

Negative and Positive Polarity Items

Doris Penka

1. Introduction

As many, if not all, other languages, the Germanic languages have expressions that are sensitive to the polarity of the clause in which they occur. Negative polarity items (NPIs) can only occur in clauses that are negative (in a sense to be made precise below), whereas positive polarity items (PPIs) can only occur in clauses that are affirmative. The prime examples are the determiners *any* and *some* in English (as well as their derivatives like *somebody/anybody* etc.). As an NPI, *any* is fine under negation, but gives rise to ungrammaticality if it occurs in a plain affirmative clause.

- (1) a. I didn't call **anyone**.
b. *I called **anyone**.

Some, in contrast is fine in affirmative clauses, but cannot be used under negation. While a sentence in which *some* co-occurs with negation, such as (2b), is grammatical, *some* crucially cannot be interpreted in the semantic scope of negation. For (2b) only a reading is available where the indefinite takes wide scope over negation ('There is somebody who I didn't call'). The sentence cannot mean the same as (1a), i.e. that I called nobody.

- (2) a. I called **somebody**.
b. I didn't call **somebody**. * not >> somebody, ✓ somebody >> not

This contrast exhibited by *any* and *some* is usually described by saying that negation licenses NPIs like *any* and anti-licenses PPIs like *some*.

At this point is useful to mention some caveats that one should be aware of when investigation polarity items. The first concerns indefinite NPIs like *any* in English. It is well known that there are uses of *any* that do not require a negative licenser. In these so-called Free Choice uses, illustrated in (3), *any* is not interpreted existentially as in NPI-uses, but receives a quasi-universal reading.

- (3) a. Press **any** key to start.
b. You may choose **any** advanced course.

c. **Any** five-year old could answer this question.

It is a long-standing question whether *any* is lexically ambiguous or whether both NPI and Free Choice uses can be derived under a unified analysis. This question will be addressed in section 6. For now it is important to be aware that examples like (3) do not undermine the claim that *any* is an NPI.

The second caveat concerns negation, which as said above licenses NPIs and anti-licenses PPIs. There is, however, a type of negation of which it is characteristic that it behaves differently with respect to polarity items. So-called metalinguistic or echoic negation is not used to deny the truth of the embedded proposition but rather to object to the assertability of the corresponding positive utterance (see Horn 1985). The sentence in (4), for instance, which contains the PPI *some*, would typically be used to object to the previous utterance *John met some old lady* on grounds of it being inappropriate to call the person he met *some old lady*, as the continuation makes clear.

(4) John didn't meet **some** old lady. He met the Queen of England.

Since metalinguistic negation does not affect truth-conditions, it does not license NPIs and anti-license PPIs.

A final caveat concerns another class of elements that show a certain affinity to negation, so-called negative concord items (also called neg-words or n-words). In Afrikaans, for example, negative indefinites like *niemand* 'nobody' have to co-occur with the negative marker *nie*.

(5) Hier slaap **niemand** *(nie) (Afrikaans)
here sleeps nobody not
'Nobody sleeps here.' (Biberauer and Zeijlstra, 2012, 357)

While negative concord items are sometimes discussed on a par with NPIs (e.g. Laka 1990, Giannakidou 1998 and sequel, Chierchia 2013) it is quite clear that the restrictions governing their distribution are different (see Penka 2011 for extensive discussion). Most importantly, negative concord items are self-licensing in the sense that in certain contexts they seem to be able to induce the licensing negation by themselves (Ladusaw 1992). For instance, negative concord items can be used as negative fragmentary answers, whereas NPIs cannot.

(6) a. Wie het my boek gesien? **Niemand.** (Afrikaans)

who has my book seen? No-one

‘Who saw my book? No-one’ (Biberauer and Zeijlstra, 2012, 357)

b. Who knows the answer? ***Anybody**.

Because of these differences, negative concord items will not be discussed in this chapter.

Questions that the phenomenon of polarity sensitivity raises for linguistic research and that will be addressed in the rest of the chapter include the following (see also Ladusaw 1996):

- i) What are the lexical properties of polarity sensitive items?
- ii) How can the environments in which NPIs are licensed and PPIs anti-licensed be characterized as natural class?
- iii) How is the licensing condition to be formulated?
- iv) Why are polarity items sensitive to the polarity of the context in which they occur?

Section 2 takes a closer look at the lexical semantics of polarity sensitive items. While this section addresses NPIs and PPIs alike, the following sections will focus on NPIs, with which the bulk of work on polarity items is concerned. Section 3 takes a closer look at the distribution of NPIs and gives a semantic characterization of the environments in which NPIs are licensed. Section 4 considers the fact that not all NPIs behave alike and discusses several subtypes that have been identified in the literature. Section 5 is concerned with the licensing condition and addresses issues about the structural relation between an NPI and its licenser. Section 6 addresses the question why there should be expressions in language that are polarity sensitive. Section 7 returns to PPIs and discusses their distribution as well as analyses that have been proposed in the literature. Section 8 concludes.

2. Lexical properties of polarity sensitive items

While polarity items are found in many syntactic categories – Determiners like *any*, verbs like *bother* in English and *hoeven* ‘need’ in Dutch, VPs like *budge an inch*, adverbs like *ever*, and particles like *yet* and *either* amongst others – it has been observed that across languages, expressions that are polarity sensitive tend to have certain properties concerning their lexical semantics.

Cross-linguistically, indefinites are often NPIs, like indefinites formed with *any* in English and *irgend-* in German. While not all Germanic languages have a full paradigm of NPI indefinites,

most have an indefinite temporal adverb that is an NPI: *ever* in English, *ooit* in Dutch, *jemals* in German, *någonsin* in Swedish.

A second common type of NPIs across languages comprises idiomatic expression describing minimal amounts or minimal intensities of actions. Examples of such minimizer NPIs from English include *lift a finger*, *budge an inch*, *give a damn*, *drink a drop*, *sleep a wink*, *give a red cent*, and *have the faintest idea*. Similar idiomatic expressions are found in other Germanic languages, e.g. *einen Finger rühren* ‘move a finger’, *ein Auge zu tun* ‘close an eye’, and *einen blasen Dunst haben* ‘have a pale haze’ in German; *ett rött öre* ‘a red cent’, *ett dug* ‘a bit’, *ett jota* ‘a jota’ in Swedish (Brandtler, 2012).

Another type consists of scalar focus particles like English *so much as*, German *auch nur*, Dutch *ook maar*, Swedish *ens* (all of which are NPI-versions of English *even*).

While the above-mentioned types of NPIs all denote or combine with low-scalar expressions, other, less common types denote or involve high quantities. These high-scalar NPIs come in two different flavors, depending on the way they are used conversationally. First, there are maximizing NPIs that are used to make an utterance stronger and add emphasis, similarly to the minimizer NPIs discussed above. Examples from English are the following:

- (7) a. He would*(n’t) do it **for all the tea in China**.
b. I *(don’t) agree **at all**.
c. I have*(n’t) seen him **in weeks/ ages**.

The other kind of high-scalar NPIs are used in the opposite way, i.e. to make a claim weaker. English examples of such NPIs, which Israel (1996) calls understating or attenuating, are given in (8).

- (8) a. John is *(not) **all that** clever.
b. I *(don’t) **much** like coffee.

Turning now to PPIs, we also find emphatic and attenuating uses. But the pattern is now the reverse: high-scalar expressions make emphatic PPIs (i.e. they make an utterance stronger) and low-scalar PPIs are attenuating (Israel, 1996). Examples of emphatic PPIs are the following:¹

¹ All cited examples of PPIs are acceptable under a metalinguistic interpretation of negation (see Section 1 above). The ‘*’ applies if negation is read as plain sentential negation.

- (9) a. They (*don't) earn **tons** of money.
 b. We are (*not) **far better** of without him.

Moreover, most intensifiers are PPIs, e.g. *utterly*, *entirely* (van der Wouden, 1997).

Examples of understating or attenuating PPIs include degree modifiers like *rather* and *pretty* and quantifiers like *a tad* and *a little bit*, as illustrated in (10).

- (10) a. John is(*n't) **rather** tall.
 b. I am (*not) **a little bit** worried.

It should, however, be noted that these generalizations in terms of lexical properties correspond to mere tendencies. There are also instances of polarity sensitive items that do not straightforwardly fit into this classification. Examples for such NPIs include the temporal preposition *until* (and its cognate *förran* in Swedish) when combined with a time point, and the modal verbs *hoeven* 'need' in Dutch and *brauchen* in German. Any attempt to reduce polarity sensitivity entirely to lexical semantic properties is moreover called into question by the existence of pairs of expressions that arguably mean the same, where one member is a PPI and the other a NPI, such as the determiners *some* - *any*. Other examples are the particles *already* - *yet* and *too* - *either*.

- (11) a. John has arrived {**already** / ***yet**}
 b. John hasn't arrived {***already** / **yet**}

Having taken a closer look at the lexical semantics of polarity items, we next turn to the environments in which they can occur.

3. Distribution of NPIs

It is well known that NPIs cannot only be licensed by negation, but can occur in many other grammatical contexts as well. A non-exhaustive list of environments in which NPIs are licensed is given in (12), along with examples illustrating with the NPI *ever*.

- (12) a. Negative quantifiers and adverbs: *nobody*, *no* N, *never*
Nobody has **ever** seen him again.
 b. Semi-negative quantifiers and adverbs: *few*, *at most* n, *only*, *rarely*, *seldom*, *hardly*
At most five people have **ever** read this book.
 c. Negative conjunctions: *without*, *neither* ... *nor*

- He left without ever looking back.
- d. Semi-negative predicates: *doubt, be surprised, be unlikely*
I doubt that she'll **ever** come back.
- e. Comparative constructions: *more than, too*
The situation is worse than we **ever** imagined.
- f. First argument (restrictor) of universal quantifiers:
Everyone who has **ever** been to Paris remembers the atmosphere.
- g. Antecedents of conditionals:
If you ever visit China, you should see the Great Wall.
- h. Questions:
Have you **ever** heard of such a thing?

This rather diverse list raises the question what property all these contexts have in common and how the environments in which NPIs are licensed can be characterized as a natural class.

As observed by Fauconnier (1975, 1979) and Ladusaw (1979), (most of) the contexts that license NPIs can be characterized as giving rise to downward entailing inferences. This means that these contexts allow inferences from general to more specific statements, i.e. from sets to subsets. Most other contexts are upward entailing and allow inferences from sets to supersets, i.e. from the specific to the general. Entailment patterns are therefore reversed in downward entailing contexts. For illustration, consider the two arguments of the quantifier *every*. Given that dogs are pets and that terriers constitute a sub-kind of dogs, (13) shows that the first argument of *every* allows downward entailing inferences from sets to subsets, but not upward entailing inferences from sets to supersets.

- (13) a. Everyone who owns a dog has to pay a fee.
b. \implies Everyone who owns a terrier has to pay a fee.
c. \nRightarrow Everyone who owns a pet has to pay a fee.
- (14) a. Everyone who wants to join this club has to own a dog.
b. \nRightarrow Everyone who wants to join this club has to own a terrier.
c. \implies Everyone who wants to join this club has to own a pet.

The second argument of *every*, in contrast, allows inferences from sets to supersets, rather than inferences from sets to subsets, and thus constitutes an upward entailing context, as shown in

(14). Formally, downward entailment (also called downward monotonicity) can be defined as follows (where ‘ \Rightarrow ’ stands for cross-categorial entailment)(von Fintel, 1999, p. 100):

(15) A function f of type $\langle\sigma,\tau\rangle$ is **downward entailing** if and only if for all x,y of type σ such that $x \Rightarrow y$: $f(y) \Rightarrow f(x)$.

The hypothesis that NPIs are licensed in downward entailing contexts then accounts for the fact that NPIs can occur in the first argument of *every*, but not in the second, as illustrated in (16).

- (16) a. Everyone who answered **any** question correctly passed the test.
b. *Everyone who passed the test answered **any** question correctly.

While the characterization of NPI licensing contexts in terms of downward entailment has been widely adopted, it also has some well-known problems. The most obvious is that some of the contexts in which NPIs are licensed are not intuitively downward entailing. Examples are the scope of *only* and complement clauses of *be surprised* and *be sorry*, in which NPIs like *any* and *ever* are licensed, as illustrated in (17). Inferences from sets to subsets, however, are not intuitively valid and the inferences in (18) do not go through.

- (17) a. Only Sam ate **anything**.
b. Tom is sorry that he **ever** left.

- (18) a. Only Sam ate a vegetable. #Therefore, only Sam ate spinach.
b. Tom is sorry that he bought a car. #Therefore, Tom is sorry that he bought a Mercedes.

Von Fintel (1999) argues that what is responsible for the invalidity of the inferences in (18) is a presupposition triggered by the licenser, which interferes with downward entailment. In the case of *only* for instance, it is usually assumed that while the exclusive meaning component is asserted, the truth of the prejacent (the clause without *only*) is presupposed. Thus, while the inference from (19) to (20) goes through as far as the truth conditions in (a) are concerned, the presupposition in (20b) does not follow from anything in (19) (Sam could have eaten carrots, for instance), and thus spoils the overall inference.

- (19) Only Sam ate a vegetable.
a. Truth conditions: Nobody who is not Sam ate a vegetable.
b. Presupposition: Sam ate a vegetable.

- (20) Only Sam ate spinach.
- a. Truth conditions: Nobody who is not Sam ate spinach.
 - b. Presupposition: Sam ate spinach.

Similarly, factive verbs like *be surprised* and *be sorry* trigger the presupposition that the complement clause is true. In case of (18b), the second sentence presupposes that Tom bought a Mercedes, it is not guaranteed by the first sentence, making the overall inference invalid. Thus, while the scope of *only* and complement clauses of *be surprised* and *be sorry* constitute downward entailing contexts as far as truth conditions are concerned, they do not do so anymore once presuppositions are also taken into account. Von Stechow defines a form of entailment, which he called Strawson entailment, in which presuppositions are factored out, and argues that this is the relevant notion underlying NPI licensing.

- (21) A function f of type $\langle \sigma, \tau \rangle$ is **Strawson downward entailing** if and only if for all x, y of type σ such that $x \Rightarrow y$ and $f(x)$ is defined: $f(y) \Rightarrow f(x)$.

But even if Strawson downward entailment is adopted as the unifying property of contexts in which NPIs are licensed, there are still cases that are not covered by this generalization. There are examples of licit NPIs that do not occur in a (Strawson) downward entailing context. A well-known example from Linebarger (1987: 373) is (29a), where *any* occurs in the scope of the non-monotone quantifier *exactly n* (i.e. in an environment that is neither upward nor downward entailing). Similar, even more extreme cases where “negation is everywhere present yet nowhere visible” like (22b) and (22c) are discussed by Horn (2001, 176f) under the label ‘Flaubert polarity’.

- (22) a. Exactly four people in the world have **ever** read that dissertation: Bill, Mary, Tom, and Ed.
- b. A fat lot of good THAT **ever** did me.
 - c. Small thanks you get for THAT, **either**.

To deal with such cases, it has been proposed that there are two ways in which NPIs can be licensed (Baker, 1970 Linebarger, 1980, 1987). Besides the core case of licensing, in which NPIs are licensed by negation, it is assumed that NPIs can also be licensed pragmatically via a ‘Negative Implicatum’ (which is supposed to subsume entailments as well as presuppositions and implicatures). The NPI *ever* in (22a), for instance, is argued to be licit because the sentence

plausibly gives rise to the inference ‘Everyone who is not Bill, Mary, Tom, or Ed has not ever read that dissertation’, in which *ever* is in the scope of negation and thus licensed under the core condition. The appeal of such an account lies in the assumption that the Negative Implicatum has to be pragmatically salient, thus making leeway for context-dependency. This squares well with the observation that the possibility of NPIs to occur in such environments crucially depends on the context. While *ever* is licit under non-monotone *exactly four* in (22a), it is not in under non-monotone *exactly one hundred* in (23).

(23) *Exactly one hundred people in the world have **ever** read that dissertation.

The problem with this pragmatic approach to NPI licensing is that it is not restrictive enough and severely overgenerates. Because there are many inferences of any given sentence and many different way to represent them, it will always be possible to come up with a Negative Implicatum, and it is unclear how and under which conditions precisely this Negative Implicatum is salient enough for an NPI to be licensed.

4. Varieties of NPIs

While identifying (Strawson) downward entailment as the unifying property of the contexts that licenses NPIs has been an important step towards our understanding of NPIs, it cannot be the whole story. It has been observed that not all NPIs behave uniformly and different classes have been identified.

The first dimension of variation concerns the locality requirements that NPIs pose on their licenser. While NPIs of the *any*-kind can also be licensed by a negation in a higher clause, (24a), so called strict NPIs such as punctual *until* require a clausemate licenser (Horn, 1978):

- (24) a. I didn’t claim that Mary stole **anything**.
b. *I didn’t claim that Mary would arrive **until** midnight.

Another dimension along which NPIs differ has to do with the strength of negativity that a NPI requires in order to be licensed. While it was shown above that NPIs like *any* and *ever* are licensed in all (Strawson) downward entailing contexts, there are other NPIs that have a more limited distribution and require a stronger form of negativity from their licensers. The following examples illustrate this for *in weeks* and *yet*:

- (25) a. I have*(n’t) seen Mary **in weeks**.

- b. No doctor has seen Mary **in weeks**.
- c. *At most five doctors have seen Mary **in weeks**. (Gajewski 2011, 114)
- (26) a. I haven't been here **yet**.
- b. No one has been here **yet**.
- c. At most five people have been here **yet**.
- d. I regret that you have been here **yet**. (Szabolcsi 2004, 427)

One approach to tackle NPIs that are only licensed in a subset of downward entailing contexts distinguishes different logical strengths of negativity. While downward entailment corresponds to a rather weak notion of negativity, stronger notions can be formally defined (Zwarts, 1996). Besides downward entailment, other logical properties that have been argued to play a role in the licensing of polarity items are anti-additivity and antimorphism.² The formal definitions (in terms of Boolean algebras) are given in (27).³

- (27) a. A function f is **anti-additive** if and only if for all x, y in its domain:
- $$f(x \vee y) \Leftrightarrow f(x) \wedge f(y).$$
- b. A function f is **antimorph** if and only if for all x, y in its domain:
- $$f(x \vee y) \Leftrightarrow f(x) \wedge f(y) \text{ and } f(x \wedge y) \Leftrightarrow f(x) \vee f(y)$$

² Yet other logical properties are based on the notion of veridicality (Zwarts 1995):

- (i) A function f is non-veridical if and only iff $f(p)$ does not entail p , for all propositions p .
- (ii) A function f is anti-veridical if and only iff $f(p)$ entails $\neg p$, for all propositions p .

Giannakidou (1998 and sequel) argues non-veridicality and anti-veridicality to be relevant for NPI-licensing in Greek and other languages.

³ Formally, these finer-grained notions of negativity are defined via the entailments making up De Morgan's Laws, which negation in classical logic obeys. Generalized for arbitrary functions, the two Laws of De Morgan are:

- (i) 1. $f(x \wedge y) \Leftrightarrow f(x) \vee f(y)$
 2. $f(x \vee y) \Leftrightarrow f(x) \wedge f(y)$

Different logical properties can be defined, depending on the entailments that are valid. Functions that validate both of de Morgan's Laws are antimorph. Anti-additive functions validate only the second Law of De Morgan. For merely downward entailing functions only half of the second Law of De Morgan is valid, i.e. $f(x \vee y) \Rightarrow f(x) \wedge f(y)$.

These logical properties form a hierarchy of negative contexts: Antimorphism is the strongest form of negativity and downward entailment the weakest. Antimorphic contexts constitute a proper subset of anti-additive contexts, which in turn are a proper subset of downward entailing contexts.

Intuitively, anti-additivity can be tested for by checking whether wide scope conjunction is equivalent to narrow scope disjunction. This is the case for negative quantifiers like *no student*, but not, for instance, for quantifiers formed with *at most*. As illustrated in (28), the entailment is valid in both directions in case of *no student*, whereas the entailment from wide scope conjunction to narrow scope disjunction does not go through for *at most* ((29b) is true, for example, in a situation where two students gave a class presentation and two students wrote a term paper, whereas (29a) is false in this situation.) Quantifiers with *at most* are therefore not anti-additive and merely downward entailing.

(28) a. No student gave a class presentation or wrote a term paper.

⇔

b. No student gave a class presentation and no student wrote a term paper.

(29) a. At most three students gave a class presentation or wrote a term paper.

⇒ ⇏

b. At most three students gave a class presentation and at most three students wrote a term paper.

Other operators that are downward entailing, but not anti-additive, are the quantifier *few* and the adverbs *seldom* and *hardly*. Besides negative quantifiers, the conjunctions *without* and *before* have been argued to be anti-additive and so have the complement of verbs like *refuse* or *deny*. Antimorphic operators are sentential negation and expressions like *allerminst* ‘least of all, not at all’ in Dutch and *keinesfalls* ‘in no case’ in German.

In line with these different degrees of negativity, Zwarts (1998) and van der Wouden (1997) distinguish different classes of polarity items, depending on which negative strength they require of a context in order to be licensed.⁴

⁴ It should be noted that the terminology is not used consistently. In contrast with the terminology of Zwarts (1998), which is most often adopted, van der Wouden (1997) calls NPIs that are licensed in antimorphic contexts only ‘strong’ and expressions that require an anti-additive context ‘NPIs of medium strength’. Krifka (1995) uses the term ‘strong NPI’ in yet another sense, namely for emphatic NPIs like stressed *ANY*. Sometimes the items that Zwarts

(30) Classes of NPIs (Zwarts 1998, van der Wouden 1997):

Weak NPIs: Licensed in all downward entailing contexts

Strong NPIs: licensed in anti-additive contexts, but not in merely downward entailing contexts

Superstrong NPIs: licensed in antimorphic contexts only

The distribution of *in weeks* and *yet* observed in (25)-(26) above now follows from their status as strong NPI: while they are licensed by negation (an antimorphic operator) and negative quantifiers (anti-additive operators) they are not licensed by merely downward entailing operators like *at most*. Other expressions that van der Wouden (1997) argues to require an anti-additive licenser include Dutch *ook maar* ‘at all, even’ and *med en finger aanroeren* ‘touch with a finger’. NPIs that have been classified as requiring an antimorphic licenser are mostly highly idiomatic, such as Dutch *mals* ‘tender’, *pluis* (literally ‘plush’) and *voor de poes* (literally ‘for the cat’).

Another account of the difference between weak and strong NPIs is offered by Gajewski (2011). He argues that strong NPIs are sensitive to non-truth conditional meaning of their licensers while weak NPIs are not. His proposal starts from the observation (see also Krifka, 1995) that typical anti-additive licensers coincide with expressions forming endpoints of scales made up of downward entailing expressions. Negative quantifiers, for example, constitute the strongest member of the scale $\langle no, few, not many, not all \rangle$. It is also well-known that weaker, non-endpoint scalar elements trigger scalar implicatures to the effect that statements involving their stronger scale-mates are false. The sentences in (31a) for instance, all give rise to the implicature in (31b).

(31) a. {Few / not many / not all } students failed the exam.

b. Implicature: Some students passed the exam

(= It is false that no student passed the exam).

Gajewski now argues that these positive implicatures interfere with the licensing of strong NPIs. Endpoint scalar items, in contrast, do not give rise to implicatures, which accounts for the contrast in (32).

(1998) calls ‘strong NPIs’ are also referred to as ‘strict NPIs’, whereas following Horn (1978) the term ‘strict NPI’ is usually used for a NPI that requires its licenser to be in the same clause.

- (32) a. *{Few / not many / not all } students have failed **in years**.
b. *No student has failed **in years**.

In a similar vein, strong NPIs are argued not to be licensed in the scope of *only* and in the complement of factive verbs like *regret*, because these introduce positive presuppositions. Summarizing the approach of Gajewski (2011), the licensing conditions of strong NPIs require them to be in a downward entailing context at all levels of meaning – be it truth conditions, presuppositions or implicatures. Weak NPIs, in contrast, require downward entailment only at the level of the asserted content, and disregard non-truth conditional meaning.

Further distinctions among different subtypes of NPIs have been proposed based on the interpretational effects they give rise to. Minimizer NPIs and other NPIs like stressed *ANY* add emphasis to the utterance they occur in. They moreover contrast with *any* and *ever* in their behavior in questions. While *any* and *ever* can be used in information seeking questions, minimizer NPIs in questions give rise to a strong negative bias. In contrast to (33a), (33b) feels like a rhetorical question in which the speaker suggests that Bill did not help (Guerzoni 2004).

- (33) a. Did Bill help you with **anything**?
b. Did Bill **lift a finger** to help you?

We will return to this contrast between different subtypes of NPIs in section 5, when possible analyses to account for it are discussed. But for now we neglect the more fine-grained distinctions among different types of NPIs and stick to the simplifying assumption that NPIs are licensed in downward entailing environments.

5. The nature of the licensing relation

Having identified logical properties by which the contexts in which NPIs are licensed can be characterized, the next question to address is how precisely the licensing requirements of NPIs should be formulated. Assuming that downward entailment is the relevant property, the licensing condition on NPIs can be stated in two different ways:

- (34) Licensing condition on NPIs:
a. A NPI is only grammatical if it is in a downward entailing environment.
b. A NPI is only grammatical if it is in the scope of a downward entailing operator.

The two conditions might *prima facie* seem equivalent – after all, a downward entailing

environment is induced by a downward entailing operator. There are, however, important differences, as pointed out by Homer (to appear), who provides arguments in favor of formulating the constraint in terms of environments rather than operators. The operator-based view, which is prevalent in the literature, raises issues about the structural relation between the licenser and the NPI.

It has been observed that in the Germanic languages NPIs cannot occur in subject position of negated clauses, cf. (35), even though it is in principle possible for a subject to be interpreted in the scope of a clausemate negation.

(35) ***Anyone** didn't come.

This observation has led to the claim that the licensing requirement can not only be formulated with respect to the level of interpretation (in terms of semantic scope), but must also refer to surface syntax, and that an NPIs has to be c-commanded by its licenser in the surface syntax. There are, however systematic exceptions to this restriction. NPIs can be embedded in preverbal subjects, as in the following example from Linebarger (1980).

(36) A doctor who knew **anything** about acupuncture was not available.

De Swart (1998) argues that the restrictions on the surface position of NPIs reduces to pragmatic constraints on inverse scope and shows that in case a subject can be interpreted in the scope of clausemate negation, it can also involve an NPI.

Another structural constraint that has been proposed to be effective in the licensing of NPIs is the Immediate scope constraint of Linebarger (1987), according to which another semantic operator cannot intervene between a NPI and its licenser. This explains why the following sentence does not have a reading where the universal quantifier *every party* takes scope in between negation and the indefinite object if it involves *any*, even though the reading 'It was not to every party that she wore earrings' is available if the indefinite object is realized as the bare plural *earings*.

(37) She didn't wear **any** earrings to every party. * not >> every >> any, ✓ not >> any >> every

While Linebarger's Immediate scope constraint assumes a structural relationship between an NPI and its licenser, other accounts of intervention effects are also compatible with an environment-based approach. Chierchia (2013) argues that scalar implicatures triggered by

intervening operators interfere with the licensing of NPIs. As it is the common characteristic of NPI licensers that they induce scale reversal, it is now scalar endpoint expressions like *every* that give rise to scalar implicatures in their scope. The non-available reading ‘It was not to every party that she wore earrings’ for (37), for instance, would yield the positive implicature that she wore earrings to some parties, which interrupts downward entailment.

6. The source of polarity sensitivity

So far the discussion in this chapter has been mainly descriptive, providing semantic characterizations of different types of NPIs and the environments in which they are licensed as well as formulations of the licensing conditions. But that does not yet answer the question what it is that makes an expression polarity sensitive.

Syntactic accounts of NPI licensing essentially stipulate that NPIs are endowed with a feature that forces them to enter a certain configuration with a licenser (e.g. Klima 1964, Progovac 1994, den Dikken 2002). Szabolcsi (2004) and Collins and Postal (2014) view NPI features as negations in the lexical semantics of NPIs themselves.

But such syntactic approaches still do not explain why there are elements in natural language that are sensitive to logical properties of the context in which they appear. Moreover, it is puzzling why it is precisely downward entailment, rather than any other logical property, that is decisive for NPI licensing. These and related questions have gotten into the focus of the study of polarity items since the mid-1990.

Focusing on one particular common type of polarity items, low-scalar NPIs, there is an intuitive reason for why it makes sense to use them in downward entailing contexts: In downward entailing contexts, which allow inferences from smaller to larger quantities, the use of an expression denoting a minimal quantity or action results in a strong statement. In (38), for instance, the use of the minimizer NPI *lift a finger* excludes any kind of help from Bill, even the most minimal activity, and thus results in the strongest possible statement a speaker could make about Bill’s contribution.

(38) Bill didn’t **lift a finger** to help.

In upward entailing contexts, in contrast, low-scalar NPIs make for such weak statements that they are effectively unusable. It seems then that NPIs can be used precisely when they

strengthen an utterance. To formally spell out this intuition, however, has proven challenging. There are two different issues that need to be addressed: First, in what way do NPIs lead to stronger statements? While the answer to this question seems rather straightforward for minimizer NPIs, it is less obvious in the case of other NPIs like *any*. Second, how does the grammar enforce strengthening, such that NPIs are excluded from occurring in environments in which they do not strengthen the utterance? Different analyses have been proposed to deal with these questions.

In a seminal paper, Kadmon and Landman (1993) propose that *any* induces widening of the quantificational domain. This is illustrated by way of the following example:

- (39) a. I don't want presents for my birthday.
 b. I don't want **any** presents for my birthday.

In (39a) the quantificational domain of the bare indefinite *presents* is restricted contextually to include only things that are usually regarded as presents. These contextual restrictions are lifted when *any* is used in (39b), such that things that might not always count as presents, e.g. flowers and chocolate, are also part of the quantificational domain. In this way, the use of *any* reduces tolerance of exceptions – provided that it occurs in a downward entailing environment. Because more restricted quantificational domains are subsets of the widened domain, and downward entailing contexts support inferences from sets to subsets, an utterance with *any* in a downward entailing environment entails all possible alternative statements with a more restricted domain of quantification. Domain widening is therefore useful in downward entailing contexts, where it leads to stronger statements.

Domain widening has also been argued to be key to understanding why across languages, many indefinite expressions that are NPIs can also be used as Free Choice items (see Hapelmuth 1997 for a cross-linguistic survey). Besides *any*-indefinites in English, German indefinites formed with *irgend-* also lead this double life.

- (40) a. Du kannst **irgendeine** Farbe nehmen. Free Choice (German)
 you can any color pick
 ‘You can pick any color.’
 b. Niemand hat **irgendetwas** gesagt. NPI
 no one has anything said

No one said anything

It has been a long-standing question whether a unified analysis of NPI and Free Choice uses of *any* is possible. Early unified accounts (Reichenbach (1947: §21), Quine (1960: §29)) treat *any* as a universal quantifier that obligatorily takes wide scope. Because of the semantic equivalence of a universal quantifier taking scope above negation and an existential quantifier in the scope of negation ($\forall \neg \leftrightarrow \neg \exists$) this seems a viable option when NPI *any* occurs in a strict negative (i.e. anti-additive or antimorphic) context. But for NPI *any* in other contexts, the equivalence does not hold, as shown for example (41) from Fauconnier (1979: 297-98). It is clear that in these cases *any* is interpreted as an existential in the scope of its licenser. Thus NPI *any* cannot generally be analyzed as wide scope universal. Instead, an existential analysis seems warranted.

(41) I wonder if Susan married **anybody**.

I wonder if there is an x such that Susan married x.

NOT: For every x: I wonder if Susan married x

Other attempts have tried to reduce Free Choice *any* to generic uses of indefinites (e.g. Kadmon and Landman 1993, Lahiri, 1998), but have proven equally problematic.

Under the domain widening account, being an NPI and being a Free Choice item represent two sides of the same coin, corresponding to two different strategies in which domain widening can be exploited for communicative purposes. While the wish to make a stronger statement is the reason for a speaker to use a NPI in a downward entailing context, strengthening is not the only possible use of a domain widening indefinite. Kratzer and Shimoyama (2002) argue that another reason is the wish to prevent the hearer from drawing unintended exhaustivity inferences. By instructing the hearer to consider a wide domain of quantification, the speaker could signal that he does not want to rule out any conceivable option. In the German example with *irgendein* in (40a) above, for instance, the speaker conveys that there are no restrictions regarding colour and any colour is a conceivable option. Since the exhaustivity inferences that non-domain widening indefinites would give rise to (namely that an interpretation with a narrower domain would not be a possible option) arise as implicatures and are limited to upward entailing contexts, the anti-exhaustivity effect of domain widening indefinites does not arise in downward entailing contexts. This explains the flip-flop behavior of *any*- and *irgend-*

indefinites: In upward entailing contexts (with a modal component) domain widening is used to convey anti-exhaustivity, while in downward entailing contexts domain widening strengthens the utterance. See Chierchia (2013) for a detailed proposal for a domain widening analysis of NPI and Free Choice uses of indefinites, which also accounts for different flavors of Free Choice indefinites as well as for the fact that cross-linguistically not all indefinite NPIs can also serve as Free Choice items.

While domain widening provides a widely adopted answer to the question in what sense indefinite NPIs make a statement stronger, the second question – why strengthening is obligatory for NPIs – remains open. (Kadmon and Landman essentially stipulate a strengthening requirement, which has been criticized as being non-compositional.) One type of approaches assumes that NPIs obligatorily associate with the focus sensitive particle *even*, which is covert in the Germanic languages but overt in other languages such as Hindi (Lahiri 1998). The presupposition of *even* requires the proposition to which it attaches to be less likely than the focus alternatives. Since NPIs denote elements located at the bottom of their scale, i.e. very general properties, this presupposition is satisfied in downward entailing contexts, but cannot be fulfilled if the NPI occurs in an upward entailing environment. In non-monotone contexts, whether the presupposition is fulfilled depends on the context, which accounts for the context-dependency of NPIs in non-monotone contexts illustrated in (22) and (23) above (Crnič 2014).

Some theories of NPI licensing assume that there are two different types of NPIs: emphatic NPIs – minimizers such as *lift a finger* and stressed *ANY* – which involve (a covert operator like) *even*, and others like unstressed *any* and *ever*, which do not associate with *even* (Heim 1984, Krifka 1995, Guerzoni 2003, Chierchia 2013). The presence of covert *even* is argued to account for the rhetorical effect of the first type of NPIs in questions, which was illustrated in (33) above: The presupposition triggered by *even* reduces the set of possible answers to the question to the singleton set containing the negative answer (Guerzoni 2003).

Another type of approach relates NPI licensing to the mechanism underlying scalar implicatures (Krifka 1995, Chierchia 2013). Similar to the *even*-based account, this approach also assumes that NPIs obligatorily activate alternatives that are more informative. These alternatives are factored into meaning via an exhaustification operator, whose effect is to deny all more informative alternative propositions. For utterances with NPIs in upward entailing

contexts, this results in a contradiction: It is simply impossible for a more general statement to be true while at the same time all possible more specific statements are false. For NPIs in downward entailing contexts, in contrast, the alternative propositions are all logically weaker and exhaustification does not have an effect. A challenge that implicature-base approaches face is the question why unlicensed NPIs lead to ungrammaticality, rather than just pragmatic infelicity. This has partly motivated the recently popular assumption that scalar implicatures are generated by a mechanism that is part of the core grammar system rather than being derived by pragmatic reasoning (Chierchia 2013).

Finally, it should be mentioned that there are licensing contexts as well as types of NPIs for which strengthening based approaches cannot account. This concerns the licensing of NPIs in questions as well as understating NPIs. As in unifying NPI and Free Choice uses of *any*, the key to accounting for these NPI uses seems to be realizing that there are potentially different reasons for why a certain utterance would be more relevant and thus preferred over alternatives. The most basic reason is that the utterance is more informative because it logically entails its alternatives. This entailment-based notion of strength is what most accounts of NPIs build on. But another way in which an utterance is more useful than an alternative is found in questions: Using an NPI in a question has the effect of making possible answers more informative and thus maximizes the utility of the question (Krifka 1995, van Rooy 2003). To account for understating NPIs, it has been argued that they can be used by a speaker to avoid making a strong claim in a situation where it might be disadvantageous for the speaker to commit to a stronger proposition (Israel 2001, van Rooy 2003). For instance, by uttering (42a) rather than (42b) a speaker makes a weaker claim about the insufficiency of John's intelligence and thus appears more polite.

- (42) a. John is not **all that** clever.
b. John is not clever.

In sum, recent investigations of NPIs have identified two key ingredients for an explanatory account of NPI licensing: First, alternatives play a crucial role for polarity sensitivity. NPIs trigger alternatives to which an utterance containing an NPI is compared. The second ingredient is a mechanism ensuring that these alternatives are factored into the meaning computation and give rise to ungrammaticality whenever an NPI does not occur in a licensing context.

- (45) a. *(Höchstens) fünf Personen haben **jemals** diese Buch gelesen. (German)
 At most five people have ever this book read
 ‘At most five people have ever read this book.’
- b. *Peter hat nicht **jemals** diese Buch gelesen.
 Peter has ever this book read
 ‘Peter hasn’t ever read this book.’

But it seems that there is an independent reason why *jemals* is banned from occurring in the scope of negation. In German, indefinite expressions cannot be immediately adjacent to sentential negation and have to be realized as a negative indefinite instead, as illustrated for the indefinite determiner in (46).

- (46) Ich habe {*nicht ein/kein} Buch gekauft.
 I have not a no book bought.
 ‘I didn’t buy a book.’

This is, however, a surface syntactic constraint, since indefinites can be interpreted in the scope of negation as long as they are not adjacent to negation in the surface syntax, e.g. when they are topicalized. With the intonation of the so-called topic-focus accent, which forces the topicalized indefinite to reconstruct into the scope of negation (Büring 1997),

(47) means something like ‘As for books, I didn’t buy any’.

- (47) Ein Buch habe ich nicht gekauft.
 a book have I not bought

This shows that indefinites in German can semantically occur in an antimorphic context. The fact that indefinites in German are banned from occurring with clausmate negation can thus not be due to polarity sensitivity. Instead, the distribution of general and NPI indefinites is best explained in terms of morphological blocking: because there is a more specific morphological form for this use, i.e. negative indefinites, the less specific forms, i.e. general and NPI indefinites, are blocked from occurring in this position (see Hoeksema 1999 for Dutch).

But even if attention is restricted to the prime example of a PPI, English *some*, it turns out that PPIs and NPIs are not in complementary distribution. There are environments where both PPIs and NPIs are licit. In (48), for example, the polarity item is separated from the (anti-)licensing

negation by a clause boundary and both *some* and *any* can be interpreted within the embedded clause (Ladusaw 1979).

(48) I don't think that Sam called { **someone** / **anyone** }. ✓ not >> someone

In certain configurations, PPIs can even be interpreted in the scope of a clausemate anti-licenser. This is the case if both the PPI and the anti-licenser are in the scope of another operator, which is said to rescue the PPI (Baker 1970).

(49) I am surprised that Sam didn't call **someone**. ✓ surprise >>not >> someone

Szabolcsi (2004) argues that PPIs of the *some*-type are rescued in those contexts where standard NPIs such as *any* and *ever* are licensed. In line with this, she proposes that the anti-licenser and the PPI in its scope compose to form a derived NPI, which is assumed to be subject to the same licensing conditions as lexical NPIs.

Taking a different perspective on the distribution of *some*-PPIs and their relation to NPIs, Nicolae (2012) argues that PPIs can be integrated into the alternative-based account of polarity sensitivity developed by Chierchia (2013). As in the case of NPIs, PPIs are assumed to activate alternatives that are obligatorily factored into the meaning via exhaustification. The crucial difference is argued to be in the nature of the alternatives: while *any*-NPIs widen the quantificational domain by activating sub-domain alternatives, which lead to strengthening in downward entailing contexts, *some*-PPIs activate super-domain alternatives, which result in strengthening in upward entailing environments. Similar analyses in terms of weaker, i.e. more general, alternatives have been proposed for maximizer PPIs like *tons of* by Krifka (1995). For the adjectival modifiers *rather* and *pretty*, Krifka proposes that the alternatives are interpretations of the adjective at weaker precision standards.

To conclude the discussion of PPIs, I would like to remark that the expressions that have been subsumed under the label 'positive polarity item' constitute a much more heterogeneous class than NPIs. The factors governing the distribution of various different types of expressions that somehow resist being in the scope of negation include blocking by more specific expressions and obligatory widest scope for speech act related reasons. Recent alternative-based accounts of PPIs, however, analyze certain PPIs as true counterparts of NPIs.

Conclusion

This chapter reviewed some lines of inquiry on polarity sensitive items that have been developed within the framework of generative grammar over the past fifty years. Because there is an enormous body of work on this topic, only the approaches and ideas that I take to be the most influential could be considered. While a lot of progress has been made over the past decades, a number of questions remain open and there is still no unified analysis that can account for all types of NPIs and PPIs.

As the discussion in this chapter showed, syntax, semantics and pragmatics closely interact in the constraints that govern the distribution of polarity items. The investigation of polarity items can thus serve as a window into the interaction between these components of grammar and into the architecture of grammar more generally.

References

- Baker, Carl Lee. 1970. Double Negatives. *Linguistic Inquiry* 1, 169-186.
- Biberauer, Theresa, and Hedde Zeijlstra. 2012. Negative concord in Afrikaans: Filling a typological gap. *Journal of Semantics* 29:345–371.
- Brandtler, Johan. 2012. *The Evaluability Hypothesis: The Syntax and Semantics of Polarity Item Licensing in Swedish*. Amsterdam: John Benjamins.
- Büring, Daniel. 1997. *The Meaning of Topic and Focus — The 59th Street Bridge Accent*. London: Routledge.
- Chierchia, Gennaro. 2013. *Logic in Grammar*. Oxford/New York: Oxford University Press.
- Crnič; Luka. 2014. Non-monotonicity in NPI licensing. *Natural Language Semantics* 22:169–217.
- Collins; Chris and Postal, Paul M. 2014. *Classical NEG Raising. An Essay on the Syntax of Negation*. MIT Press.
- Den Dikken, Marcel. 2002. Direct and indirect polarity item licensing. *Journal of Comparative Germanic Linguistics* 5: 35–66
- Fauconnier, Gilles. 1975. Pragmatic scales and logical structure. *Linguistic Inquiry* 6:353–376.
- Fauconnier, Gilles. 1979. Implication reversal in a natural language. F. Guenther & S. J. Schmidt (eds.), *Formal Semantics and Pragmatics for Natural Languages*, 289-301. Dordrecht: Reidel.
- von Stechow, Kai. 1999. NPI licensing, Strawson-entailment, and context dependency. *Journal of Semantics* 16:97–148.

- Gajewski, Jon R. 2011. Licensing strong NPIs. *Natural Language Semantics* 19(2):109–148.
- Giannakidou, Anastasia. 1998. *Polarity Sensitivity as (Non) Veridical Dependency*. Amsterdam: John Benjamins.
- Guerzoni, Elena. 2004. Even-NPIs in yes/no questions. *Natural Language Semantics* 12(4): 319–343.
- Haspelmath, Martin. 1997. *Indefinite pronouns*. Oxford: Oxford University Press.
- Heim, I. (1984). A note on negative polarity and downward entailingness. In C. Jones & P. Sells (eds.), *Proceedings of the 14th North Eastern Linguistic Society meeting*, pp. 98–107. Amherst: GLSA.
- Hoeksema, Jack. 1999. Blocking effects in the expression of negation, *Leuvense Bijdragen* 80: 403–423.
- Homer, Vincent. to appear. Domains of Polarity Items. *Journal of Semantics*.
- Horn, Laurence R. 1985. Metalinguistic negation and pragmatic ambiguity. *Language* 61(1). 121–174.
- Horn, Laurence R. 1978. Remarks on Neg-raising. In Peter Cole (ed.), *Syntax and Semantics 9: Pragmatics*, 129-220. New York: Academic Press.
- Horn, Laurence R. 2001. Flaubert triggers, squattive negation, and other quirks of grammar. *Perspectives on Negation and Polarity Items* ed. by Jack Hoeksema et.al. Amsterdam: John Benjamins.
- Israel, Michael. 1996. Polarity sensitivity as lexical semantics. *Linguistics and Philosophy* 19: 619-666.
- Israel, Michael. 2001. Minimizers, maximizers and the rhetoric of scalar reasoning. *Journal of Semantics* 18: 297–331.
- Klima, Edward. 1964. Negation in English. J. A. Fodor and J. J. Katz (eds.), *The Structure of Language*, 246-323. Englewood Cliffs: Prentice-Hall.
- Kratzer, Angelika and Junko Shimoyama. 2002. Indeterminate pronouns: The view from Japanese, in Y. Otso (ed), *Proceedings of the Third Tokyo Conference on Psycholinguistics*, Tokyo: Hituzi Syobo.
- Krifka, Manfred. 1995. The semantics and pragmatics of polarity items, *Linguistic Analysis* 25: 209–258.
- Ladusaw, William A. 1979. Polarity sensitivity as inherent scope relations. Doctoral Dissertation, University of Texas, Austin. Published 1980 by Garland, New York.

- Ladusaw, William A. 1992. Expressing Negation, in C. Barker and D. Dowty (eds), Proceedings of SALT II, Ohio State Working Papers in Linguistics 40, 237–259, Ohio State University.
- Ladusaw, William A. 1996. Negation and Polarity Items. In Shalom Lappin (ed.), *The Handbook of Contemporary Semantic Theory*, 321--341. Blackwell.
- Lahiri, Utpal. 1998. Focus and negative polarity in Hindi. *Natural Language Semantics* 6:57–123.
- Laka, Itziar. 1990. Negation in Syntax: On the Nature of Functional Categories and Projections, PhD thesis, MIT.
- Linebarger, Marcia C. 1980. The Grammar of Negative Polarity, PhD thesis, MIT.
- Linebarger, Marcia C. 1987. Negative Polarity and Grammatical Representation, *Linguistics and Philosophy* 10: 325–387.
- Nicolae, Andreea. 2012. Positive polarity items: An alternative-based account. Proceedings of Sinn und Bedeutung 16, 475–488.
- Penka, Doris. 2011. *Negative Indefinites*, Oxford/NY: Oxford University Press.
- Quine, W. V. O. 1960. *Word and Object*. Cambridge: MIT Press.
- Reichenbach, Hans. 1947. *Elements of Symbolic Logic*. New York: The Free Press.
- van Rooy, Robert. 2003. Negative polarity items in questions: Strength as relevance. *Journal of Semantics* 20. 239–273.
- Spector, Benjamin. 2014. Global positive polarity items and obligatory exhaustivity. *Semantics and Pragmatics* 7(11): 1–61.
- de Swart, Henriette. 1998. Licensing of negative polarity items under inverse scope. *Lingua* 105: 175-200.
- Szabolcsi, Anna. 2004. Positive polarity–negative polarity. *Natural Language and Linguistic Theory* 22(2): 409–452.
- van der Wouden, Ton. 1997. *Negative contexts: Collocation, polarity and multiple negation*. London/New York: Routledge.
- Zeijlstra, Hedde. to appear. Universal Positive polarity Items. To appear in *Glossa*.
- Zwarts, Frans. 1995. Nonveridical contexts, *Linguistic Analysis* 25, 286–312.
- Zwarts, Frans. 1996. A hierarchy of negative expressions, in H. Wansing (ed.) *Negation: A Notion in Focus*, Berlin: de Gruyter, 169–194.
- Zwarts, Frans. 1998. Three types of polarity, in F. Hamm and E. Hinrichs (eds.) *Plurality and Quantification*, Dordrecht: Kluwer, 177–238.