijoxela' xkiq'etej ju-jun tz'i'.
each(dist) the students hugged one-DIST dog
'Each of the students hugged a dog.' (Kaqchikel, Henderson 2014)

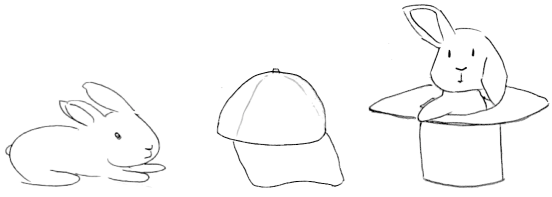
(9) BOY EACH(dist) CHOOSE-DIST ONE-DIST GIRL.
'The boys each chose one girl.' (ASL, Kuhn 2017)

(10) Haksayng twu-myeng-i kakkak sangca han-kay-ssik-lul wunpanhayssta.
student two-CL-NOM each(dist) box one-CL-DIST-ACC carried
'Two students each carried one box.' (Korean, Oh 2006)

In these examples, the distributive numeral (e.g., *ju-jun* in (8)) can be replaced by a plain numeral (e.g., *jun*, 'one'), with the sentence receiving the same interpretation. As with negative concord, distributive numerals thus appear to be redundant with a licensor—here, the distributive operator *each*. A common interpretation of these facts is that *each* contributes distribution, while the distributive numeral reflects a syntactic feature or semantic property of the environment generated by *each* (Brasoveanu and Farkas, 2011; Henderson, 2014; Rushiti, 2019).

A related pattern appears with definite-marking when one definite expression is embedded underneath a second. Specifically, Haddock (1987) observes that the expression in (11a) can be used to describe the image in (11b). The definite marking on the lower noun phrase (*the hat*) is unexpected on a standard analysis. It is commonly assumed that the definite article *the* presupposes that its restrictor set is singleton, but such an analysis incorrectly predicts that (11) should be undefined in the provided context, which contains two hats.

(11) a. the rabbit in the hat (Haddock, 1987)

b. 

The relation of this pattern to concord can be seen in a couple of ways. First, in (11), it seems that the lower definite article does not contribute a presupposition of definiteness in the standard way; we observe, for example, that it can be replaced with an indefinite article—*the rabbit in a hat*—with no apparent difference in felicity conditions. The lower *the* is thus redundant with the higher *the*, and is licensed by an interaction with the syntax or semantics of embedding environment, similar to NC items or distributive numerals. Second, we have characterized concord as a pattern in which multiple lexical items express a single logical meaning. For negative concord, this has been spelled out by de Swart and Sag (2002) as polyadic negative quantification over multiple variables. Haddock (1987)'s analysis of embedded definites shows that these cases can be viewed similarly, as a polyadic presupposition of the uniqueness of a tuple of variables. In (11), there may be multiple hats and multiple rabbits, but there is a unique rabbit-hat pair in the containment relation. We can thus view such cases as an instance of 'definite concord.'

2.2 An analysis by paraphrase

Like for negative concord, there several possible perspectives on the semantics of these redundant forms. For example, do distributive-marked verbs and numerals themselves have a distributive semantics, or are they a morphological exponent of a (covert or overt) distributivity operator elsewhere in the sentence (Oh, 2006; Kimmelman, 2015)? For distributive concord, Henderson (2014) and Kuhn and Aristodemo (2017) argue that each distributive marker *is* semantically interpreted. They advance an analysis that is based on scope taking and dynamic semantics. On this view, distributive marking on verbs and numerals is a wide-scoping predicate that checks that a plurality of events has been introduced. Notably, this hypothesis converges with Bumford (2017)'s analysis of definite concord, which also involves scope-taking of a dynamic predicate.

The core of these analyses can in fact be explained quite easily by paraphrase. In the case of distributive concord, the meaning of the distributive numeral is equivalent to a plain numeral, but there is an added condition, equivalent to a follow-up sentence, that the DP refers to a plurality of individuals. In the case of definite concord, the meaning of the definite article is equivalent to an indefinite article, but there is an added condition, equivalent to a follow-up sentence, that the DP refers to a unique individual. Thus, a pseudo-LF is provided in (12) for the Kaqchikel sentence in (8); a pseudo-LF is provided in (13) for an English sentence including the expression in (11).

(12) Each of the students hugged a dog. <u>There are several such dogs</u>.

(13) A rabbit in a hat (<u>there is one such rabbit and one such hat</u>) ate a carrot.

In both cases, the follow-up sentence (underlined) is a non-assertive felicity condition, returning ungrammaticality if the condition is not met. In this sense, the condition is formally equivalent to a presupposition, which returns infelicity when not entailed by a given context. On the other hand, a notable difference with the standard characterization of presuppositions regards the order of evaluation. Presuppositions are generally checked before a sentence is uttered; the conditions above are evaluated after it. In this respect, the conditions above are an example of *postsuppositions*, propositions that are evaluated after the meaning of the sentence has been integrated into the context (Lauer, 2009; Brasoveanu, 2013). Nevertheless, in the rest of this paper, and in particular

in §5.2, I will adopt the view that postsuppositions are a compositional mechanism for delaying interpretation (Charlow, to appear), but that any kind of meaning (assertions, felicity conditions) may be postsupposed. Thus, although somewhat unintuitive, I will continue to use the term presupposition to refer to a general *kind* of meaning—a check that a given condition is entailed by the context—regardless of when it is evaluated.

These (postsupposed) presuppositions may have consequences on the acceptability of a sentence or the range of meanings that are available to it. For example, note that the underlined condition in (12) guarantees a $\forall > \exists$ interpretation for the target sentence, since the $\exists > \forall$ interpretation only involves a single dog. More generally, distributive numerals require the presence of a plural licensor, since the underlined condition can never be met if all arguments are singular (cf. (14)).

(14) (Yesterday at 2:05,) John hugged a dog. #There are several such dogs.

Here, I propose an exactly analogous analysis for negative concord. Building on insights from Alonso-Ovalle and Guerzoni (2004), I propose that the meaning of an NC item is equivalent to an existential, but there is an added condition, equivalent to a follow-up sentence, that the extension of the DP is empty. Thus, a pseudo-LF is provided in (15) for the sentences in (1)–(3).

(15) Mary didn't see a thing. There are no such things.

Like for distributive concord, the presupposed condition of NC items will necessitate a licensor. In particular, observe that the same sentence, without negation, yields a contradiction: if Mary saw something, then it is not true that the set of things that Mary saw is empty. The presupposition is not satisfied, and the sentences in (6) and (7) are correctly predicted not to be grammatical.

(16) Mary saw something. #There are no such things.

This analysis-by-paraphrase is precise enough to make predictions about what can serve as a licensor for NC items. In particular, cross-linguistically, it turns out that the quantifier *few* is generally not able to license NC items, despite the fact that it is downward entailing, and is potentially decomposable into *not* + *many* (e.g. Solt, 2006).

(17) * Poche persone hanno visto nessuno.
few people AUX seen nothing (Italian)

Why is this the case? We run the same analysis-by-paraphrase, as in (18). Here, the situation is slightly different from the one in (16), since there is no contradiction: the two sentences are perfectly compatible. Nevertheless, the algorithm still predicts ungrammaticality, since the underlined sentence is presupposed; presuppositions require their content to be part of the common ground—that is, true in *every* world in the local context (Stalnaker, 1973; Heim, 1983). Stated in another way, the common ground must entail the underlined sentence at the point at which it is evaluated. Because *few* is compatible with scenarios in which the predicate holds of a small but non-zero number of people, the underlined sentence in (18) yields a presupposition failure.

(18) Few people saw something. #There are no such things.

As we will see in §5, this characterization needs to be revised slightly. Consider the example in (19); here, *look for* is an intensional verb that may be compatible with the existence or non-existence of the entity sought. In the case at hand, though, it is likely part of the common ground that unicorns do not exist. In such a situation, the continuation in (19) is entailed by the context in which appears. Nevertheless, this is not an environment in which NC items are licensed, regardless of what is taken to be common ground. This is a general property of NC items: unlike presuppositions elsewhere, they are blind to the local context. The non-existence of a discourse referent must be ensured by the embedding context itself. §5 formalizes this context blindness.

(19) Mary is looking for a unicorn. <u>There are no such things</u>.

Sentential negation, as we have seen, is one operator that blocks the introduction of discourse referents, but other operators may also have the necessary semantic effect. For example, in Italian, like many other languages, one licensor of negative concord is *senza*, 'without,' as in (20). This is predicted from the analysis-by-paraphrase in (21): if Mary left without eating a thing, then the set of things that Mary ate is necessarily empty, and the presupposition is satisfied.[1]

(20) Maria è partita senza mangiare niente.
Mary AUX left without eat nothing
'Maria left without eating anything.' (Italian)

(21) Maria left without eating a thing. <u>There are no such things</u>.

More generally, the logical environment in which NC items can appear has been previously characterized as *anti-additive* (van der Wouden and Zwarts, 1993; Zwarts, 1998) or *anti-veridical* (Giannakidou, 1997). The present analysis can be seen as an extension of anti-veridicality to non-propositional constituents. The relation to anti-additivity will be discussed in §4.3. The analysis here goes a step further, explaining *why* this is the relevant class: these are the environments that prevent discourse referents from being introduced. (See also Lin (1996, 1998); Giannakidou (1998, 2011) for the idea that the interaction of negation with discourse referents underlies the distribution of some polarity sensitive items.)

In the rest of the paper, we will spell out this analysis using split scope and dynamic semantics, but it is possible already, in the analysis sketch here, to see where each technology will be valuable. In the paraphrases above, observe that it is one and the same item that introduces the existential and the underlined condition, but these two components of meaning are structurally separated from each other. This is where split-scope comes in handy; split-scope provides a way for a single lexical object to be evaluated in two distinct hierarchical positions. Second, note the use of anaphoric language in the paraphrases above, instantiated in the word *such*. This anaphoric language allows us to refer back to the specific discourse referent associated with the DP; in (15), we do not want to presuppose that no things exist in the world, just that there are no things that were seen by Mary. Dynamic semantics is used to capture anaphoric behavior.

[1] Zeijlstra (2004) reports that NC items are licensed by *without* in Bavarian, Berber, Catalan, Czech, French, Greek, Hebrew, Hungarian, Italian, Polish, Portuguese, Quebecois, Romanian, Spanish, and Yiddish. But there are exceptions: in Russian and Serbo-Croatian, for example, acceptability of NC items under *without* varies based on dialect and register. I will have relatively little to say about these cross-linguistic differences, though see discussion in §4.2.

In §3, I spell out this analysis formally. In §4, I show that the analysis immediately and correctly predicts that NC items should be licensed by a sufficiently local negative operator. In §5, I discuss how NC items fit into the taxonomy of presuppositions and postsuppositions. In §6, I discuss uses of NC items in which they contribute negative force themselves, and show that these cases can be cleanly captured by manipulating what is *at-issue* in the denotation of the NC item. I discuss the typology of concord items and potential parameters of variation from the novel perspective, and compare it competing accounts.

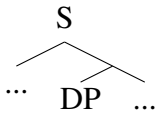
3 Negative concord

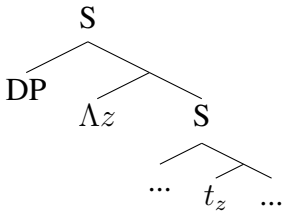
I propose that negative concord items introduce a discourse referent (like an existential), but then test that no discourse referent has been introduced in any assignment. These apparently contradictory requirements are licensed with split scope around negation. Introduction occurs below negation; the test appears above it.

In compositional implementation, the proposal here will closely follow Charlow (to appear)'s analysis of postsuppositions. Bumford (2017) and Charlow (to appear) observe that split-scope can be analyzed by allowing DP denotations to have the type of a lifted generalized quantifier. If generalized quantifiers are of type $Q = \langle et, t\rangle$, higher-order quantifiers are of type $\langle Qt, t\rangle$. When integrated with a dynamic system, Charlow shows that this provides a compositional mechanism to generate the effect of postsuppositions, as the higher-order quantifier is able to lexically specify the order in which its components are evaluated.

3.1 Split scope

We adopt an analysis of split scope following Cresti (1995) and Charlow (to appear). Notationally, e is the type of individuals; t is the propositional type, whether static or dynamic. Note that we will ultimately be using dynamic semantics, so t is not a primitive type, but this changes nothing in the syntactic analysis. We assume a rule for Quantifier Raising (QR), as in (22).

(22) a. 

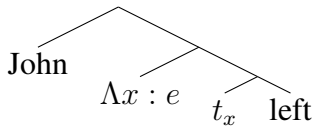
$\Rightarrow$ b. 

The node Λz lambda abstracts over the variable z, so if the DP leaves a trace of type e, then the constituent [Λz S] is of type $\langle e, t\rangle$. If a proper name is QRed, it can be left as type e, or can be lifted to type $\langle et, t\rangle$, as in (23a). Note that lifting does not add new meanings; it just 'flip-flops' the function and the argument (Partee and Rooth, 1983). On the other hand, lexical items 'born' with type $\langle et, t\rangle$ can be more complex, as in the case of generalized quantifiers like *everybody*, in (23b).

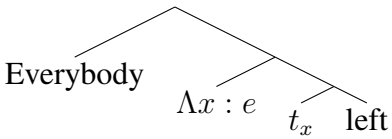
(23) a. $\textsc{lift}(\text{john}') = \lambda P.P(\text{john}')$

b. everybody′ $= \lambda P.\forall x[P(x)]$

(24) a.



b.

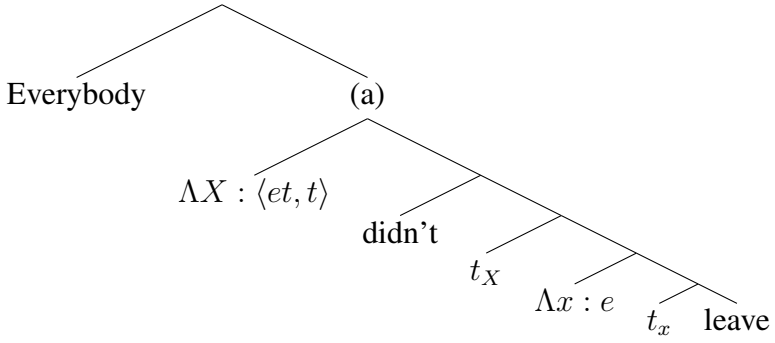


Now, consider that we lift the higher-order generalized quantifier, leaving behind a trace of type $\langle et, t\rangle$. To draw a clear analogy, let us define the type Q to be $\langle et, t\rangle$. By the schema in (22), this transformation is perfectly well-defined. If the DP leaves a trace of type Q (i.e., $\langle et, t\rangle$), then the constituent [ΛX S] is of type $\langle Q, t\rangle$ (i.e., $\langle\langle et, t\rangle, t\rangle$). (Note that this assumes that objects of type $\langle et, t\rangle$ must exist in the range of an assignment function.)

Cresti (1995) proposes such an analysis for syntactic reconstruction effects. For example, the sentence in (25) can naturally be uttered in response to the question 'Did everyone leave?' to communicate the fact that people still remain. This scopal order, $\neg > \forall$, can be derived with the tree in (26), in which the universal quantifier leaves behind a trace of type Q below the negation.

(25) Everybody didn't leave.

(26)



(27) $[\![(26a)]\!] = \lambda\mathcal{P}.\neg\mathcal{P}(\text{leave}') \quad :: \quad \langle Q, t\rangle$

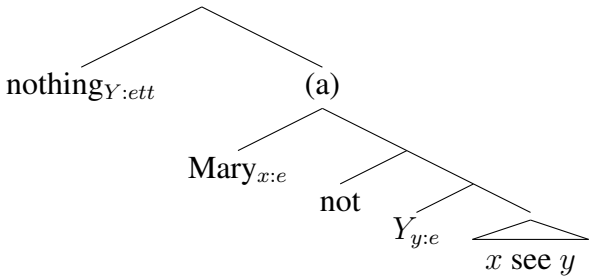
If a generalized quantifier is QRed in this way, it can be left as type Q, or can be lifted to type $\langle Qt, t\rangle$ Once again, lifting does not add new meanings; it just 'flip-flops' the function and the argument. As in the case of lifting a proper name, the result is that the generalized quantifier is interpreted as if it remained in its unraised position.

(28) LIFT(every′) $= \lambda c.c(\text{every}') = \lambda c.c(\lambda P.\forall x[P(x)])$

But, once again lexical items 'born' with type $\langle Qt, t\rangle$ can be more complex. Following Charlow (to appear)'s analysis for distributive numerals and Bumford (2017)'s analysis of definites, I propose that this will be the case for negative concord items. The structure of (29) is thus provided in (30). NC items, of type $\langle Qt, t\rangle$, take arguments of type $\langle Q, t\rangle$, as in (31).

(29) Mary didn't see nothing.

(30)



(31) $[\![(30a)]\!] = [\![8_{\langle et,t\rangle}\ [\text{Mary}\ [6_e\ [\text{not}\ [t_8\ [7_e\ [t_6\ \text{see}\ t_7]]]]]]]\!] = \lambda\mathcal{P}_{\langle et,t\rangle}[\neg\mathcal{P}(\lambda x[\text{see}(x)(\text{mary})])]$

In (31), what is notable is that the variable $\mathcal{P}$ appears under negation. When this function is fed to a higher operator, that operator is able to contribute meaning outside the scope of negation, but it is also able to feed the function an argument of type Q which will take scope below negation. The effect of these higher-order operators can be illustrated by analogy to ordinary generalized quantifiers. When a DP has type $\langle et, t\rangle$, it can be assigned a meaning schematized in (32); here, Op^x is an operator that acts on a variable x that may appear in the argument of P. When a DP has type $\langle Qt, t\rangle$, it can be assigned a meaning schematized in (32); here, Op^x is an operator that acts on a variable x that may appear in the argument of c.

(32) $[\![\text{everybody/somebody/...}]\!] \approx \lambda P_{\langle et\rangle}.\text{Op}^x(P([...x...]_e))$

(33) $[\![\text{nobody}_{\text{NC}}\text{/...}]\!] \approx \lambda c_{\langle Qt\rangle}.\text{Op}^x(c([...x...]_{\langle et,t\rangle}))$

On the present proposal for NC items, the argument of c is a standard existential, which introduces a discourse referent at x; the operator 'Op' that appears outside the scope of c is a dynamic test that checks that no discourse referent exists at x in any assignment.

3.2 Dynamics

In dynamic semantics, sentential meaning is conceived of not as a static set of truth conditions but as a way of updating the discourse context. At a given point in discourse, speakers have a representation of shared information (often spelled out as a set of possible worlds), as well as the set of discourse referents that have been introduced (often represented as the values of an assignment function). Uttering a sentence has the potential to both introduce information (i.e., eliminate possible worlds), and to introduce discourse referents (i.e., change values of the assignment function).

Historically, dynamic semantics has proved useful for a number of semantic effects that span sentence boundaries, including the behavior of presuppositions in different environments (Heim, 1983), as well as the anaphoric potential of pronouns (Groenendijk and Stokhof, 1991; Muskens, 1996). Because the present analysis involves both presupposition and anaphoric potential, the system here will essentially be a cross of Heim (1983) and Muskens (1996), incorporating information about both informational content and discourse referents. In doing so we are adopting the general framework of Beaver (1992); Groenendijk et al. (1996).

In Stalnaker (1973), Heim (1983), and Schlenker (2009), among others, contexts are represented as sets of possible worlds. Letting $\mathcal{W}$ be the set of all possible worlds, $C \subseteq \mathcal{W}$ for all contexts C. In Groenendijk and Stokhof (1991) and Muskens (1996), among others, discourse

referents are represented as the values of an assignment function. Contexts are represented as sets of assignment functions. Letting $\mathcal{G}$ be the set of all assignment functions, $C \subseteq \mathcal{G}$ for all contexts C. Putting the two frameworks together, I follow Beaver (1992) and Groenendijk et al. (1996) in assuming that contexts are sets of tuples containing a possible world and an assignment function: $C \subseteq \mathcal{W} \times \mathcal{G}$ for all contexts C. I will use the term 'state' to refer to a world-function tuple. We let s and t be variables over states: $s = \langle w, g \rangle$. Notationally, s_w retrieves the world variable of s and s_g retrieves the assignment function variable in s; we also let S_w be $\{s_w : s \in S\}$ and S_g be $\{s_g : s \in S\}$.

Indefinites add new individuals to the assignment function in a state. Pronouns retrieve elements from the assignment function. I assume assignment functions start out with only undefined values, represented here with $\star$. As in all the theories above, predicates are tests that filter out states. States are passed through discourse: the output context of one sentence is the input context of the next. A sentence or discourse is true in a context if the output of the update is non-empty.

The discourse in (34) provides an example. We consider a starting context in which nobody has been mentioned, and in which we do not know who left (if anyone), but we know that only Emma is angry. This corresponds to the initial set of states in Figure 1, where the four worlds have the properties provided in (35). Upon the utterance of the sentence '*A girl left*,' we update all states by introducing a discourse referent at index x, then we remove each state s in which $s_g(x)$ is not a girl who left in s_w. Upon the utterance of the sentence, '*She was angry*,' the pronoun *she* retrieves the individual introduced at x, and we remove each state s in which $s_g(x)$ is not angry in s_w.

(34) (a) A^x girl left. (b) She$_x$ is angry.

(35) w_1: Emma left. Only Emma is angry.
w_2: Mary left. Only Emma is angry.
w_3: Both Emma and Mary left. Only Emma is angry.
w_4: Nobody left. Only Emma is angry.

We assume that propositions are functions from a set of states to a set of states. Note that this formulation parallels that of Heim (1983), but is slightly different from Groenendijk and Stokhof (1991), where propositions are relations of states; nevertheless, most definitions are intertranslatable. The one exception are presuppositions, which test that a property holds *across* the states in an input context; these will thus be easier to express in the current formulation. A full list of types is provided in Figure 2.

We now define logical operators and lexical items. Dynamic conjunction uses the output of the first proposition as the input of the second, as in (36). Introduction of a discourse referent at index u takes a set of states S and gives the set of states that differ from a member of S only with respect to the value that the assignment function assigns to u, as in (37)[2]. Predicates are filters that return only the states t in which a given property holds in t_w, as in (38). Negation is a filter that returns only those states in which the propositional complement does not hold, as in (39). Note that, as a test, negation does not pass along any discourse referents that may be introduced in its scope.

(36) $\varphi \,;\, \psi \quad := \quad \lambda S.\psi(\varphi(S))$

[2]The expression s$^{u \mapsto d}$ returns the state t that is exactly like s except that $t_g(u) = d$.

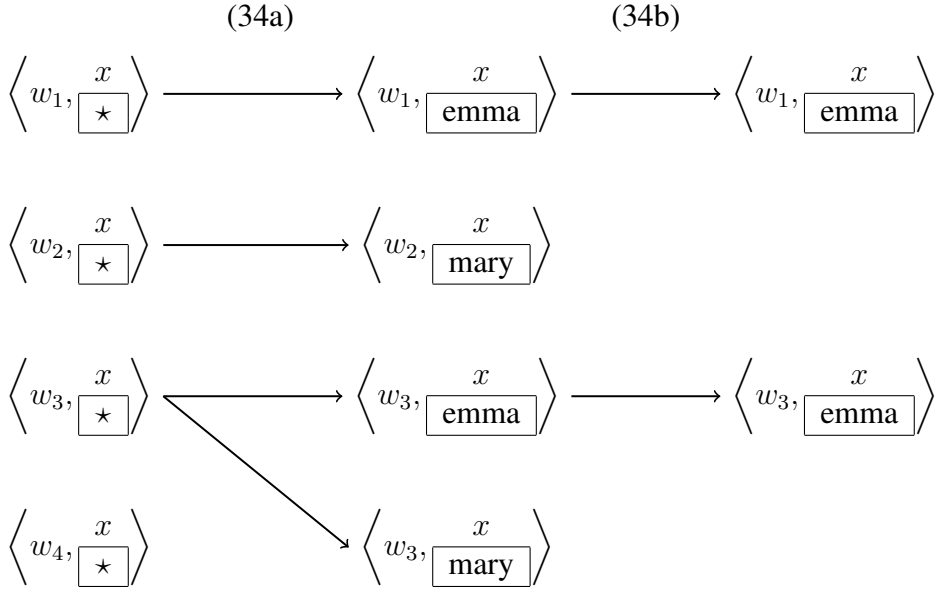


Figure 1: Diagram of updates of the discourse in (34)

Type		Variables	Example
truth value			true, false
worlds		w	w_1, w_2
index		u, v	x, y
entity		d, e	john, mary
predicate	index → proposition	P, Q	LEFT, ZEBRA
assignment function	index → entity	g, h	x y | al | eve
state	⟨world, assign. fn.⟩	s, t	$\langle w_2, x \; y \mid \text{al} \mid \text{eve} \rangle$
context	state → truth value	S, T	$\{\langle w_2, x \; y \mid \text{al} \mid \text{eve} \rangle, \langle w_5, x \; y \mid \text{ed} \mid \text{ann} \rangle\}$
proposition	context → context	φ, ψ	

Figure 2: List of types

(37) $[u] \quad := \quad \lambda S.\{t \mid \exists s \in S[\exists d[t = s^{u \mapsto d}]]\}$

(38) $P_{\text{dyn}}(u_1, ..., u_n) \quad := \quad \lambda S.\{t \mid t \in S \wedge P_{\text{stat}}(t_g(u_1), ..., t_g(u_n))(t_w)\}$

(39) $[\![\text{not}]\!] \quad = \quad \neg \quad := \quad \lambda\varphi\lambda S.\{t \mid t \in S \wedge t_w \notin \varphi(S)_w\}$

We are now in a position to build the tools needed to analyze negative concord. Recall that there are two proposed components to the meaning of negative concord: (i) the introduction of a discourse referent, synonymous to an existential, and (ii) a test that the extension of the discourse referent is empty. The first part of the definition is completely straightforward; (40) provides a definition of the existential quantifier *somebody*^{x}. The function takes a predicate, introduces a

discourse referent at x, and then returns only those states s in which the predicate holds of $s_g(x)$ in s_w. As discussed in §3.1, the meaning of negative concord *nobody* will be of type $\langle Qt, t\rangle$, so it will in fact be built out of lifted *somebody*, as in (41).

(40) $[\![\text{somebody}^x]\!] \quad = \quad \lambda P.[x]; P(x)$

(41) $\text{LIFT}([\![\text{somebody}^x]\!]) \quad = \quad \lambda c.c(\lambda P.[x]; P(x))$

We then need to define the presupposition that tests that the extension of the discourse referent is empty. As a presupposition, this test must check that the relevant property holds in all worlds compatible with the common ground (Heim, 1983). In the present framework, a presupposition must hold in all states in the input context. As a presupposition, the test also does not return falsity in the case of failure, but infelicity, notated with #. This is implemented in the definition in (42). The function of '$\mathbf{0}_u$' is a global test (it looks across all states in the input context) that returns undefinedness if any state has an assignment function with a defined value at index u.

(42) $\mathbf{0}_u \quad := \quad \lambda S. \begin{cases} S & \text{iff } |S_g(u)| = 0, \quad \text{where } S_g(u) = \{x \mid \exists s \in S[x = s_g(u)] \wedge x \neq \star\} \\ \# & \text{otherwise} \end{cases}$

This definition is fundamentally modeled after Bumford (2017)'s global test for definites, which also implements a cardinality test across the assignment functions in the context. The principal difference between the two definitions lies in the cardinality tested: Bumford (2017)'s entry for *the* checks that there is one unique defined individual in the context; the above test checks that there are zero.

3.3 The meaning of negative concord items

We can now assign a meaning to negative concord items, as the dynamic conjunction of (41) and (42), shown in (43). In this definition, the effect of split-scope can be seen in the fact that the test $\mathbf{0}_x$ appears *outside* the scope of c. As in the analysis of Charlow (to appear), the test's status as a postsupposition can be seen in the fact that it appears *after* the evaluation of c. As promised at the end of §3.1, this is a definition that cannot be derived simply by lifting a generalized quantifier.

(43) $[\![\text{nobody}^x_{\text{NC}}]\!] \quad = \quad \lambda c.c(\lambda P.[x]; P(x)); \mathbf{0}_x$

We can now see how this compositionally derives the desired results. The meaning in (44) is repeated from our derivation in §3.1. Plugging this into NC *nobody* returns the meaning in (45).

(44) $[\![\text{Mary not see}]\!] = \lambda Q_{\langle et,t\rangle}[\neg Q(\lambda x[\text{see}(x)(\text{mary})])]$

(45) $[\![\text{Mary didn't see nobody}^x_{\text{NC}}]\!] \quad = \quad \neg([x]; \text{see}(x)(\text{mary})); \mathbf{0}_x$

To get a handle on the action of this denotation, let us compare NC *nobody* to the ordinary existential *somebody*, to show how we derive the desired pattern of results. We schematize this pattern of results in (46). To abstract away from a specific language, we are using pseudo-English sentences, but the judgments reported in (46) should we taken to be representative of analogous sentences in negative concord languages. For simplicity, we will also ignore the fact that English *somebody* is itself a PPI (Szabolcsi, 2004) focusing only on its dynamic contribution.

(46) a. Ed saw somebody.
b. Ed didn't see somebody.
c. * Ed saw nobody$_{\text{NC}}$.
d. Ed didn't see nobody$_{\text{NC}}$. (Schematic negative concord paradigm)

Observe that the definition of NC *nobody* in (43) and of lifted *somebody* in (41) differ only in the addition of the function '$\mathbf{0}_x$'; thus, the dynamic computation up until this stage is identical. Examples (47) and (48) show the dynamic behavior of the sentences '*Ed saw somebody*' and '*Ed didn't see somebody*,' uttered in a context in which only Ed has been previously mentioned, and where the three worlds under consideration are w_1, in which Ed saw only Sue, w_2, in which Ed saw only Ann, and w_3, in which Ed didn't see anybody. As observed above, negation ($\neg$) is a filter, so cannot return any assignments that were not in the input set.

(47) $[\![\text{Ed saw somebody}^y]\!]\left(\left\{\left\langle w_1, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle, \left\langle w_2, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle, \left\langle w_3, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle\right\}\right)$
$$= \left\{\left\langle w_1, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \text{sue} \\ \hline \end{array}\right\rangle, \left\langle w_2, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \text{ann} \\ \hline \end{array}\right\rangle\right\}$$

(48) $[\![\text{Ed didn't see somebody}^y]\!]\left(\left\{\left\langle w_1, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle, \left\langle w_2, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle, \left\langle w_3, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle\right\}\right)$
$$= \left\{\left\langle w_3, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed} & \star \\ \hline \end{array}\right\rangle\right\}$$

The only difference for NC *nobody* is an additional update with $\mathbf{0}_y$, evaluated on the output of the sentence with the existential. $\mathbf{0}_y$ checks that y is undefined in all assignments. The test is satisfied for '*Ed didn't see nobody*,' so it returns the same output as (48). It is not satisfied for '*Ed saw nobody*,' so it returns a presupposition failure.

3.4 Relation to distributive concord and definite concord

In §2, I provided an analysis-by-paraphrase that illustrated the connection between negative concord, distributive concord, and definite concord. In all three cases, the DP participating in concord is equivalent to an indefinite, but with a delayed presupposition (i.e., a postsupposition) that checks a property of the discourse referent that it introduces. Having now introduced an explicit proposal for negative concord, we are now in position to spell out this parallel in more precise terms (and observe some differences between the phenomena).

As we have seen, NC items have two components of meaning: (i) the introduction of a discourse referent, and (ii) a postsupposition that the extension of the discourse referent is empty, as repeated in (49a). These two components of meaning must take split scope around a negative licensor, generating a meaning like the one in (49b).

(49) a. $[\![\text{nobody}^x_{\text{NC}}]\!] = \lambda c.c(\lambda P.[x]; P(x)); \mathbf{0}_x$
b. $[\![\text{Ed didn't see nobody}]\!] = \neg([x]; \text{see}(x)(\text{ed})); \mathbf{0}_x$

According to Henderson (2014) and Kuhn (2017), distributive numerals also have two components of meaning: (i) the introduction of a discourse referent, and (ii) a postsupposition that the discourse referent is a plurality. In (50a), the postsupposed condition $|x/y| > 1$ checks that the values of x vary with respect to the values of y. Again, these two components of meaning must take split scope around a distributive licensor, generating a meaning like the one in (50b).

(50) a. $[\![\text{one-one}^x_y \text{ book}]\!] = \lambda c.c(\lambda P.[x]; \text{book}(x); \text{one}(x); P(x)); |x/y| > 1$
b. $[\![\text{Everyone}^y \text{ read one-one}^x_y \text{ book}]\!] = \delta_y([y]; [x]; \text{bk}(x); \text{one}(x); \text{read}(x)(y)); |x/y| > 1$

According to Bumford (2017), definite noun phrases, once again, have two components of meaning: (i) the introduction of a discourse referent, and (ii) a postsupposition that the discourse referent is unique. The interpretation of polyadic uniqueness arises when these two components of meaning take split scope, interleaved with another definite noun phrase, as in (51b).

(51) a. $[\![\text{the}^x \text{ hat}]\!] = \lambda c.c(\lambda P.[x]; \text{hat}(x); P(x)); \mathbf{1}_x$
b. $[\![\text{the}^y \text{ rabbit in the}^x \text{ hat}]\!] = \lambda P.([y]; [x]; \text{hat}(x); \text{rabbit}(y); \text{in}(x)(y)); \mathbf{1}_x; \mathbf{1}_y; P(y)$

The analyses of these three phenomena have several important features in common. Compositionally, they all use split scope, which we have seen can be generated using higher-order quantifier raising. The three cases also are united in having an existential core, with a postsupposed cardinality check, whether this cardinality be zero, one, or more than one.

There a number of more subtle differences in the analyses that are encoded into the more general set-up of the system. Of note, Bumford (2017) does not want to derive that '*The child left*' presupposes that there is a single child who left. His system thus tracks not only the assignment functions in which the proposition is true, but also those in which it is false; his global test checks for uniqueness across both sets. '*The child left*' thus presupposes that there is a single child, whether or not they left. Another notable difference between definite concord on the one hand and negative and distributive concord on the other regards the sensitivity to the context. The definite noun phrase *the hat* can be used when the local context entails the uniqueness of a hat, but NC items have a stricter constraint; the non-existence of a discourse referent must be entailed by the sentence itself. Context sensitivity and context blindness will be discussed in more depth in §5.

Despite these differences, the three phenomena share significant formal properties; notably, since all three use the same compositional mechanism to derive a postsuppositional meaning, all three are predicted to be sensitive to the same compositional constraints.

4 Predictions

4.1 Locality

Cross-linguistically, the licensor of a NC item is known to obey certain locality constraints (see Longobardi 1992 for Italian; Przepiórkowski and Kupść 1997 for Polish). Déprez (1997), Giannakidou (2000), and de Swart and Sag (2002) argue that these locality constraints are closely tied to constraints on quantifier scope: a negative operator cannot license a NC item if the two are separated by a scope island. The sentences in (52) and (53) illustrate this correspondence with Greek

stressed KANENAN, which Giannakidou (2000) shows to be a NC item. The same environments that delimit the scope of quantifiers also block the licensing of NC items. (Below, these scope islands are indicated with angled brackets.)

(52) Scope-islands block NC item licensing (Greek, Giannakidou 2000)

a. * Dhen lipame ⟨pu pligosa KANENAN⟩.
not regret that hurt nobody$_{NC}$
Desired: 'I don't regret that I hurt anybody.'

b. O Pavlos dhen theli na dhi KANENAN.
the Paul not want SUBJ see nobody$_{NC}$
'Paul doesn't want to see anybody.'

(53) Scope-islands block inverse scope of universals (Greek, Giannakidou 2000)

a. Kapjos fititis lipithike ⟨pu kathe kathijitis tis sxolis apolithike⟩.
some student regretted that every professor the department got-fired.
'Some student regrets that every professor in the department got fired.
$*\forall > \exists \quad \checkmark\exists > \forall$

b. Kapjos kathijitis ihele kathe ipopsifios s' afti ti lista na vri dhulja.
some professor wanted every candidate in this the list SUBJ find job
'Some professor wanted every student on this list to find a job. $\checkmark\forall > \exists \quad \checkmark\exists > \forall$

Giannakidou (2000) uses this as evidence that NC items take scope. Under her analysis, NC items are universal quantifiers that take scope above negation. The present analysis differs in the denotation of NC items, but the analysis makes exactly the same predictions with respect to scope islands. On the present analysis, the structural configuration that licenses NC items is one in which the NC item takes split scope around its licensor. Scope islands block scope-taking, so disallow this logical form.

As it turns out, similar locality effects have been found for distributive concord and definite concord (Choe, 1987; Oh, 2006; Zimmermann, 2002; Cable, 2014; Kuhn, 2017; Bumford, 2017). In the Hungarian sentence in (54), an island intervenes between the distributive-marked numeral and the quantifier *minden*, 'every.' In other circumstances, *minden* can license *két-két*, but the island blocks the process, yielding ungrammaticality. In the English expression in (55), an island intervenes between the two definite DPs; as a result, the phrase cannot be used felicitously in a situation with multiple doctors and multiple patients, but only one doctor-patient pair such that the doctor knows which treatment cured the patient (*cf.* '*the doctor who cured the rabies patient*').

(54) * Minden professzor azt mondta, hogy meglepné, ha ⟨két-két diák diplomát szerezne⟩.
every professor DEM said that surprised if two-two student diploma receive
'Every professor said that he would be surprised if two students graduated.'
(Hungarian, Kuhn 2017)

(55) # the doctor who knows ⟨which treatment cured the rabies patient⟩
[in a context with multiple rabies patients] (English, Bumford 2017)

Each of these effects is predicted on an analysis in which licensing is explained via scope-taking.

It should be noted that the precise conditions of locality for both quantifier scope and for NC item licensing has been a matter of debate in the literature. Wurmbrand (2018), for example, argues that quantifier raising is not subject to syntactic constraints on locality, but is gradiently available, depending on the processing difficulty of recovering a covert dependency. I know of no systematic work that compares these predictions to the constraints on NC item licensing. Moreover, not all quantifiers are subject to the same islands (see, e.g., Barker, 2019). Given that the present analysis relies on split scope via higher-order quantifier raising, it is fully possible that there exist further locality constraints specific to this operation. Generalizations should be built by comparing the locality conditions of NC item licensing with the locality conditions for phenomena in the same category. (As a starting point, §5.2 enumerates a variety of other cases of postsuppositions, including distributive concord and definite concord.)

4.2 Licensors beyond negation

In §2, I sketched an informal version of the analysis that predicted the set of operators that should act as licensors, beyond negation. We saw that the (downward entailing) quantifier *few* is not predicted to license NC items, but operators like *without* are predicted to license NC items. Here, we spell out the case of generalized quantifiers in more detail.

A relatively recent literature has investigated the dynamic potential of different kinds of generalized quantifiers, including the discourse referents that they themselves introduce, as well as those of indefinites that appear in their scope (van den Berg, 1996; Nouwen, 2003; Brasoveanu, 2008). In descriptive terms, a quantifier in a sentence of the form 'Q A B' systematically introduces a plural discourse referent corresponding to its refset ($[\![\text{A}]\!] \cup [\![\text{B}]\!]$), and admits plural discourse referents collecting the values of any indices introduced in its scope. Thus, the sentences in (56) will collect the set of all children who saw a cat at index x and the set of all cats they saw at index y.

(56) a. Several^{x} children saw a^{y} cat.
b. Few^{x} children saw a^{y} cat.
c. No^{x} children saw a^{y} cat.

We simplify the analyses above by assuming that these discourse referents are sums of individuals. We can illustrate the behavior of quantifiers with an example. We assume the starting context C_0 in (57) with the worlds described in (57a) and the assignment function in (57b).

(57) a. w_1: Ed saw cat$_1$, Sue saw cat$_2$, Al saw cat$_3$. Nobody else saw any cats.
w_2: Ed saw cat$_4$, Sue saw cat$_5$, Al saw cat$_6$. Nobody else saw any cats.
w_3: Sue saw cat$_1$ and Al saw cat$_2$. Nobody else saw any cats.
w_4: No children saw any cat.

b. $g = \begin{array}{|c|c|}\hline x & y \\ \hline \star & \star \\ \hline \end{array}$

c. $C_0 = \{\langle w_1, g\rangle, \langle w_2, g\rangle, \langle w_3, g\rangle, \langle w_4, g\rangle\}$

Assuming that *few* means 'two or less' and *several* means 'three or more,' updating with each of the sentences in (56) thus gives us the following output states.

(58) $[\![(56a)]\!](C_0) = \left\{ \left\langle w_1, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed}\oplus\text{sue}\oplus\text{al} & \text{c}_1\oplus\text{c}_2\oplus\text{c}_3 \\ \hline \end{array} \right\rangle, \left\langle w_2, \begin{array}{|c|c|}\hline x & y \\ \hline \text{ed}\oplus\text{sue}\oplus\text{al} & \text{c}_4\oplus\text{c}_5\oplus\text{c}_6 \\ \hline \end{array} \right\rangle \right\}$

$[\![(56b)]\!](C_0) = \left\{ \left\langle w_3, \begin{array}{|c|c|}\hline x & y \\ \hline \text{sue}\oplus\text{al} & \text{c}_1\oplus\text{c}_2 \\ \hline \end{array} \right\rangle, \left\langle w_4, \begin{array}{|c|c|}\hline x & y \\ \hline \star & \star \\ \hline \end{array} \right\rangle \right\}$

$[\![(56c)]\!](C_0) = \left\{ \left\langle w_4, \begin{array}{|c|c|}\hline x & y \\ \hline \star & \star \\ \hline \end{array} \right\rangle \right\}$

This explains the licensing of NC items. Under *several*, the index y is defined in all output states. Under *few*, the index y is defined in some states, and remains undefined in states with no cat seen. Under *no*, the index y remains undefined in all output states. The global test $\mathbf{0}_y$ is only satisfied in the last of these. The analysis thus correctly predicts that *few* does not license NC items. What about *no*? Following the definitions above, we should expect that '*no children*' will license NC items. The situation is complicated, though, by the fact that many of the operators that block introduction of discourse referents in non-concord languages are exactly those words that are translated as NC items in concord languages: *nobody, nothing, never, no N,* and so on. Nevertheless, in §6, I will argue that there are indeed some cases in which these operators can be used with a meaning like that of Standard English, blocking introduction of discourse referents. Namely, in 'non-strict' concord languages, I will propose that NC items in preverbal position may be interpreted as having universal negative force. In these cases, the analysis correctly predicts that the operators can license further NC items in their scope. This being said, evaluation of these predictions will depend on the ultimate analysis of NC items in non-strict concord languages.[3]

There remain a handful of operators besides negation that license NC items that do not face the confound above. Most clearly, one operator robustly attested cross-linguistically is *without*. Section 2 provided an example from Italian; sentences (59) and (60) provide further examples from French and Greek. (See fn. 1 for many other languages where *without* licenses NC items, from Zeijlstra 2004.)

(59) Jean est parti sans rien dire à personne.
Jean AUX left without $\text{nothing}_{\text{NC}}$ say to $\text{nobody}_{\text{NC}}$
'Jean left without saying anything to anybody.' (French)

(60) ... xoris na dhi KANENAN.
... without SUBJ see $\text{nothing}_{\text{NC}}$
'...without having seen anybody.' (Greek, Giannakidou 2000)

Informally, the explanation for licensing by *without* is clear: if X happened without Y happening, then Y did not happen, so no discourse referents are introduced that are involved in a

[3]The sentence *Zero children saw a cat* also generates the inference that no cats were seen. The numeral *zero* is nevertheless not generally a licensor of NC items. On the other hand, *zero* displays a number of other unusual properties (e.g., it also doesn't license NPIs), leading Bylinina and Nouwen (2018) to hypothesize that *zero* means 'at least zero,' and that the 'exactly zero' interpretation arises from obligatory exhaustification of alternatives. On such an analysis, the literal meaning of *zero* does not in fact create a downward entailing environment.

Y-ing event. More generally, though, the precise predictions for a given operator will depend on its precise dynamic definition. In well-studied cases, like the case of generalized quantifiers, broad generalizations have been made that derive dynamic meanings from static meanings, but this is not the case across the board. Not only are there many operators for which the dynamics have not been studied, it is additionally possible that fine variation in the lexical semantics will modulate judgments across languages, dialects, and registers. Such variation has been attested. For example, Herburger (2001) shows that in Spanish, NC items may be licensed under the verbs *forbid*, *doubt*, and *deny*. In contrast, analogous constructions are not possible in Italian or French (though similar constructions are found in older French). For example, Spanish *nada* in (61) is grammatical with an existential interpretation, but Italian *niente* in (62), to the extent it is possible, only receives a double negation reading.

(61) Dudo que vayan a encontrar nada.
doubt.1SG that FUT.3PL find $\text{nothing}_{\text{NC}}$
'I doubt that they'll find anything.' (Spanish, Herburger 2001)

(62) ?? Dubito che troveranno niente.
doubt.1SG that find.FUT.3PL $\text{nothing}_{\text{NC}}$
'I doubt that they'll find nothing.' (Italian)

In light of such data, it is possible that the felicity conditions for NC items in Spanish and Italian are similar but not completely identical. The sentence in (61), for example, is consistent with an actual world in which something was found, but entails that no such world exists in the speaker's beliefs. Parameterization of $\mathbf{0}_x$ to an intensional context could explain some of the variation between Spanish and Italian. It may further turn out that the ability to license NC items is a gradient property. Chemla et al. (2011), for example, argue that the grammaticality of NPIs like English *any* and *ever* is best predicted not by whether or not a context is downward entailing or not, but by the degree to which people *perceive* a context to be downward entailing. A similar situation could easily hold for NC item licensing.

4.3 The relation to anti-additivity

As we have seen, the set of operators that license NC items is more constrained than simply those that are downward entailing; for example, *few* is downward entailing, but does not license NC items. In some previous work, the operators that license NC items have been characterized as those that are *anti-additive* (Zwarts, 1998; Ladusaw, 1992; van der Wouden and Zwarts, 1993). Downward entailing operators are those that preserve the inference in (63). Anti-additive operators additionally preserve the converse inference, in (64).

(63) a. An operator f is *downward entailing* iff $f(X \cup Y) \rightarrow f(X) \cap f(Y)$
b. e.g. 'Few people danced or sang' $\rightarrow$ 'Few people danced and few people sang.'

(64) a. An operator f is *anti-additive* iff $f(X \cup Y) \leftrightarrow f(X) \cap f(Y)$
e.g. 'Nobody danced or sang' $\leftrightarrow$ 'Nobody danced and nobody sang.'

In my analysis above, my characterization of the licensors of NC items is intuitively rather different. On my analysis, the set of NC licensors are those that block the introduction of a discourse referent in their scope. Let us call these *dref-blocking* operators. This characterization has a close connection with Giannakidou (1997)'s property of *antiveridicality*. A proposition-embedding function f is antiveridical if $f(p)$ entails $\neg p$. Notably, any such contexts will entail the non-existence of discourse referents introduced in their scope. The present characterization of dref-blocking operators can thus be seen as an extension of anti-veridicality to non-propositional constituents.

What is the relation between dref-blocking operators and anti-additivity? For many lexical operators, these two properties coincide. We can go through the list: operators that are both anti-additive and dref-blocking include: *not*, *without*, *nobody*, *nothing*, *never*, *no*. Operators that are downward entailing but neither anti-additive nor dref-blocking include: *few*, *less than N*, *not all*.

Nevertheless, the two properties are not equivalent, and neither is stronger than the other. For simplicity, let us limit ourselves just to quantifiers of type $\langle et, \langle et, t\rangle\rangle$. Based on the generalizations described in §4.2, we will assume that an operator Q is dref-blocking if $Q(A)(B) \rightarrow A \cap B = \emptyset$. First, let us consider the hypothetical quantifier Q_1, defined in (65). By the assumption above, this is dref-blocking, since $Q_1(N)(P)$ entails that $N \cap P$ is empty. On the other hand, the quantifier is *not* anti-additive: $Q_1(N)(X) \wedge Q_1(N)(Y)$ does not entail $Q_1(N)(X \cup Y)$.

(65) a. $Q_1 = \lambda N \lambda P\,.\,\text{no}'(N)(P) \wedge \text{few}'(N)(\text{want}'(P))$

b. 'Q_1 children left' $\leftrightarrow$ 'No children left, and few of them wanted to leave.'

Of course, this operator is very unnatural, in that it consists of the conjunction of quantifiers of different quantificational forces which perform different operations on the predicate. Even if such a predicate were to exist in natural language, it is unclear that our simplifying assumption about the definition of dref-blocking would hold.

Moving towards actual natural language operators, there nevertheless remain operators for which the two logical properties are dissociated. Of note, on its restrictor argument, the universal quantifier *every* is anti-additive but is not dref-blocking. The equivalence in (66) can be checked to show that *every* is anti-additive on its restrictor argument. On the other hand, $\forall x[N(x) \rightarrow P(x)]$ certainly does not entail that $N \cap P$ is empty. More to the point, discourse referents introduced in the restrictor of a universal are by now well known to project their dynamic potential beyond the clause and even beyond the sentence boundary (van den Berg, 1996; Nouwen, 2003; Brasoveanu, 2008). As seen empirically in (67), the restrictor of a universal is not dref-blocking.

(66) $\forall x[M(x) \rightarrow P(x)] \wedge \forall x[N(x) \rightarrow P(x)] \quad \leftrightarrow \quad \forall x[[M(x) \vee N(x)] \rightarrow P(x)]$

(67) Every friend of mine with a plant takes good care of it. They each water it every day.

With respect to this operator, then, we can evaluate the predictions of the two logical properties. Does the restrictor of *every* license NC items or not? As observed by Gajewski (2011) and Chierchia (2013), it turns out that this environment does *not* allow NC items, as seen in (68), despite the fact that it is anti-additive. Note that this is not just a matter of scope islands and locality, since the sentence in (69) allows an inverse scope '$\forall > \exists$' reading.[4]

[4]On the other hand, relative clauses generally *are* scope islands. This means that no theory predicts NC items to be

(68) * Ogni rappresentante di nessuna regione farà parte del gruppo di redazione.
every representative of no_{NC} region take.FUT part of.the group of writing.
Desired: 'Every representative from any region will take part in the drafting team.'

(69) Un rappresentante di ciascuna regione farà parte del gruppo di redazione.
one representative of each region take.FUT part of.the group of writing.
'One representative from each region will take part in the drafting team.' (Italian)

In this case, then, looking at the dynamic properties of the operator provides us with better predictions than theories based on anti-additivity.

For exactly parallel reasons, the antecedent of a conditional is anti-additive but not dref-blocking. The clause *If Mary saw anything* does not entail that nothing was seen by Mary, so negative concord items are not predicted to be grammatical in these environments. As illustrated in (70), this prediction is borne out. On the other hand, given that the antecedent of a conditional is a scope island, it may be possible for an analysis based on anti-additivity to explain these facts by appealing to locality constraints on NC item licensing, as discussed in §4.1.

(70) * Se Maria ha visto niente, me lo dirà.
if Mary AUX seen nothing, me it tell.FUT
Intended: 'If Mary has seen anything, she will tell me.' (Italian)

In sum, for many operators, we have seen that the theory outlined above coincides with the property of anti-additivity, previously argued to be the semantic property responsible for licensing NC items. On a few cases, though, the two theories can be dissociated. On at least one clear front, the present theory makes better predictions than theories based on anti-additivity.

4.4 The meaning of negation and interveners

The definition of negation provided in §3.2 is overly simplistic. Specifically, following Groenendijk and Stokhof (1991) and much subsequent work, we have provided a definition of negation that is externally static—that is, it completely prevents blocks the introduction of any referents introduced in its scope. Empirically, this corresponds to the observation that an indefinite under negation cannot introduce a discourse referent, as seen in (71).

(71) * I didn't see a student in the room. She was studying hard.

On the other hand, this generalization has long been known to be too strong on several fronts. First, under cases of double negation or negation under disjunction, a discourse referent can in fact be introduced, as seen in (72) (Karttunen, 1969; Krahmer and Muskens, 1995; van Rooy, 2001; Hofmann, 2019; Gotham, 2019).

(72) Either this restaurant doesn't have a bathroom or it's well hidden.

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grammatical in a relative clause modifying the restrictor of a universal quantifier, since locality is not satisfied ('Every boy who loves $\text{nobody}_{\text{NC}}$...'). In this respect, the sentence in (68) provides a more tightly controlled test case than the examples that appear in Gajewski (2011) and Chierchia (2013), which involve relative clauses.

Second, in cases of modal subordination, embedding a pronoun under a modal verb allows reference to a relevant discourse referent in a counterfactual world. In (73), the pronoun picks out Sarah's car in those possible worlds in which she owns a car. (Roberts, 1987; Brasoveanu, 2010)

(73) Sarah doesn't own a car. She would have no place to park it.

Finally, negation of some quantificational expressions may be compatible with a non-empty refset $N \cap P$. In (74), for example, the negated quantifier *not many* is compatible with the existence of some people who did see the movie, a discourse referent that is recoverable by a pronoun.[5]

(74) Not many people saw the movie, but they all enjoyed it.

What these examples seem to show is that, even under negation, quantifiers introduce an intensional discourse referent, that picks out the individual or the maximal set (the refset) that has a given property when such an individual exists. The frequent inability to use a pronoun to retrieve this discourse referent, as in (71), arises because it is not defined in the extension of the sentence. On the other hand, examples like the one in (73) show that the discourse referent may indeed be defined in other accessible worlds. Example (74) shows that a discourse referent may sometimes even remain available in the true extension of the sentence.

These observations have several ramifications for our present theory. First, examples like (73) show that—however one might revise the definition of negation—the definition of $\mathbf{0}_x$ must remain a cardinality check on the values of x in the *extension* of the proposition—the worlds in which it is true. The availability of a discourse referent in a counterfactual world does not block the use of a NC item. Methodologically, this fact also slightly complicates our ability to diagnose dref-blocking environments. Thus far, we have identified dref-blocking environments as those which don't allow a later pronoun. Examples like (73) show that there are strategies to use pronouns even in contexts in which the extension of the discourse referent is empty.[6]

Sentences like the one in (74) pose a different kind of challenge to the present account. Specifically, these sentences show that, in certain semantic environments, indefinites under negation may

[5]Lasnik (1972) reports an almost identical sentence (without 'but') as ungrammatical. Although I agree that (i-a) is not so great, I find the grammaticality of both (74) and (i) to be exactly parallel to sentences with *few*, which is generally taken to allow discourse anaphora (Kamp and Reyle, 1993; Nouwen, 2003). The same pattern holds for sentences in which *not* is syntactically separated from *many*, as in (ii).

(i) a. ? Not many people saw the movie. They enjoyed it. (Lasnik, 1972)
b. ? Few people saw the movie. They enjoyed it.

(ii) a. I haven't published many papers, but they all appear in top journals.
b. I have published few papers, but they all appear in top journals.

[6] Such strategies are often marked by a modal verb, but even this may not be foolproof. A reviewer points out that the discourse in (i) sounds perfectly natural. Even though there is no modal verb, I am inclined to say that this is a special case of accessing a discourse referent in a counterfactual world. This can be seen if one replaces the pronoun with a definite description; the pronoun must denote something like 'the car he would own, had he not sold it.'

(i) John doesn't own a car. He sold it last week.

still introduce a discourse referent in worlds in the true extension of the proposition. In (74), for example, the construction '*many* A B' introduces the refset $[\![\text{A}]\!] \cap [\![\text{B}]\!]$—the set of people who saw the movie—and asserts that this set has many individuals. Negating the sentence negates this assertion, but there remain some worlds in which the refset is not empty—those worlds in which some but not many people saw the movie. The intervening quantifier *many* thus allows an escape-hatch for discourse referents under negation. This behavior makes a prediction for the present account: that quantifiers like *many* can also act as an intervenor for NC item licensing. An NC item cannot be licensed by negation in a '$\neg > \textit{many} > \exists_{\text{NC}}$' scope configuration. (This prediction is reminiscent of Law (2019)'s observation that negation can act as an intervenor between a distributive numeral and its distributive licensor in cases of distributive concord.)

Data from Italian bears out this prediction. Italian does not naturally allow a construction directly parallel to English '*not many*,' but parallel examples can be made with the adverbial phrase *in molti* (lit., 'in many') or the temporal quantifier *spesso*, 'often.' Below, (75a) provides a grammatical sentence with a '$\neg > \textit{many} > \exists$' scope configuration; (75b) shows that the existential may nevertheless not be replaced with a NC item. Of course, if *in molti* takes wide scope, the sentence becomes grammatical again, since there is nothing intervening between negation and the NC item.

(75) a. Non in molti hanno visto una balena.
not in many AUX seen a whale
'Not many people have seen a whale.'

b. * Non in molti hanno visto niente.
not in many AUX seen nothing
Intended: 'Not many people have seen anything.'

c. In molti, non hanno visto niente.
in many, not AUX seen nothing
'Many people saw nothing.' (Italian)

The sentence in (76) provide a parallel paradigm with the temporal adverb *spesso*. In (76b), *spesso* intervenes between negation and the NC item, generating ungrammaticality. Intuitively, if a person has not often thanked anybody, it is nevertheless possible that people were thanked on a few occasions. The existence of these few people will ensure that $\mathbf{0}_x$ is not satisfied.

(76) a. Non ha ringraziato spesso i suoi (genitori).
not AUX thanked often the his (parents)
'He has not often thanked his parents.'

b. * Non ha ringraziato spesso nessuno.
not AUX thanked often nobody
Intended: 'He has not often thanked anybody.' (Italian)

I have, of course, not actually provided a revised definition of negation, so the 'predictions' of intervention discussed above should be correspondingly modest. Nevertheless, the empirical parallel between the accessibility of pronouns and the (un)licensing of NC items provides a clear new path towards understanding intervention effects from a dynamic perspective.

5 Blind postsuppositions

5.1 NC items are blind to their local context

Above, we derived the fact that *few* does not license NC items in its scope when the local context includes possible worlds in which some (but few) individuals have the relevant property. The fact that these worlds are preserved in the output context means that the condition introduced by $\mathbf{0}_y$ is not satisfied, and the sentence is ungrammatical. This derivation was shown in (58).

However, under the current analysis, a different result is derived if it is already established in the common ground that no individuals have the relevant property. To make this concrete, consider the evaluation of (77) in the context provided in (78), in which the only world is one in which no cats were seen. The output context provided in (79) satisfies $\mathbf{0}_y$, since y is undefined in all states. The current analysis thus predicts that *few* should license NC items in this context.

(77) Few^x children saw a^y cat.

(78) a. w_4: No children saw any cat.

b. $g = \begin{array}{|c|c|}\hline x & y \\ \hline \star & \star \\ \hline \end{array}$

c. $C_1 = \{\langle w_4, g\rangle\}$

(79) $[\![(77)]\!](C_1) = \left\{ \left\langle w_4, \begin{array}{|c|c|}\hline x & y \\ \hline \star & \star \\ \hline \end{array} \right\rangle \right\}$

Elsewhere, the sensitivity of a presupposition to its local context is empirically desirable. For example, the change of state verb *stop* generally presupposes that a property previously held of its subject; '*John stopped smoking*' is only felicitous if the local context entails that John used to smoke. A presupposition filter like '*if ... then*' can filter out a presupposition by introducing it into the local context in which the presupposition trigger is evaluated (Karttunen, 1973); thus, the examples in (80) have no presuppositions at the level of the matrix sentence.

(80) a. If John used to smoke, then John stopped smoking.

b. If Tyler left, then Alice left, too.

However, a different empirical situation seems to hold for NC items. Specifically, NC items are ungrammatical under *few* even in local contexts that entail the non-existence of a discourse referent. For example, the consequent of the conditional in (81a) remains ungrammatical, even though the antecedent entails that nobody saw anything. Of course, it is pragmatically odd to assert that few individuals have a given property if it is already established in the context that none do. Nevertheless, the ungrammaticality of (81a) goes deeper than this pragmatic oddness. Specifically, while the sentence in (81b), without an NC item, sounds like the tautological statement of a logical deduction, it nevertheless remains grammatical, like its English translation.

(81) a. * Se nessuno ha visto niente, allora in pochi hanno visto niente.
if nobody AUX seen nothing then in few AUX seen nothing

b. Se nessuno ha visto una balena, allora in pochi hanno visto una qualsiasi balena.
if nobody AUX seen a whale then in few AUX seen a whatsoever whale
If nobody saw a whale, then few people saw a whale. (Italian)

The presupposition contributed by the NC item thus seems 'blind' to the local context in a way that the presuppositions of *stop* and *too* do not. Such context blindness has been previously been argued for by Magri (2009) in the domain of scalar implicatures. Specifically, Magri (2009) observes that '*John is sometimes tall*' triggers the implicature that John is not always tall, even though it is common ground that tallness is a permanent property, so there is contextual equivalence with the competitor sentence, '*John is always tall.*' Magri (2009) uses this as evidence that certain linguistic operations (including scalar implicatures) are blind to contextual knowledge.

In the present framework, context blindness can be implemented by modifying the context on which the NC item is evaluated. Under the analysis in §3, the contribution of the NC item was evaluated with respect to the local context, as repeated in (82). A context-blind version of the same operation can be constructed by evaluating the NC item with respect to the null context C_0, which contains all possible states. The output of this operation (if successful) is then combined with the information from the local context. A potential context-blind definition is provided in (83).

(82) Context sensitive *nobody*$_{\text{NC}}$ (repeated from (43)):

a. $[\![\text{nobody}^x_{\text{NC}}]\!] \quad = \quad \lambda S \lambda c \lambda t.(c(\lambda P.[x]; P(x)); \mathbf{0}_x)(S)(t)$

(83) Context blind *nobody*$_{\text{NC}}$ (first attempt):

a. $[\![\text{nobody}^x_{\text{NC}}]\!] = \lambda S \lambda c \lambda t.(((c(\lambda P.[x]; P(x)); \mathbf{0}_x))(C_0) \cap S)(t)$

b. $C_0 = W \times G$

This context-blindness can further explain a qualitative difference in judgment between a presupposition failure and an unlicensed NC item. While a standard presupposition failure forces accommodation ('Hey wait a minute!'), an unlicensed NC item is not rescuable, resulting in an ungrammatical sentence. Obligatory evaluation with respect to the null context C_0 can explain this intuition of non-rescuability, as the context in which the NC item is evaluated has no effect on its felicity of use.

There remains one final wrinkle in the implementation of context blindness, which is that context blind evaluation must be modified to handle other presuppositions that may appear in the scope of the NC item. For example, in the Russian sentence in (84), the verb *brosil*, 'stopped' appears in the scope of the NC item *nikto*; on the definition in (83), it is subsumed in the variable c that is evaluated with respect to the null context C_0. But this will incorrectly predict that the presupposition of *stop*, too, will be analyzed with respect to the null context, thus generating ungrammaticality. The full system must therefore provide a way for NC items to be evaluated blindly, while allowing other presuppositions to pass alongside to be treated as normal.

(84) Nikto ne brosil kurit'.
nobody not stopped smoking
'Nobody stopped smoking.' (Russian)

As it turns out, the problem of entangled presuppositions has been discovered elsewhere, in examples that have nothing to do with postsuppositions or context blindness. Specifically, Romoli (2011), building on insights from Soames (1979), observes that there are cases in which one presupposition trigger is locally accommodated while embedded presupposition triggers continue to project, as in (85), in which *stop* is accommodated, but embedded presuppositions remain: that John left the country and that someone else did, too. If local accommodation is spelled out as a grammatical operator $\mathcal{A}$ that applies to a syntactic constituent and shifts undefinedness to falsity, there is no way for it to selectively accommodate some but not all of the presuppositions in its scope.

(85) Either John $\mathcal{A}$[stopped being upset that he left the country too], or $\mathcal{A}$[John started being upset that he left the country too]. (Romoli, 2011)

A few authors have suggested that $\mathcal{A}$ operators may be co-indexed with specific presuppositional triggers (Fox, 2013; Nicolae, 2015), but to the best of my knowledge, there does not yet exist a general solution within this framework. In the specific case at hand, we can of course write out the necessary definition for an NC item, as in (86).[7] Here, the $\mathbf{0}_x$ constraint is evaluated on the sentence after any unrelated presuppositions have been accommodated into the common ground; if $\mathbf{0}_x$ is satisfied, then the sentence is evaluated on the input context. Thus, pending a general solution to entangled presuppositions, we will for now relegate to the lexical semantics something that is probably better handled through the more general plumbing of the compositional system.

(86) $[\![\text{nobody}^x_{\text{NC}}]\!] = \lambda S \lambda c. \begin{cases} \# \quad \text{iff} \quad (\mathcal{A}(c(\lambda P.[x]; P(x))); \mathbf{0}_x)(C_0) = \# \\ c(\lambda P.[x]; P(x))(S) \quad \text{otherwise} \end{cases}$

5.2 Towards a taxonomy of postsuppositions

By now, a wide range of phenomena have been analyzed as 'postsuppositional.' Below is a non-exhaustive list of phenomena that have been claimed to have a postsuppositional component. What these phenomena have in common is that one component of meaning is evaluated *after* another component of meaning has been manipulated by the embedding semantic environment. As Charlow (to appear) shows, these can be modeled using a shared schema, involving higher-order scope-taking within a dynamic framework (as we have pursued here for negative concord). There are also some notable differences between these phenomena. Specifically, they differ with respect to their assertive/presuppositional contribution to the discourse, as highlighted below.

(87) **A taxonomy of postsuppositions**

a. *Blind postsuppositions*

- Negative concord items
- Distributive numerals ('distributive concord') (Henderson, 2014; Kuhn, 2017)

b. *Context-sensitive postsuppositions*

[7] A dynamic definition of $\mathcal{A}$ is provided in §6.2.

- Haddock definites ('definite concord') (Bumford, 2017)
- Additive particles (Brasoveanu and Szabolcsi, 2013)

c. *Assertive postsuppositions*

- Modified numerals (Brasoveanu 2013; Charlow, to appear)
- *Same* (Kuhn, 2017)

As we have just seen, the postsupposed component of a negative concord item is a blind presupposition: it must be satisfied by the embedding context itself, and returns ungrammaticality if not. Distributive numerals that participate in distributive concord seem to be similarly blind to the context, returning ungrammaticality when the embedding environment does not provide a plural or distributive argument. (See the discussion surrounding example (14).)

On the other hand, other cases of postsuppositions *do* appear to be sensitive to the context in which the sentence is evaluated. Notably, Bumford (2017) argues that the definite article has a postsuppositional component, but this component must be satisfied by the local context; the expression '*the book*' presupposes uniqueness in the local context. Brasoveanu and Szabolcsi (2013) argue that additive particles in languages like Hungarian and Japanese provide another case of a context-sensitive postsupposition. In Japanese, the particle *mo* can attach to a noun phrase, with an additive meaning, similar to English *too*, as illustrated in (88). Unlike English *too*, however, the additive contribution of *mo* can also be satisfied by the very sentence in which *mo* appears. In (89), for example, A satisfies the additive requirement of B-*mo*, and B satisfies the additive requirement of A-*mo*. Because the contribution of *mo* is evaluated after the sentence, the sentence itself may change the context to satisfy the additive condition, as in (89); but, if the sentence does not change the context in the relevant way, then the postsupposition essentially behaves like a presupposition, and may be satisfied by the local context, as in (88).

(88) A-mo hashitta.
A-MO ran.away
'A, too, ran away.'

(89) A-mo B-mo hashitta.
A-MO A-MO ran.away
'A and B ran away.' (Japanese, Brasoveanu and Szabolcsi 2013)

Finally, some cases of postsuppositions have been argued to make an assertive contribution to the truth conditions of a sentence. For example, Brasoveanu (2013) argues that modified numerals may be evaluated after the rest of the sentence in examples such as in '*Exactly three professors nominated exactly four students*.' In these cases, though, failure of a context to satisfy the relevant condition results in falsity, not a presupposition failure. Similarly, Kuhn (2017) sketches a postsuppositional analysis of sentence-internal *same*; in the sentence '*Every student read the same book*,' comparison of books is postsupposed to occur after the closure of the distributive scope of *every*; if the books are not the same, the sentence is false, not undefined.

The differences between these phenomena show that postsuppositional meaning is a matter of evaluation order and scope, not of the 'kind' of meaning. Blind presuppositions, ordinary (context-sensitive) presuppositions, and assertions can all be postsupposed. The present system allows us

the flexibility to model this diversity, since the compositional tools that determine evaluation order are separate from those that govern whether an operation is an at-issue contribution or presuppositional test. There is certainly more to be investigated here. Notably, each of the phenomena included in the taxonomy above shows a certain degree of cross-linguistic stability regarding the category of meaning. (For example, it does not seem to be the case that NC items are context-blind in some languages but context-sensitive in others.) The explanations for these cross-linguistic generalizations remain an open question. Similarly, given the recency of postsuppositions as a formal tool, it remains to be seen if there are formal constraints on the range of possible meanings, similar to those that have been observed for generalized quantifiers (Keenan and Stavi, 1986).

6 Negative uses of NC-items

Our point of departure included two desiderata: (i) to explain the distributional properties of NC items, and (ii) to explain the apparent presence of two different meanings of NC items. Up to this point, I have accomplished the first: providing an analysis that explains why NC items need to be licensed by a sufficiently local negative operator. In this section, I address the second point: how do we explain NC items when they appear to carry negative force themselves?

As a reminder, whereas many uses of NC items need to appear below a negative licensor, there are a number of uses of these words in which they appear without any overt licensor. As mentioned in the introduction, the clearest such example is the case of fragment answers, where an NC item may appear without an overt negation, but nevertheless carries negative force.

(90) Chto Marija videla? Nichego.
what Mary saw? nothing
'What did Mary see? Nothing.' (Russian)

(91) Cosa ha visto Maria? Niente.
what AUX seen Mary? nothing
'What did Mary see? Nothing.' (Italian)

Exactly where these 'licensor-free' uses can appear is subject to cross-linguistic variation. Notably, negative concord languages can be roughly divided into two different categories: *strict* concord languages and *non-strict* concord languages (Giannakidou, 1997, 2000; Zeijlstra, 2004), though a few languages display both patterns (Catalan: Espinal 2000, Hungarian: Szabolcsi 2018). In strict concord languages, when an NC item appears in preverbal position, it requires negation in order to be grammatical, just like NC items in postverbal position. Example (92) gives an example from Russian, a strict concord language. In non-strict concord languages, there is an asymmetry between perverbal and postverbal position: when an NC item appears before the verb, it does not need an overt licensor, and indeed is not compatible with negation. Example (93) gives an example from Italian, a non-strict concord language.

(92) a. Nikto ne zvonil.
nobody not called
'Nobody called.'

b. * Nikto zvonil.
nobody called (Russian)

(93) a. * Nessuno non ha telefonato.
nobody not AUX called

b. Nessuno ha telefonato.
nobody AUX called
'Nobody called.' (Italian)

When Italian *nessuno* is used in preverbal position, no additional negative marker appears in the sentence, and yet the sentence carries a negative meaning. The use of *nessuno* thus appears very similar to Standard English *nobody*, which itself carries negative force.

6.1 How many meanings?

In the descriptive generalizations of the patterns above, I have stated that NC items 'appear' to bear two different meanings, depending on the context, but whether there are actually one or two denotations involved depends on the analysis one adopts.

Two general directions are possible. On the first kind of analysis, NC items are ambiguous between two meanings. Some uses of NC items are existential, and require a negative licensor; other uses of NC items carry negative force themselves, like standard English *nobody*. Notationally, I will distinguish these uses with subscripts: $nobody_{\text{NC}}$ refers to the 'concord' use of the NC item, which must be licensed by a negative operator; $nobody_{\neg}$ refers to the use on which the NC item itself contributes negative force. Such an analysis has been pursued by van der Wouden and Zwarts (1993); Herburger (2001). This line of analysis faces two explanatory challenges. First: what is the relation, if any, between these two meanings? Second: what explains the distribution of where the two meanings can appear?

On the second kind of analysis, NC items always bear the same meaning—one that is fundamentally existential, and which requires a negative licensor. In certain cases, though, a silent negative operator can appear in the structure, licensing NC items that appear below it. This is postulated to be the case for the uses of NC items in fragment answers and NC subjects in non-strict concord languages. Such an analysis must explain why covert negative operators can appear sometimes in the derivation, but not always (e.g. 'Mary called' can never be used to mean 'Mary didn't call' in any NC language, strict or non-strict). This line of analysis, and the explanation for where silent operators appear, has been pursued by Ladusaw (1992); Zeijlstra (2004); Chierchia (2013), among others.

Here, I propose an analysis that lies between these two options. Like the first kind of analysis, there are two different denotations, but I provide a mechanism by which the negative use $nobody_{\neg}$ is systematically derived from the concord use $nobody_{\text{NC}}$. Specifically, building on insights from Alonso-Ovalle and Guerzoni (2004), I will propose that negative uses of NC items arise from a shift of the non-assertive component of the NC item to the at-issue meaning: $nobody_{\neg}$ is the result of accommodating the presupposition of $nobody_{\text{NC}}$. But, the analysis also shares properties with the second kind of analysis: a sentence that is otherwise ungrammatical is rescued by an

operator that changes the meaning of the sentence. For Zeijlstra (2004) and others, this operator is silent negation. I propose a different operator: ACCOMMODATE, related to accommodation operators motivated independently from the behavior of presupposition elsewhere. Modeling this shift of meaning as an operator allows us to explain distributional facts by adopting insights from operator-based analyses of negative concord (e.g., Zeijlstra, 2004).

6.2 Shifting between presupposed and at-issue meaning

At-issue content and presupposed content act differently from each other. In analyses based on context sets (Stalnaker, 1973; Heim, 1983; Beaver, 2001; Schlenker, 2009), a presupposition must be true in all worlds in the input context, and results in undefinedness if not satisfied. An at-issue or assertive proposition filters out worlds, and results in falsity when there is no world in which it is satisfied. In natural discourse, what is presupposed and at-issue may vary, depending on factors such as information structure (Karttunen, 1971; Simons, 2007; Beaver, 2010; Beaver et al., 2017). For example, although in many contexts the verb *notice* presupposes its complement, there are certain contexts in which the complement is taken to be an at-issue contribution, as in (94).

(94) If I notice that he's cheating, he will be penalized.
= If he is cheating and I notice it, he will be penalized.

These shifts between at-issue and presupposed meaning can be modeled in a dynamic framework (Beaver, 1992, 2001). Given a proposition φ, the semantic shift ∂ in (95) expresses what it means to presuppose φ (Beaver, 1992). Presuppositions must be true in every single state in the context set (i.e., they filter out nothing); if not, they result in infelicity (#). Conversely, given a proposition φ with a presupposition ψ, the semantic shift in (96) expresses what it means to accommodate ψ. The new meaning returns the maximal context that doesn't generate a presupposition failure.

(95) $\partial(\varphi) = \lambda S. \begin{cases} \varphi(S) & \text{iff } S_w = \varphi(S)_w \\ \# & \text{otherwise} \end{cases}$ (Beaver, 1992)

(96) $\text{ACCOMMODATE}(\varphi) = \lambda S. \bigcup\{T : T \subseteq S \wedge \varphi(T) \neq \#\}$
'Return the maximal context that doesn't yield failure.'

These type-shift rules allow us to be descriptively explicit about the meanings of sentences with presuppositions. The meaning of *stop* can be stated as the dynamic conjunction of a presupposed and a non-presupposed proposition. The semantic shift of *notice* in (94) is derived by first accommodating the presupposition of the sentence. (Note that this accommodation operator is slightly different from the $\mathcal{A}$, 'Assert,' operator of Beaver and Krahmer (2001), but $\mathcal{A}$ can be decomposed into a two step process; first you accommodate; then you update. $\mathcal{A}(\varphi) = \text{ACCOMMODATE}(\varphi); \varphi$.)

(97) $[\![\text{John stopped smoking}]\!] = \partial([\![\text{John used to smoke}]\!]); [\![\text{John doesn't smoke}]\!]$

(98) $\text{ACCOMMODATE}([\![\text{I notice that he's cheating}]\!]) = [\![\text{he's cheating}]\!]$

6.3 Deriving *nobody*$_\neg$

I claim that the uses in which NC items bear negative force are derived from concord uses of NC items via a shift of presupposed meaning to at-issue meaning. The proposal is summarized in (99).

(99) $[\![\text{nobody}_\neg]\!](c) = \textsc{accommodate}([\![\text{nobody}_{\text{NC}}]\!](c))$

Let us recall the definition of *nobody*$_{\text{NC}}$ proposed above. In (100), $\mathbf{0}_x$ is a presupposition, so either the result is # (when $\mathbf{0}_x$ is not satisfied), or it is the output of $c(\text{somebody}^x)$.

(100) $[\![\text{nobody}^x_{\text{NC}}]\!] = \lambda c.c(\lambda P.[x]; P(x)); \mathbf{0}_x = \lambda c.c(\text{somebody}^x); \mathbf{0}_x$

(101) $\mathbf{0}_u := \lambda S. \begin{cases} S & \text{iff } |S_g(u)| = 0 \\ \# & \text{otherwise} \end{cases}$

Applying the ACCOMMODATE operator in (96) to the meaning of *nobody*$_{NC}$ in (100), we thus derive the meaning for *nobody*$_\neg$ in (102a), paraphrased in (102b).

(102) a. $[\![\text{nobody}^x_\neg]\!] = \lambda c \lambda S. \bigcup\{T : T \subseteq S \wedge |(c(\text{somebody}^x)(T)_g(x)| = 0\}$

b. 'Return the largest context T such that, if I had updated T with *somebody Xed*, then checked that for individuals witnessing that proposition, I wouldn't have found any.'

To illustrate the effect of this derived meaning, we take the Italian example of a NC item in subject position, repeated in (103). Following the definitions in §3, this is assigned the meaning in (104). As we have already observed, if left unmodified, this results in a presupposition failure, since it introduces an individual at index x, then checks that there is no individual at index x.

(103) Nessuno ha telefonato.
nobody AUX called
'Nobody called.'

(104) $[\![\text{nessuno}^x_{\text{NC}}]\!]([\![\text{ha telefonato}]\!]) = \lambda c[c(\lambda P.[x]; P(x)); \mathbf{0}_x](\lambda Q.Q[\lambda u.\textsc{called}(u)])$
$= [x]; \textsc{called}(x); \mathbf{0}_x$

However, following to the hypothesis above, we assume that when Italian *nessuno* appears in subject position, its presupposition is accommodated. We thus apply the ACCOMMODATE operator to the meaning derived in (104). We assume the context set given in (105), with the four worlds described in (106) and $g(x) = \star$. The meaning of ACCOMMODATE instructs us to consider what happens to each subset of S_0 when updated with (104).

(105) $S_0 = \{\langle w_1, g\rangle, \langle w_2, g\rangle, \langle w_3, g\rangle, \langle w_4, g\rangle\}$

(106) w_1: Only John called.
w_2: Only Mary called.
w_3: John and Mary both called.
w_4: Nobody called.

When any context containing $\langle w_1, g\rangle$ is updated with (104), we first introduce an individual at $g(x)$, then check that $g(x)$ called in w_1; the output context will necessarily contain $\langle w_1, h\rangle$, where h which is identical to g except that $h(x) =$ john. We then evaluate $\mathbf{0}_x$; the test returns $\#$, since $h(x)$ is defined in at least one state in the output context. For analogous reasons, updating any context containing $\langle w_2, g\rangle$ or $\langle w_3, g\rangle$ with (104) will also return $\#$. But consider what happens when $\{\langle w_4, g\rangle\}$ is updated with (104). We first introduce an individual at $g(x)$, then check that $g(x)$ called in w_4. Since nobody called in w_4, the output of the update is the empty context, $\{\}$. But the algorithm is not yet finished; we now evaluate $\mathbf{0}_x$. The test is trivially satisfied, since there are no states in $\{\}$, so there are no states s such that $s_g(x)$ is defined. The test $\mathbf{0}_x$ thus returns its input context, $\{\}$—it does *not* return $\#$. The ACCOMMODATE operator returns the maximal context that doesn't in failure. The output of ACCOMMODATE$((104))(S_0)$ is thus $\{\langle w_4, g\rangle\}$, or, more generally, the largest context containing only worlds in which nobody called.

Finally, we observe that the derived meaning of *nobody*$_\neg$ should be able to license further NC items in its scope. Intuitively, this is because '*Nobody*$_\neg$ *Xed*' entails that the set of people who Xed is empty. Technically, we observe that the definition in (102) does not preserve updates to the assignment function that may have been introduced by its complement c. Empirically, the prediction is borne out; in the Italian sentence in (107), the NC item *niente* is grammatical. As promised in §4.2, *nessuno*$_\neg$ is thus another operator that blocks the introduction of discourse referents.

(107) Nessuno ha visto niente.
nobody AUX seen nothing
'Nobody saw anything.' (Italian)

6.4 The distribution of *nobody*$_\neg$

As mentioned above, the availability of 'licensor-free' NC items is restricted to certain environments: to fragment answers of questions and, in non-strict NC languages, to syntactic positions before the verb. We note that preverbal positions are not restricted to subjects, nor are subjects restricted to preverbal position, as material may move via topicalization. In (108), if the prepositional phrase *con nessuno* is moved before the verb, the negative concord item does not need (and cannot take) overt negation; in (109), if the subject *nessuno* remains after the verb, the negative concord items requires an overt negation.

(108) Con nessuno ha parlato Maria.
with nobody AUX spoken Maria
'Mary has spoken to anybody'

(109) Non ha telefonato nessuno.
not AUX telephoned nobody
'Nobody called.' (Italian, cf. Ladusaw 1992)

Because our analysis of licensor-free NC items involves an operator that rescues an otherwise ungrammatical sentence, we are able to account for the distribution of such NC items by directly adopting an analytical strategy developed elsewhere in the literature (Zeijlstra, 2004; Chierchia, 2013; Szabolcsi, 2018). Specifically, on these analyses, sentential negation in non-strict concord

languages can only take scope over linguistic objects that it c-commands. Linear order corresponds directly to hierarchical order, so sentential negation can only license NC items that appear to its right. As a consequence, preverbal NC items appear hierarchically too high to be licensed by overt sentential negation. Zeijlstra (2004) proposes that it is exactly these cases that trigger a 'last-resort' option, licensing a covert negative operator that scopes over the entire sentence, thus licensing the NC item. Critically, as a last-resort option, this mechanism is only available when it is not possible to license the NC item with an overt negative operator. For example, (110) cannot be saved by covert negation, since a competing logical form is grammatical with overt sentential negation.

(110) * Maria ha visto niente.
Mary AUX seen nothing

The same basic architecture can be transferred over to the present analysis. Whenever possible, NC items must be licensed by a (dref-blocking) negative operator. When hierarchical structure prevents such an operator scoping above the NC item, the NC item shifts its presupposed meaning to an at-issue contribution in order to avoid a presupposition failure. In doing so, it becomes itself an operator that can license further NC items, as seen above. Just as for Zeijlstra (2004), this rescue mechanism is only available as a last resort, when no overt licensor is available.

On such an analysis, the difference between strict concord languages and non-strict concord languages can be explained in one of several ways. Following Szabolcsi (2018), we will assume that the fundamental difference lies in the scopal configurations that are permitted for a given syntactic configuration. For non-strict concord languages, like Italian, sentential negation can only take scope over indefinites that follow the verb. For strict concord languages, like Russian, sentential negation can also take scope over indefinites that precede it. Thus, in such configurations, no last resort mechanism is needed, since sentential negation suffices to license NC items in preverbal position. (See Zeijlstra 2004 for an alternative, and Szabolcsi 2018 for a comparison of the two proposals.)

There are a number of variations possible to this general analysis. For example, Herburger (2001) argues that licensor-free uses of NC items are available in all structural positions but that the verb introduces an event variable that necessarily scopes over all indefinites that it c-commands. On such an analysis, the sentence in (110) is thus not ungrammatical, but can only describe the pragmatically strange situation in which there exists a seeing event, but nothing was seen. I see no reason why an analogous analysis could not be retold from the dynamic perspective.

6.5 The role of information structure

Recent work has shown that what is at-issue and what is presupposed is in many cases influenced by the information structure of a sentence (Beaver et al., 2017). The proposition '*I notice that he's cheating*' is allowed to shift its assertive content in those contexts in which the relevant question under discussion is whether or not the person in question is cheating. In the case of negative concord, I think that it is unlikely that the ACCOMMODATION operation proposed here is subject to the same freedom. Notably, it is not possible to remove the structural constraints on NC items in languages like Italian by simply manipulating the discourse in which the sentence appears (see related

discussion in §5.1). This suggests that the operation proposed here is distinct from mechanisms of accommodation developed in other domains.

On the other hand, it is possible that the two domains draw on similar resources. Of note, while some constraints on NC items remain inviolable, other grammatical factors relating to information structure *do* modulate the availability of negative uses of NC items. For example, Labov (1972) and Zeijlstra (2004) report that double negation readings may be made available in English and Italian by focusing NC items with prosodic stress. Szabolcsi (2018) shows that NC items in Hungarian allow patterns of non-strict concord exactly when the NC items is paired with the focus particle *sem*, 'even.' Kuhn and Pasalskaya (2019) show that Russian Sign Language allows non-strict concord only when NC items have been moved to a (phrase-final) focus position. The broad cross-linguistic generalization seems to be that negative uses of NC items are more easily available (though still subject to language-specific constraints) when they are in focus. A comprehensive analysis of these data are a long way off; nevertheless, the employment of accommodation to generate negative uses of NC items opens the door to new analyses that seek to explain aspects of the synchrony or diachrony of negative concord in terms of information structure.

6.6 Covert accommodation vs. covert negation

In many respects, the 'meaning-shift' analysis that we have described above is very similar to the covert negation analysis. In both cases, an ungrammatical sentence is rescued by a silent operator. Indeed, it was this similarity that allowed us to adopt the fundamental insights from the covert negation analysis to explain the distribution of licensor-free NC items.

On the other hand, the two analyses differ with respect to where the negative meaning resides. Under a theory with a covert negative operator, the denotation of an NC item is not at all negative. In cases of NC items with no overt licensor, negation comes entirely from the covert negative operator. In contrast, under the meaning-shift analysis, the covert operation does not itself contribute negation; it just 'unlocks' it, freeing it from the realm of non-assertive meaning. Negation is thus fundamentally part of the meaning of a NC item: NC items check (or, if shifted, assert) that a particular set is of cardinality zero.

Empirically, this difference has potential ramifications when considering phenomena beyond the domain of negative concord. For example, negative polarity items (NPIs) also have a restricted distribution, only grammatical in downward entailing environments. Zeijlstra (2004) observes that one cross-linguistic difference between negative polarity and negative concord, though, is that NPIs are generally unable to appear in fragment answers, as seen in (112). One must thus explain why the covert operation that rescues NC items in identical environments does not rescue NPIs.

(111) Quién vino? Nadie.
who came? nobody
'Who came? Nobody.'

(112) * Quién vino? Un alma.
who came? a soul
'Who came? A single soul.' (Spanish, Herburger 2001)

Zeijlstra (2004)'s explanation regards the source of ungrammaticality: NC items require a syntactic feature to be checked; NPIs require a specific semantic environment. For Zeijlstra, only syntactic violations can be repaired with a covert operation. Here, the meaning-shift analysis changes the perspective. Notably, for the denotation hypothesized for NC items, we have seen that the ACCOMMODATION operator results in a negative meaning, predicting the attested patterns. In contrast, NPIs do not share this denotation, so shifting what is at-issue for a NPI cannot produce a negative meaning. It is impossible to unlock a negation if there is no negation to unlock.

On the flip side, there are a number of other phenomena for which covert operators have been posited in order to explain the grammatical occurence of a semantically-restricted lexical item. For example, as we saw in the introduction, distributive numerals like Hugarian *egy-egy* (lit., 'one-one'), are restricted to distributive environments. In many cases, these environments are furnished by an overt operator, such as the distributive operator *minden*, 'every,' in (113a). But, cross-linguistically, distributive numerals turn out also to be licensed by plurals, as in (113b), motiving analyses from both syntactic and semantic perspectives to posit a covert distributivity operator (Oh, 2006; Henderson, 2014; Rushiti, 2019). It bears noting that this is not the same as the free-floating covert D operator that has been motivated elsewhere (Link, 1987; Champollion, 2016), since, as Oh (2006) observes, there is an 'inter-dependence' with the distributive numeral that is not observed for the free-floating D operator.

(113) a. Minden gyerek hozott egy-egy könyvet.
every(dist) child brought one-DIST book.
'Every child brought one book.'

b. A gyerekek hoztak egy-egy köyvet.
the children brought one-DIST book.'
'The children brought a book each' (Farkas 1997, Hungarian)

Similarly, epistemic indefinites are restricted to modal environments in which there is intensional variation in the value of the indefinite (Kratzer and Shimoyama, 2002; Alonso-Ovalle and Menéndez-Benito, 2010; Aloni and Port, 2010). In many cases, these environments are furnished by an overt operator, such as the modal *muss*, 'must,' in (114a). But, epistemic indefinites may also appear in simple indicative sentences, as in (114b), leading some analyses to posit a covert modal operator (Chierchia, 2006; Alonso-Ovalle and Menéndez-Benito, 2010).

(114) a. Juan muss in irgendeinem Zimmer im Haus sein.
Juan must in IRGENDEINEM room in.the house be
'Juan must be in a room of the house.'

b. Juan ist in irgendeinem Zimmer im Haus.
Juan is in IRGENDEINEM room in.the house
'Juan is in a room of the house.'

(German, Alonso-Ovalle and Menéndez-Benito 2015)

One interpretation of these data is to conclude that language contains many single-use silent operators: there's covert negation, used exclusively to license NC items; there's covert distributivity, used exclusively to license distributive numerals, and there's covert modality, used exclusively to

license epistemic indefinites. The alternative, and the direction that I would advocate here, is that these meanings—negative, distributive, or modal—are contained in the lexical semantics of the indefinites themselves. Silent operators may unlock these meanings, but do not contribute them. (For arguments that distributive numerals are themselves distributive, see Kuhn 2017, 2019.)

7 Conclusion

I have presented a novel theory of negative concord items based on their dynamic properties. The intuition is simple: NC items check that the set of discourse referents that they introduce is empty. I have shown that, implemented correctly, this condition correctly predicts the range of operators that license NC items. A new explanation has also been provided for the negative uses of NC items. I show that these uses are exactly the meaning that is derived by shifting what is at-issue in the denotation of the NC item. On a larger scale, the dynamic analysis provided here builds a unified, semantic perspective of concord phenomena more generally, mirroring theories built independently for distributivity and definiteness.

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