The phenomenon of polarity sensitivity: questions and answers

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Abstract

This paper is a short critical survey of almost forty years of research on polarity sensitivity in the generative paradigm. From the questions and the proposals that have been debated, it emerges that the conceptual structure of the phenomenon has been largely dominated by features of the theoretical frameworks of the researchers and is still under revision.

Negative (NPI) and *affirmative/positive* (API/PPI) *polarity items* are terms applied to atomic or compound expressions which seem to be attracted by negative (resp. affirmative) contexts and repelled by the complement contexts. Example (1)[1] shows a 'prototypical' NPI respectively within and outside a negative environment. Example (2) contains a 'prototypical' PPI respectively in and ouside the required context. A trigger/licenser such as *not* in (1) is an element that validates the occurrence of NPIs, and its scope is the environment where the 'licensing' obtains. *Not* is also the antilicenser for PPIs, see (2).

(1) a. She did not read *any* books.
     b. #She read any books.

(2) a. She read *some* books.
     b. #She did not read some books.

It is general practice to introduce polarity items by giving examples, with the comment that they constitute a rather puzzling collection where many syntactic categories are represented. In (3) and (4), adapted from (Baker 1970), we present a selection of NPIs and PPIs.

(3) a. Chloe won't *ever* accept that proposition.
     b. The chemist isn't *all that* clever.
     c. He did not drink *a drop*.
     d. Chloe did not *lift a finger*.

(4) a. Daphne *would rather* go.
     b. She is gone *already*.
     c. He is *pretty* boring.

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[1]The hash sign is used to mark sentences, not necessarily ungrammatical, in which the intended reading is not available.

The role of negation in the manifestations of the phenomenon has been noted from the start. The notion of polarity, presumably imported from physics, depicts the impression that these items are not evenly distributed in a sample text. Instead, they cluster in negative and affirmative contexts respectively. In spite of the qualification of *negative*, however, it might be worth keeping in mind that their relation to traditional negation is not as straightforward as it might appear from (1).

This critical survey of the literature on polarity sensitivity pays particular attention to the evolution of a typology and the progressive definition and conceptualisation of the phenomenon. We look at how the shaping is reflected in the theories proposed and is affected by the frameworks. This tour reveals that the investigation has proceeded without a clear independent way of identifying polarity sensitive items. Scholars focus on an implicitly agreed core of items—considered to require the cooccurrence with licensers—but diverge on a peripheral group whose identification relies more heavily on the type of analysis adopted.[2] The general inability of defining the object of the research, other than by referring to its description, may indicate that an adequate analysis still escapes the research community. Little justification is provided for the licensing relation, apart from some reference to negative feature matching, idiosyncratic requirements, or similar. At the start, when there wasn't a standard conceptualisation of the topic, the relevant work contained features of different trends. Subsequent analyses diverged, it became possible to distinguish syntactic and semantic approaches. But in recent years, syntactic approaches to negative polarity have paid more attention to semantic facts, such as features for the characterisation of the context of occurrence, interferences of tense and predicate types. Conversely, semantic approaches have paid more attention to syntactic facts, such as locality constraints, and points of contact tend to increase.

Section 1 discusses early work on negation within generative grammar. Section 2 looks at a period where most of the shaping of the phenomenon takes place: it is singled out from the negation-related mass of data, it is given a name and a basic conceptual structure. A period of relative systematisation follows. Section 3 reviews work that develops further the theoretical possibilities and applies them to languages other than English. The cross-linguistic perspective exposes unresolved theoretical questions. Then, section 4 looks at the issues of the variation in the typology, the putative lexical split characteristic of many polarity items, and the existence of PPIs, possibly one of the mirror effects induced by the notion of polarity. More recent developments are presented in section 5, with an update in section 6. Finally, section 7 contains general considerations and concluding remarks.

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[2]It is interesting to note that English *any* is one of the few expressions unanimously acknowledged as negative polarity items. But, it is also the one for which it is most difficult to find a complete correspondent in another language.

1 A starting point

Klima (1964) is widely considered a corner stone paper in the field, although it contains no direct reference to the existence of a phenomenon of negative polarity. A transformational approach for modelling the distribution of elements such as *any* and *some* is put forth. The central idea that a given meaning may be expressed in different ways depending on the context. The relation he aims at establishing between interpretation and distribution is captured by means of different derivations that lead to the realization of lexical items starting from abstract components. This paper introduces almost all the cases that constitute the traditional negative polarity typology, and most of the features subsequently traditional of the phenomenon: the restricted distribution of the items, the connections with negation, the observation that other contexts not directly tied with negation are also suitable hosts for NPIs, and ties with indefinites.

Klima claims that a mobile preverbal particle *neg* is involved in the derivation of many elements associated with negation. Items such as *any*, as contrasted with *one*, are derivative forms of indefinites produced in cooccurrence with *neg*, by the application of a rule of negation incorporation. *neg* realises as surface form *not* whenever alone. The distribution in (5) and (6) is analysed by means of a transformational rule that changes what would become the word *some* in positive contexts into what would become *any* in negative contexts. These sentences are considered to support the derivative hypothesis inasmuch as they are all acceptable subordinate clauses, see (7), but not all of them correspond to well formed simple sentences.

(5) a.   They think that rain fell somewhere else.

   b. *They think that rain fell anywhere else.

(6) a.   He had realized that some time had elapsed.

   b. *He had realized that any time had elapsed.

(7) a.   They don't think that any rain fell anywhere else.

   b.   He hadn't realized that any time had elapsed.

The application of the neg-incorporation rule depends on syntactic factors within the sentence, identifiable on the surface form. Negation is incorporated into the first element of the series of indefinites. The restricted distribution of 'indefinite quantifiers' is characterised as follows.

> . . . the presence of the pre-verbal particle *neg* provides a favourable environment for the occurrence of the indefinite quantifiers within the clause in which *neg* occurs, as well as in any clause subordinate to the latter clause. (Klima 1964, p.279)

In modern terminology, Klima notes that licensing can take place across clausal boundaries. The characterisation he proposes is overpredictive, as shown in (Baker 1970) and discussed shortly. The discussion on the distribution results indirectly in an opportunity for introducing the basic components of a

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negative polarity typology. Apart from *neg*, other constituents such as the question marker *wh-* in (8), the restrictive *only* in (9), and conditionals and adversatives in (10), are said to provide favorable environments for "indefinites". Their similarity results from the presence of the common grammatico-semantic feature called *Affect*(ive). First postulated as a separate morpheme, this is then redefined as a syntactico-semantic feature associated to all morphemes and constructions that legitimate NPIs.

(8)   Who expects him to write any more novels?

(9)   Only young writers ever accept suggestions with any sincerity.

(10)   I doubt that I need ever consider the problem.

In conclusion, the notion of sensitivity seems to dawn in the attention given to the interaction of elements like *any* with the environment. Locality constraints are still *in nuce*, but there is a subdivision between *affective* elements and affected items, with a geometrical relation connecting them. Licensing power is detected in negative elements other than overt negation, such as *scarcely, few* and *too*. The solution proposed is the abstract feature *Affect*, whose content is left underspecified, and for which distributional constraints are not provided.

Lakoff (1969) argues against Klima's idea of allomorphic pairs of items. Klima does not strictly require the presence of pairs of items, but this is more or less implied by the fact that overt forms are treated as derived from the interaction of meaning and constraints due to the context, including its polarity. Lakoff notes that the indefinite incorporation rule should be optional in order to account for pairs such as (11), where *some* and *any* are found in identical syntactic environments. But (11) shows that these items cannot be interchanged, because the two questions are used in different circumstances. When the speaker expects or hopes the answer to be positive, and the antecedent of a conditional to be fulfilled, *some* is used. In case of negative or neutral presupposition, *any* is chosen. She concludes that *some* and *any* must be distinct lexical items. Lakoff calls for a broader, pragmatic approach to negative polarity taking into consideration notions such as presupposition, speaker's and hearer's belief about the world and previous discourse.

(11)   a.   Who wants some beans?
       b.   Who wants any beans?

With respect to negation in general, Jackendoff (1969), (1972), discusses problems connected with the assumption that *neg* is always base generated attached to the sentential node. He also highlights the irregularity of the group of items that undergo Indef incorporation, and the lack of matching non-affective forms for all the 'indefinites', e.g. *any more* or *at all* lack positive counterparts. Jackendoff (1972) proposes that all NPIs are basic lexical items, rather than items derived from PPIs via a transformation rule.[3]

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[3]Klima's rule for the positioning of negation is a transformation that modifies the meaning

2 Setting the stage

At this point of the research, there is an intuitive perception of the existence of a connected group of linguistic data. All the main elements that will be found in subsequent discussions have been mentioned. The seeds of the three hypotheses on the nature of the phenomena syntactic, semantic and pragmatic have also already been sowed. The next step is to create a special label of *polarity sensitive* (PS), to identify this set. Usually, (Baker 1970) is taken to contain the first official occurrence of the terminology now widely attested. The work done in this period sets the stage for future developments, inasmuch as it provides a conceptualisation of the phenomenon. NPIs and PPIs are said to be subject to extra constraints, on top of the general constraints derived from the lexical and syntactic categorization. This characterisation is not that informative *per se*, rather its potential value resides in the definition of these constraints, which vary according to the framework adopted. Yet, it is conceptually constraining, since it says that licensers and polarity items are linked by cooccurrence, and that once the relation has been verified, it holds for any item *qua* polarity item. It is constraining also because it has to be read in the perspective of research centered on the issue of licensing, hence locality, rather than on sensitivity.

Baker 1970
Baker (1970) focusses on double negation cases such as in (12a). The issue he raises is twofold. First, it appears that the question of the definition of suitable environments for polarity items cannot receive a strictly 'local' answer because of the contrast between (12a) and (12b), where the same item is in analogous contexts, part of main and embedded clauses respectively.

(12) a. There isn't anyone in this camp who wouldn't rather be in Montpelier.

   b. *I wouldn't rather go to New Orleans.

Second, a link between 'local' and 'global' perception of the environment cannot be established by counting the number of affective operators in a sentence from the root down to the occurrence site and cancelling them out in pairs by means of a polarity-reversal rule. With this in view, Baker first explores a possible extension of Klima's and Jackendoff's analyses. Polarity elements carry a specification of the type of environment in which they can occur. Whenever they cooccur with an affective element, some feature is added in the reading of the affective element. The sentence is then marked as semantically anomalous whenever inherent and assigned features disagree at the end of the derivation. A rule that reverses the value of a feature, and which can be applied cyclically is shown to make incorrect predictions, for instance for (13a), since (13b) is also acceptable, and for (14). In (14a) there shouldn't be reversal in the subordinate

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of the sentence to which it applies. At the end of the seventies, transformation rules, their power and the objects to which they apply were hot topics in generative linguistics. Jackendoff was against transformation rules that manipulate specific words or phrases. His position on polarity must be considered in this context.

clause and in (14b) there should. But if the application of the rule is made optional, and is connected with the presence of certain items, then in order to rule out (14c) it is necessary to say that a rule cannot affect one particular element within a clause unless it can affect them all.

(13) a. Someone didn't eat some of his porridge.
          (Someone left some of his porridge behind)

      b. Someone didn't eat any of his porridge.
          (Someone left all of his porridge behind)

(14) a. There isn't anyone here who doesn't care to do anything down town.

      b. There isn't anyone here who wouldn't rather do something down town.

      c. *There isn't anyone here who wouldn't rather do anything down town.

Baker's final analysis is expressed in terms of two principles. The first one defines a sufficient condition for the use of PS items with respect to the presence or absence of a negation and to a scope defined on a surface structure representation. In keeping with contemporary work, it is formulated as a syntactic filter, i.e. a structural condition defined without referring to syntactic properties. No independent definition for NPIs and APIs is provided, a weakness that affects many subsequent proposals too.

(15) Negative polarity items are appropriate in structures within the scope of negations, whereas affirmative polarity items are appropriate elsewhere. (Baker 1970, p.179)

The second principle consists of a semantically motivated procedure for carving out from the representation of a sentence a suitable subset that satisfies the first principle. The aim is to provide a treatment for double negatives and to find a way to reduce to the first principle cases where there is no overt negation. The method adopted is first to find out a sentence containing a polarity item whose acceptability is defined according to the first principle. Then, if the existence of a certain semantic relation between a semantic representation of this sentence and of the one under examination can be verified, it can be said that the polarity item appearing in the latter is appropriate or licensed. As Baker himself notes, the snag is that the operation of carving out a subset is not defined because there is no indication of what is a legitimate subset. The type of semantic relation between the two representations is also problematic at times and will be revised by (Linebarger 1980a).

(16) Given semantic representations P_1 and P_2 satisfying the following conditions:
      (A) $P_1 = X_1 Y Z_1$ and $P_2 = X_2 Y Z_2$ where Y is itself a well-formed semantic representation;
      (B) P_1 entails P_2; then the lexical representation appropriate to Y in P_2 (by the first principle) is also appropriate to Y in P_1. (Baker 1970, p.179)

Once the transformational rules have been abandoned, and the different items are considered to be base generated, locality issues immediately step in overtly. It is no longer the case of a self referential relation between an element and the features it incorporates, but a relation between different elements. Thereby, the notion of licensers has made its implicit appearance. The distribution of polarity items is seen as a matter of being in the scope of a suitable element, where 'scope' and 'suitable element' want definition. From now on, these two issues are at the heart of the research.

Ladusaw 1979

Ladusaw (1979) firmly establishes the semantic trend. He gives a semantic content to the vague idea of *affectedness* proposed by Klima (Ladusaw 1980), and develops the connection between negative polarity and entailment introduced by Baker and the use of pragmatic scales studied by Fauconnier (1975). He identifies the crucial role of downward monotonicity. This property defines a notion of negativity weaker than the traditional one, which makes it possible to identify licensers even in cases where there is no overt negation. The analysis is structured in terms of scope relations between members of the class of licensers and NPIs. The following rules determine the distribution of polarity items. Ladusaw explicitly says that the expression *downward entailing* can be replaced for the term *trigger* in the rules.

(17)   a. A NPI must appear in the scope of a trigger. If its trigger is in the same clause as the NPI, the trigger must precede the NPI.
b. An API may not appear within the scope of a clausemate negation.(Ladusaw 1979, p.112)

Fauconnier stated a relation between the reversed link existing between relations expressed, for instance, by words like *harder* and *easier*, and the licensing of NPIs. *Hardest* and *easiest* stand at the two extremes of the scale. Although superlatives do not mean the same thing as universal quantifiers, some superlatives in some contexts can have the strength of a universal quantifier, see (18) and (19).

(18)   a.   Alexei could lift the heaviest weight $\rightarrow$
b.   Every weight is such that Alexei could lift it

(19)   a.   Alexei could lift the lightest weight $\nrightarrow$
b.   Every weight is such that Alexei could lift it

Sentence (18a) can be used to convey (18b), but this cannot be said of the pair in (19). The reverse holds when negation is added. Fauconnier refers to the notion of pragmatic scale associated with a propositional schema, in order to account for the quantificational effect. He correlates the scale reversing effect of negation with some of the contexts that were treated by the second part of Baker's proposal. Ladusaw suggests that, instead of reverting scales, one can associate a scale with both the schemata $P(x)$ and $\neg P(x)$, where P

stands for *Alexei could lift ... weight* in the example. Then, entailments from positive sentences would run up the scale towards more informative steps, and those from negative sentences would run downwards. Thus, it could be shown that the scale-reversing property, and triggerhood, can be predicted from the meanings of expressions. The idea of scale reverser is connected to a compositional semantic analysis by identifying the semantic contexts which have the effect of licensing downward inferences with the functor meanings which take the items on the scales as their arguments (their scopes). 'These functions may have the properties that when applied to a value x which is a subset of a value y, $f(y)$ will be a subset of $f(x)$.'(Ladusaw 1979, p.145). Thus, according to the laws in (17), NPIs can occur only within the scope of functors licensing downward inferences, and APIs must avoid the scope of a negation appearing in the same clause. The licensing power is not just a feature associated to a morpheme, as claimed by Klima, but is asserted separately for each argument of what are called generalized quantifiers in (Barwise and Cooper 1981) and may vary among arguments of the same quantifier (Ladusaw 1980). The pair in (20) shows that *every*, being monotone decreasing in its first argument and increasing in its second, licenses only in (20a), while *no* always licenses, being decreasing in both arguments, and *some* never licenses, being increasing in both arguments.

(20) a. $\left\{ \begin{array}{l} No \\ Every \\ *Some \end{array} \right\}$ student who had ever read anything on phrenology attended the lectures.

   b. $\left\{ \begin{array}{l} No \\ *Every \\ *Some \end{array} \right\}$ student who attended the lectures had ever read anything on phrenology.

Ladusaw develops the anaphora-style approach expressed by licensing, which from a conceptual point of view is taken as standard at least up to the nineties. The formalisation of the scope of a licenser as the argument of a functor leads to difficulties in the case of *not* clausemate of an NPI, which Ladusaw assumes to express sentential negation unequivocally (Ladusaw 1979, p.78). According to such an assumption and the functional definition of scope adopted, (21) is expected to be grammatical, whereas it is not. Ladusaw treats the case of the subject via a clause on linear order.

(21)#Anybody did not love Louis.

Although in (21) *anybody* is inside the scope of the trigger *not*, it is not properly licensed because *not* does not precede it. In general terms, the clause says that the occurrence of the negative polarity item must be 'announced' by the trigger. This may not seem a serious interference in the treatment, because it could be viewed as a case of feature matching between the two. However, it begs the question of what is triggering what.

A positive aspect of Ladusaw's proposal is its unifying power. The single semantic notion of downward entailment represents the connection among the cases considered, and a way to systematize the contexts of occurrence. It allows him to identify licensers even in cases where there is no overt negation, and therefore to apply uniformly the same analysis with no need for a dichotomous approach like that proposed by Baker. Shortcomings are, first that negation is represented as the operator of first order logic, with the ensuing difficulties already mentioned; second, two occurrences of negation cancel each other out in first order logic, but not necessarily so in natural language. Baker's insights on the issue are left aside.

Another interesting point is the association of negative polarity items with scales of propositions, and the observation that NPIs always occupy the bottom position. However, the idea is not pursued when examining the meaning of *any*. The choice of attributing to *any* a double nature, seems to originate from complex considerations. On the one hand, there is the question of licensing, that leads to considering *any* as an element that is endowed of its own well defined, self-contained meaning. But since the results are quite different when *any* is plugged into (22a) or (22b), it is assumed that the two different meanings— free-choice (FC) and polarity sensitive (PS)—are supposed to be the result of the functional composition of different elements.

(22) a. Every dancer was expected to rehearse any steps of the ballet.

   b. Every dancer did not rehearse any steps of the ballet.

On the other hand, the discussion is made more complex by the fact that the distribution of FC *any* does not receive a precise characterization, and neither does its meaning. Ladusaw concentrates his attention on the existential reading of the negative polarity item. This choice leads to another question. Ladusaw seems to be somehow trapped in the use of the existential quantifier ∃ of first order logic to represent the meaning of *any* and *some*. Here, he presupposes that at the level of semantic interpretation it is possible to distinguish between a positive and a negative polarity item. At the same time, by using ∃, he runs into difficulties, because negative polarity *any* gets the same representation as positive polarity *some*, while having different distributions. His solution is to retain the same representation for *any* and *some*, and to expresse the difference in terms of scope preferences by means of two features, w for wide scope preference and n for narrow scope (Ladusaw 1979, p.107,207). The rules of semantic composition are sensitive to their presence during the process of combination to get the meaning of the whole sentence.

Linebarger 1980
Baker's style of proposal is taken up about ten years later by Linebarger (1980a), who argues against the idea that the distribution of NPIs is restricted to the scope domain of downward entailers. She emphasises the variety of cases which are not directly reducible to the presence of negation. Her effort to account for more linguistic data, however, leads to a formulation of the conditions that is

less clear cut than the original. What was the first principle in Baker's proposal, see (15), becomes the Immediate Scope Constraint, which restricts the acceptability of NPIs in a sentence S to cases where 'in the logical form of S the subformula representing the NPI is in the immediate scope of the operator NOT'(Linebarger 1980a, p.30). The two main differences between Baker's and Linebarger's treatments of the prototypical case of licensing are, first, that the licensing capacity of overt negation is no longer controlled on the surface structure, but on the logical form[4], a level of representation which she supposes to be unambiguous. Second, it is restricted by a requirement of immediate contiguity with the triggered element. NOT is required to take the entire proposition in its scope, and no logical elements can intervene between it and the triggered element. "Logical elements" are elements capable of entering into scope ambiguities; that is, the occurrence of the surface realization of n logical elements in a sentence S results in the association of S with up to n! logical forms expressing the possible and acceptable orderings of these elements.(Linebarger 1980a, p.30) The change in level of representation to which the licensing constraint applies is directly connected with the issue of locality conditions for licensing. This move is intended to solve problems arising from sentences containing *because* clauses, such as ** John's paper didn't hold a candle to Mary's because he had (any) help, but because he worked hard*, which she analyses as having negation always located above the discriminating point. However, this analysis is debatable and the evidence she provides may not motivate *per se* a change from surface to logical levels for the application of the constraint. Furthermore, multiple licensing must be treated as special, e.g. in (23) different orderings among polarity items are possible but only one item at the time can be adjacent to negation.

(23)   He hasn't lifted a finger to help anybody yet.

Pragmatic aspects are introduced in the analysis under the form of a derived licensing, which constitutes the second part of the treatment. This part is a modification of Baker's second principle. Both authors consider certain sentences acceptable 'because they in some way allude to the paradigm case' (Linebarger 1980a, p.67). The novelty is that Linebarger does not refer exclusively to semantic information, but relies on a notion of negative implicatum (NI), i.e. the licensing statement, to establish licensing conditions via relations between pairs of sentences. Either a negative polarity item is in the immediate scope of negation in the LF representation of sentence S, or such a configuration is verified with respect to a proposition NI which is entailed or implicated by S and which virtually guarantees the truth of the proposition expressed by S.

1. **Expectation of a negative implicatum is itself a conventional implicature.** A negative polarity item contributes to a

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[4]During the seventies, the 'interface' between syntax and semantics is relocated. Deep structures are no longer considered the locus of relationship between structure and meaning, in Chomskyan generative grammar. This role is taken up by the *logical form*, a syntactic level of representation which is mapped onto semantic representations by semantic rules. The move is paired with a general shift from conditions on the application of rules to conditions on representations.

sentence S expressing a proposition P the conventional implicature that the following two conditions are satisfied.

2. **Availability of negative implicatum.** There is some proposition NI (which may be identical to P) which is implicated or entailed by S and which is part of what the speaker is attempting to convey in uttering S. In the LF of some sentence S^1 expressing NI, the lexical representation of the NPI occurs in the immediate scope of negation. In the event that S is distinct from S^1, we may say that in uttering S the speaker is making an *allusion* to S^1.

3. **NI strengthens P.** The truth of NI, in the context of the utterance, virtually guarantees the truth of P. (Linebarger 1987, p.346)

The change from a semantic to a pragmatic relation between pairs of sentences and implicatures generated from their literal meanings is motivated by the conviction that the existence of such pairs is not sufficient to guarantee the acceptability of NPIs. Well formedness cannot be established via the syntax and compositional semantics of a sentence alone, the context of utterance is relevant too. The implicatures generated from a sentence S affect the appropriateness of uttering S and *vice versa*. Linebarger argues for this on the basis of 'trigger squishes'. With respect to (24a) and (25a), sentences (24b) and (25b) contain a 'semantically similar expression which does not license [the NPI]'(Linebarger 1980a, p.68).

(24) a. I was surprised that she contributed a red cent.

    b. *I was pleasantly surprised that she contributed a red cent.

(25) a. If you give a damn about the whales, you'll contribute.

    b. *If you give a damn about the whales, you must be George Smith.

(26) a. A doctor who knows anything about acupuncture is worth his weight in gold.

    b. *A doctor who knows anything about acupuncture is easy to find.

    c. *A certain doctor who knows anything about acupuncture was not available.

(27) a. Cows fly more often than he lifts a finger to help.

    b. *The sun rises more often than he lifts a finger to help.

Several 'squishes' cannot be considered 'semantically neutral', e.g. alternation between specific or non-specific readings of nominals or events, e.g. (25), contraction in the denotation of the original expression, e.g. (24), semantically different generic predicates, e.g. (26). However, (27) is probably the most convincing type of pairs, and does not contain self evident semantic shifts. Here the rhetoric effect is crucial.

To sum up, research done in the seventies set the stage for future work. First, the general style of analysis proceeds from cases where there is overt negation towards cases with other types of negation or no element of negative

nature. Sometimes a dichotomous treatment ensues. Second, an attempt to unify the manifestations in a unique phenomenon is done by letting the notion of licensing dominate the notion of sensitivity. Linebarger (1980a) tries to describe sensitivity to a variety of factors, but such an attempt has reduced impact because it is done in terms of derivative licensing and not in terms of the properties of polarity items. In any case, the relevance of some form of negativity receives the status of an axiom of the phenomenon. At this stage of the research, the phenomenon has received a label and, more importantly, a conceptual shape. It is no longer a seemingly connected set of natural language data, but a phenomenon with a status in linguistic theory. A collection of NPIs has been gathered and a class of licensers has been sketched. It has been established that the members of the former can appear in a sentence only when they cooccur with a member of the latter. The reading variations of phrases containing PS items are treated by postulating lexical splitting in the items.

3 Opening up the cross-linguistic perspective

Once the concept of negative polarity phenomenon is established, discussions concerning its relation to other phenomena and the extent of its internal variation become more pregnant. The issue of the variation across languages is connected with that of the identification of proper NPIs. The research exploits in full the premises of the preceding proposals. Several directions are explored. One is the development of the algebraic side of the semantic analysis, with the main aim of capturing variations of licensing power. Another is the development of finer structural constraints for capturing locality facts.

Zwarts 1991
Developing his own earlier work, Zwarts (1991), (1993), presents a formal semantic analysis of the phenomenon of negative polarity consistent with Ladusaw (1979). At the core of Ladusaw's proposal there is the idea that licensing environments are characterized by the presence of expressions denoting monotone decreasing function. The novelty of Zwarts' proposal is twofold. He defines different degrees of polarity sensitivity among NPIs, and argues that polarity sensitivity is a lexical phenomenon. First, Zwarts gives a formal definition to different degrees of polarity sensitivity, a phenomenon pointed out in (Linebarger 1980a, p.68) and (Horn 1970). Zwarts assigns varying semantic strength to the set of licensers, so that he can pin down variations of the type exemplified in (28) and (29) from Dutch. *Hoogstens één* and *niemand* can both license the NPI *hoeven*, but only *niemand* can license *ook maar iets*.

(28) a. Hoogstens één kind zal zich   hoeven te verantwoorden.
          at most one   child will himself need   to justify
          'At most one child need justify himself'

      b. Niemand zal zulk een beproeving hoeven te doorstaan.
          no one   will such an ordeal   need   to go through
          'No one need to go through such an ordeal'

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(29) a. * Hoogstens zes kinderen hebben ook maar iets bemerkt.
          at most six   children have   anything   noticed
          'At most six children noticed anything'

      b. Niemand heeft van de regenbui ook maar iets bemerkt.
          no one   has of the rain   anything   noticed
          'No one noticed anything of the rain'

The connection between negative polarity sensitivity and negation is still crucial, but negation is neither identified using the traditional vague terms of *overt* and *covert*, nor reduced to downward monotonicity, defined as in (30).[5]

(30) A function f is called monotone decreasing iff for all X, Y in the domain of f: if $X \subseteq Y$, then $f(X) \supseteq f(Y)$.

Its various manifestations are catalogued according to the different properties of downward monotonicity, anti-additivity and antimorphism. Zwarts calls the class of monotone decreasing functions *minimal negation*. In the case of stability or contraction of the cardinality of the set, the inference still holds, see (31).[6]

(31) Few boys arrived $\rightarrow$ Few fat boys arrived

Downward monotonicity explains the inference marked by the rightward arrow in (32), but not the leftward one, which must be attributed to the closure under unions that characterizes *no flower*. This expression supports the inference pattern of anti-additivity, given in (33). Zwarts calls this class of expressions *regular negation*.

(32) No flower will dry up or will fade $\leftrightarrow$
      No flower will dry up and no flower will fade

(33) W [X or Y] Z $\Leftrightarrow$ [W X Z] and [W Y Z]

The third type, the *classical negation*, is a monotone decreasing, anti-additive expression with the property of supporting the antimorphic inference pattern, represented in (34) and exemplified in (35).

(34) W [X and Y] Z $\Leftrightarrow$ [W X Z] or [W Y Z]

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[5]The similarity between Zwarts' notion of downward monotonicity and the one adopted by Ladusaw (1979) is immediately apparent, although Ladusaw defined it by referring to pragmatic entailment. The basic feature of both definitions is the ability of reversing the subset ordering of the domain.

[6]Monotone decreasing quantification can be taken as counting down towards $\emptyset$ from an upper bound which varies depending on the quantifier. Monotone increasing quantification involves the increase of the cardinality from a given lowest bound, established in the definition of each quantifier. These quantifiers allow for the possibility of drawing inferences from sets to supersets, see (i). Finally, (ii) presents a non-monotone quantifier.
(i) Some fat boys arrived $\rightarrow$ Some boys arrived
(ii) More than three and less than seven boys arrived $\nrightarrow$
     More than three and less than seven fat boys arrived

(35)   Kim didn't dance and sing ↔ Kim didn't dance or Kim didn't sing

Anti–additive functions have more licensing power than monotone decreasing functions in general, which are 'weak licensers'. The manifestations of negative polarity are governed by rules which refer to the types of negation. The mechanism is defined in terms of properties of the two elements involved in the relation, i.e. the licenser and the NPI. These conditions are taken to be necessary because the property of monotone decreasing is considered to be the minimal common characterization of the group of licensers. They are deemed to be sufficient because they are supposed to capture all the variations of behaviour among NPIs.

> a. Only sentences in which a monotone decreasing expression occurs, can contain a negative polarity item of the weak type.
> b. Only sentences in which an anti–additive expression occurs, can contain a negative polarity item of the strong type.
> c. Only sentences in which an antimorphic expression occurs, can contain a negative polarity item of the superstrong type.(Zwarts 1993, p.47)

The distinction among licensers is then brought to bear on the classification of NPIs themselves. The claim that negative polarity is a lexical phenomenon implies that a proper characterization of the relevant properties in the lexicon entries is necessary and sufficient for the treatment of polarity phenomena. It is also taken to justify the variety of syntactic categories among NPIs, as well as the variety of types of expressions, i.e. atomic or complex. Several aspects of NPIs meaning, such as indefiniteness, and scalar–endpoint role, can interact to produce the negative polarity part of that meaning. The identification of strong/weak licensing requirements is presented as evidence for the lexical nature of negative polarity sensitivity. However, the claim is not exploited in full. It is mainly implemented in the form of an analysis of the semantic characteristics and peculiarities of the class of licensers. With respect to NPIs, it reduces to attributing them features like *weak* or *strong type*, which are grounded on distinctions defined outside the class itself. Zwarts does not perform a semantic analysis of the NPIs themselves which would make the distinction clear. This means that the classification can be fragmented by any idiosyncratic element. In fact, the proposal for missing intermediary classes, see (van der Wouden 1994), could easily lead to a proliferation up to the point of equating the number of NPIs, in the worst case. As long as the new classes are also lacking independent motivation, there is little guarantee for their stability. In other words, polarity sensitivity is claimed to be a lexical property, but it is defined in a way that is rather insensitive to the internal semantics of the items.

Progovac 1988
A different direction of research is taken by Progovac (1988), who proposes a syntactic analysis of polarity in a unified frame. She capitalizes on the observation that there is an antecedent anaphor-like relation between NPIs and

licensers, that has been gaining ground in syntactic and semantic approaches to the phenomenon. Polarity sensitivity is one among the numerous cases in natural language where two elements must co-occur in a certain relation for the sentence to be acceptable. This idea had already been put forth by Milner (1979) for negative concord (NC) in French. Milner treats *ne* as the antecedent of negative nominal anaphors such as *personne* (nobody) and *rien* (nothing). Progovac too exploits the similarities between NPIs and reflexives, i.e. their need for a licenser and the locality of licensing, and models the phenomenon according to a version of Binding Theory. The relatively shallow definition of such a tool and of the features it refers to in this case make the move easier. Binding was originally proposed to control coindexing, i.e. identity of agreement features on NPs, since anaphors are elements with a referential function that are referentially dependent upon another category. Here, binding is used to control licensing, where no feature sharing, matching or checking is performed with respect to a referent.[7]

Inside this frame, Progovac's analysis develops into the two branches we have come to know, i.e. licensing via negation and via non-negative licensers. Principle A of Binding Theory defines the conditions under which coindexing is possible, and by the same means it defines the category of anaphora. Principle B defines the conditions under which coindexing is not possible, and by the same means it defines the category of pronoun. Principle C defines the conditions for referential expressions and is not relevant for the issue in hand. Stated in this way, the original theory is circular, because the categories are identified via their behaviours and the behaviours are defined with respect to the categories. Grounding the categories morphologically might be a way out. Then, if the categories are identified by the bundle of features [±anaphoric, ±pronominal], four combinations are possible. The counterpart of an antecedent for an NPI is its licenser. NPIs are never free, by definition. Binding Theory is used only to impose locality constraints between licensers and NPIs, and the only combinations that can subsist are those containing the [+anaphoric] feature. Thus two different scopes for licensing 'anaphor' and 'anaphoric pronominal' polarity items are established while retaining a generalisation over them. The core of the proposal is the following (Progovac 1988, p.75).

> **Universal:** All NPIs are A′-anaphors, subject to Principle A of the Generalized Binding framework.
> **Parameter 1:** Some NPIs are subject to Principle A only (e.g. Serbo-Croatian NI-NPIs and English NPIs), whereas others are subject to Principles A and B simultaneously (e.g. Serbo-Croatian I-NPIs).[8]
> **Parameter 2:** Some NPIs raise at LF (e.g. English NPIs and

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[7]Milner notes explicitly that this use goes beyond a straight application of binding. In reality, if the antecedent assigns a referent to the anaphor on the basis of coreference, in the case of *personne* or *rien* it is not a matter of reference nor coreference. The solution he proposes is to separate the notions of anaphor and coreference, and to treat the latter as a special case of the former. As for NC-terms, their interpretation is determined by the fact that together with *ne* they form a complete negation.

[8]I-NPIs and NI-NPIs will be defined shortly.

Serbo-Croatian I-NPIs), whereas others do not (e.g. Serbo-Croatian NI-NPIs).

Since the question is about anaphora and not traces of movement, a relation of antecedent-government and not of head-government must hold. Negation acts as valid clausemate antecedent for NPIs labelled as anaphors. The other licensers, called non-negative, license NPIs only indirectly by selecting an operator in COMP of the nested clause. Thus, the NPI in the nested clause is 'free' in its governing category (with respect to the licenser) while the operator binds it, as required for anaphoric pronoun NPIs. A similar idea is proposed by Laka Mugarza (1990), who discusses only the case of licensing by verbs like *deny*. She makes use of a negative feature situated in the head of COMP and selected by these verbs. Both these studies dismiss semantic treatments because of their incapacity of describing the putative limited licensing power of indirect licensers such as *deny* or *doubt*. This point is used as evidence to support the need for a syntactically defined scope of licensers. However, systematic evidence that these verbs can license both in clausemate position (36a) and across a clausal boundary (36b) disproves their claim of 'reduced licensing power' ((Tovena 1993), (1996)).

(36) a.   He denied any knowledge of the plot.

       b.   He denied he had any knowledge of the plot.

The morphological grounding of Progovac's proposal is done by classifying NPIs in two groups, the NI-items, from Serbo-Croatian *niko* ('nobody'), which are anaphors, and the I-items, from Serbo-Croatian *iko* ('anybody'), which are pronominals. This type of grounding, however, is not exportable across languages. There is no way of predicting to which category elements of other languages belong.

The cross-linguistic variation between Serbo-Croatian and English is captured by exploiting three independent devices, expressed as three parameters. The first two, introduced above, are the pronominal/anaphoric characterisation, and a set of different raising possibilities, that is no raising at all or raising at the LF level of representation, and different landing sites, spec/COMP, adjoined to IP or both. The third, understood, parameter is the variation in the basic position in which negation is generated in different languages. The contrast in (37) is treated by assuming that negation is adjoined to VP in English and therefore it does not c-command the subject and cannot act as an antecedent for the anaphoric *any*. In Serbo-Croatian negation is assumed to be preverbal, c-command the subject position and bind the anaphoric *niko*.

(37) a.   Niko   ne poznaje Mariju
            noone not knows   Mary-ACC
            'No one knows Mary'

       b.   *Anyone does not know Mary.

Progovac (1992) mixes a semantic characterization of licensers with a syntactic definition of scope. The approach remains fully within the syntactic

school because the modification is confined to accepting the characterization of licensers via downward monotonicity while disregarding its unificatory power over the class of licensers. The borrowing is also used in a debatable way, since she switches from a definition of licensing based on downward monotonicity to a filter which specifies non–licensing in the case of upward monotonicity so as to cover licensing in questions without having to assert their decreasing monotonicity. But in this way non-monotonic cases are wrongly drawn in as well—and they are a well defined class, not just some odd cases.[9] Then, the issue of interrogative clauses is still open. Questions are licensing environments, but they also host occurrences of FC *any*. Postulating an operator which takes the polarity item in its scope predicts the impossibility of having the FC reading in (38), contrary to facts. Not postulating it makes it impossible to account for the PS reading. The question cannot be solved by assuming optionality of the null operator, because this would correspond to saying that the licensed item selects/licenses its licenser, which leads to the question of what prevents this selection from taking place in any context.

(38)   Does anybody like Daniel?

Summing up, the effort to extend the notion of negative polarity sensitivity from English, upon which it had originally been defined, to other languages meets various problems. It has to be established whether differences are to be classified as variations within the same phenomenon or as related yet independent phenomena. For instance, van der Wouden and Zwarts (1993) propose that Serbo-Croatian *niko* be analysed as a negative concord (NC) term.[10] As long as NPIs and NC-terms are defined via a description of their behaviour(s) and no independent hypothesis is put forth on their nature(s), the difference between PS and NC can hardly be argued for or against in a conclusive way. Clearly there are similarities among them. Dowty (1994) tries to build a bridge between these negation related phenomena. His proposal springs from the observation that monotone inference patterns play a very important role in human reasoning. Dowty investigates the possibility of having a formal deductive theory for natural language, and proposes that negative polarity and NC marking are ways in which natural language overtly signals the downward direction of possible inferences, hence facilitating the application of the deductive rules. He suggests that downward rather that upward contexts are marked in natural language because the latter are much more common. As a consequence, the phenomenon of affirmative polarity is marginalised, a fact which seems to match the effectively smaller size of the phenomenon as well as the much more controversial characterization of PPIs, cf. section 4.

Dowty's unified approach indirectly questions the independent existence of the phenomena it is meant to reconcile. The difference between PS and NC is kept at the level of lexical requirements. He claims that NPIs are marked for the requirement of occurring inside a downward monotone environment,

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[9]For more detailed and extensive criticisms of the analysis, see (Hoeksema 1996).

[10]See also (Tovena 1996, ch6) for a discussion of problems with an NPI analysis.

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and he filters the syntactic structures that can host them via monotonicity-determining rules, but recall Baker's criticisms to this type of strategy. With respect to NC-terms, Dowty hypothesises that they are ambiguous between negation and NPIs, following (Ladusaw 1992), and argues that they all are uniform in signifying downward monotone positions. Tovena (1996, ch3) discusses the applicability of Dowty's proposal to Italian. The required tweaking reduces the appeal of the proposal, because, on the one hand, cases of double marking lexical entries must be extended to accommodate word order facts, e.g. pre and postverbal subjects, and on the other hand, locality constraints must be added for controlling multiclausal negative chains. Moreover, cases of constituent negation such as in (39) are wrongly predicted to be impossible.

(39) Ha telefonato per niente.
      has phoned   for nothing
      'He phoned in vain'

Building on interpretive differences of free-standing occurrences, cases of coordination and constituent negation, Tovena (1996, ch6) proposes to keep NPIs and NC-terms separate and puts forth an analysis for NC sentences in Italian where the multiple manifestations of negation are evaluated at the level of the event and of the entities involved in it, instead of being reduced to a single negation, as required in Labov's (1972) definition of NC.

4   Connected questions

Several types of variations have been mentioned in this survey. First, there is variation in the typology of NPIs. Ladusaw (1979) hypothesised that all NPIs have an ill-understood meaning in common, provisionally identified with their role of scalar endpoint. Israel (1996) pursues the goal of restating the issue of PS in the broadest possible terms. He claims that, at a very schematic level of representation, all NPIs are scalar operators. Then, their grammatical function, the type of scale they evoke, their degree of grammaticization, their frequency, etc. can and do vary dramatically. On the contrary, Tovena (1996) tries to understand why ordering relations and absolute positions on a scale, i.e. their function as scalar and focus items, are among the reasons for considering a given item an NPI. The family resemblance among NPIs and their distributional properties are worked out from their semantic content and their contextual requirements. It is proposed to link the interpretation of PS phrases inside and outside traditional licensing contexts via the computable effect of the negative environment. The ambiguity standardly postulated at the lexical level is re-examined as pertaining to the level of the complex expression.

Second, there is variation in the distribution of the polarity items. This issue has two facets. On the one hand, there is the issue of varying licensing power of licensers discussed above. On the other hand, it is common to assume a lexical split for items like *until* etc. The case of *any* is representative. The existence of two *any*s is a widespread but not uncontroversial opinion, and both analyses as quantifier and as indefinite have been proposed. Carlson (1981) notes that PS

and FC cannot be easily defined in terms of complementarity. There is a tension between the claim that *any* is always in the scope of a negative operator, and the attempt to resolve the question of its representation in terms of scope relations. Most of the authors who worked in the seventies and early eighties give a unique representation of the meaning of *any* by using First Order Logic quantifiers. Ladusaw (1979), Carlson (1980) and Linebarger (1980a), (1980b) *inter alia*, characterise it as the existential quantifier. Vendler (1967) and Kroch (1974), *inter alia*, considered it a universal quantifier, usually with the particular quality of always having widest scope. These two quantifiers are also used to represent separately the different readings, for instance Carlson (1981) claims that FC *any* is a universal and PS *any* an existential quantifiers. Much of the discussion revolves around the issue of how to scope the representation of *any* in order to get the attested readings.

The representation of the free-choice facet is by far less explored up to the nineties. Davison (1980) supports a characterisation of *any* as an existential quantifier, which is an indefinite non-specific. She considers the 'generic' reading of FC *any* as a conversational byproduct. The resulting pragmatic implicature of universality is produced by the combination of the meaning of *any* and that of environments such as modals, expressions of wishes and *wh*-questions. In support of her position, she mentions the existence of 'similar cases of conversational implicature dependent on the same environments within the sentence.'(Davison 1980, p.16). In a paper which seems to have had little impact on contemporary research, Kempson (1985) explores precisely the issue of whether one has to postulate the lexical ambiguity of *any* or whether it is possible to account for the various interpretations via different scopings. She argues that a formulation in terms of different scopings which does not invoke some form of ambiguity in *any* leads to *ad hoc* loss of generalisation somewhere else in the treatment. Kempson uses the notion of A-name, i.e. arbitrary objects from Fine's (1984) logic, for representing *any* as an element which is neutral with respect to quantificational force. She assumes that *any* leads to ambiguity at the level of propositional content, but that it does not follow that it is lexically ambiguous. The lexicon specifies that *any* is a variable over A-names and it is the context of use that determines whether the A-name is independent, i.e. with free range over the members of the set which constitutes its domain, or dependent, i.e. with a range fixed by a relation on some other entity.

> If there is some expression c-commanding *any* (preceding it if in the same clause) which can be construed at logical form as providing an entity on which the *any* expression can be dependent without giving rise to direct existential inferences, then *any* can and most naturally is interpreted as a dependent A-name.(Kempson 1985, p.241)

Thus, PS readings are cases of dependent A-names, and FC readings cases of independent A-names. This approach allows Kempson to account for the link between focussing on *any* expressions and the emergence of FC readings. Whenever the *any* expression is focussed, it is built as an independent A-name, it escapes the scope of the licenser and has FC reading. It also allows her

to account for the licensing requirement for PS readings without having to postulate it as a feature defining NPIs.

Third, there is the variation which is a 'mirror image projection', i.e. positive polarity. Despite what their name may suggest, there is no clear complementary distribution between NPIs and PPIs, but holes and overlaps are possible. As noted by Baker, PPIs induce a clear effect of outscoping, rather than ungrammaticality. Proposals for a definition of PPI are usually far weaker and more contradictory, and seem to rest more on the opposition with NPIs. There is also a strong difference between the definition of trigger and of anti-trigger, i.e. the element whose scope is avoided. Ladusaw (1979) rejects the idea of considering negative polarity and positive polarity items as symmetric reflexes of the same property. He claims that the terminology traditionally used to describe the phenomena contains incorrect assumptions. The names NPI and PPI suggest that these items are sensitive to whether a sentence is negative or positive, and that they show complementary cooccurrence restrictions to this single feature of the sentence. Ladusaw (1979, p.2–3) argues that

> the property to which NPI's are sensitive is not a property of sentences, it is a property that only expressions with functional meanings can have. [...] NPI's are items which must be semantically interpreted as being in the semantic scope of an expression with an appropriate meaning. [...] API's on the other hand are more reasonably analysed as expressions which are sensitive to whether the sentence is negative or affirmative. But we must make a distinction between sentences which are negative propositions (like (a)) and sentences which are the contradiction or denial of affirmative propositions (like (b)).
>
> (a) John hasn't talked to any of the students.
> (b) ? John hasn't already talked to some of the students.

The idea of the mirror image shows up again in more refined terms in analyses inspired by the theory of generalized quantifiers. PPIs are claimed to be allowed in the scope of monotone increasing or non monotone operators. Further evidence is proposed by van der Wouden (1994), who argues for the existence of similar subclasses for NPIs and PPIs.

There is a contrast between the large number of idioms among NPIs and their reduced or null presence in the class of PPIs. Krifka (1989) proposes a parallelism between the idea of NPIs as endpoints of decreasing pragmatic scales and of PPIs as endpoints of increasing pragmatic scales, and gives the expression *bags of money* as an example of top of the scale idiomatic PPI. However, there are at least two problematic aspects in his proposal. First, such a top of increasing pragmatic scale can be easily pushed down, as suggested by the sentence in (40), where the expression *bags of money* identifies two distinct positions on the scale. It would be more appropriate to say that the expression identifies a class rather than the scalar endpoint. Second, the idiomatic interpretation is possible also inside the scope of the anti-trigger *not*, see (41). This means that, in order to accept Krifka's proposal, the traditional definition of PPI must be modified.

(40)   Lisa and Lea both have bags of money, but Lisa has more than Lea.

(41)   I am sure that I won't get bags of money out of that business.

5   Recent developments

Work on *any* carried out during the nineties no longer restricts to polarity licensing, or makes of *any* the prototypical NPI. Attention is paid to irreferential determiners (ID) across languages, i.e. determiners that seem to block or dim the reference to individuals the way *any* does, e.g. French *tout* and Modern Greek *kanis*. The notion of irreference can be formulated in terms of existentiality. In this type of hypotheses, the existence of individuals constituting the reference of N in phrases ID + N plays a crucial role. In some respect, Kleiber and Martin (1977) had explored it for *tout*. Similar proposals have been made by Dayal (1995), and as non-veridicality by Zwarts (1995) and Giannakidou (1997a). There is another way of conceiving irreference, very close, but not coincident, which builds on the notion of individuation. This hypothesis is developed by Tovena and Jayez (1999)[11], (1997b).

   Kleiber and Martin argue that in *tout* N, N must be free to refer to an empty class, and that *tout* extends the predication of the sentence to any potential member of the class denoted by the N, including those which are not necessarily the most representative. Kadmon and Landman (1993) propose an analogous theory for capturing the free-choiceness of *any* and accounting for similarities with generic statements. They claim that *any* is an indefinite whose quodlibetic properties follows from the additional semantic/pragmatic constraints of *widening* and *strengthening*. Widening is the property according to which, in a sentence of form $\phi(any\text{N})$, ϕ is asserted to be true for absolutely all the individuals of the class N (reduced tolerance to exceptions). For instance, a generic sentence such as (42a) is equivalent to (42b) plus some instructions on how to broaden the domain of owls, because widening forces us to consider 'just any owl, not only the most normal, typical, . . . '. This is a pragmatic effect.

(42)   a.   Any owl hunts mice

       b.   An owl hunts mice

   Strengthening says that the assertion of $\phi(any\ \text{N})$ implies the assertion $\phi(a\ \text{N})$. The unacceptability of (43) is correctly predicted because *Louise read a possibly atypical book* does not imply the corresponding assertion *Louise read a typical book*. This is a semantic constraint.

(43)   ?? Louise read any book

   On the basis of common features of its meaning, these authors suggest that it is not an accident that free–choice and negative polarity *any* are the same lexical item. These considerations, consistent with Ladusaw's (1993) idea of a

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[11]This paper was written in 1996.

link between negative polarity expressions and indefinite meaning, go back to Klima (1964).

The notions of widening and strengthening can be viewed as special expressions of the more general notion of scalar inference, although Kadmon and Landman do not make any link to Fauconnier's work and reject the relevance of scalarity when discussing Krifka's (1989) idea of set of alternatives. However, on the one hand, scales would allow them to tie the case of *any* to other negative polarity manifestations, for instance with minimisers.[12] On the other hand, they would allow them to situate the issue under examination in a broader perspective, since scales are relevant for other domains of grammar.

Kadmon and Landman's analysis is built upon a relation between an 'initial' and a stronger/wider position. The existence of this dependency is not always clear. Krifka (1994, p.195) points out that the widening effect seems to take place only when *any* is stressed. The dialogue presented in (44), argues Krifka, can be modified substituting the first answer by *No, I don't have any potatoes*. This change would not express the intention of widening along a dimension whatsoever, and this *any* would not be stressed, contrary to the *any* in the second answer. We can make a similar point for the case of subtrigging[13] in (45).

(44)   A: Will there be French fries tonight?
       B: No, I don't have potatoes.
       A: Not even just a couple of potatoes that I can fry in my room?
       B: Sorry, I don't have ANY potatoes.

(45)   a.   *She read any book.

       b.   She read any book which was on the reading list.

Next, as noted by Dayal (1995), *any* can be modified by *almost* and *practically*, modifiers considered in the literature as tests for identifying universal quantifiers. This fact is not compatible with an analysis as indefinite. Finally, the phenomenon of subtrigging via non-accidental modification comes as a surprise in this analysis.

Dayal (1995) discusses cases where Kadmon and Landman's notion of strengthening cannot be used, mainly subtrigging. She claims that admissible contexts for *any* are those in which the existence can be explicitly negated without contradiction. The distribution of *any* in non intensional contexts is argued to be regulated by two constraints. First, *Non Existence* says that an occurrence of $[_{NP}$ *any* $\beta]$ in a statement ϕ is licit iff it does not entail $\exists\beta\phi$. Second, *Contextual Vagueness* says that even if some use of *any* satisfies NE, it still must not give rise to an interpretation in which the speaker knows the individuals

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[12]This term refers to expressions like *a thing, a drop*, etc. 'When these items occur in positive contexts (if they do), they denote a minimal quantity; when they occur in negative contexts, the negation denotes the absence of a minimal quantity, and hence the presence of no quantity at all.'(Horn 1989, p.400).

[13]The term of subtrigging refers to cases where the presence of a modifier of the noun rescues the use of *any*, see (Davison 1980), (Carlson 1981), (Dayal 1995).

which constitute the set referred to by *any β*. The difference between (46a) and (46b) is explained by postulating that, in extensional contexts, universal quantifiers bearing on an unmodified noun N entail existence of individuals of the N category, while this entailment is not in force with some types of N's modification (e.g. relatives).

(46) a. ??Mary read any book.

   b.   Mary read any book assigned for the exam.

Zwarts (1995) argues that a common point between FC and PS *any* is that they are restricted to nonveridical contexts. PS *any* occurs in downward monotone environments, a proper subset of nonveridical ones. A sentential operator O is *veridical* only if $O(p_1 \ldots p_n) \Rightarrow p_1 \wedge \ldots \wedge p_n$ is always true. It is *nonveridical* in any other case. A nonveridical operator O is called *averidical* if $Op \Rightarrow \neg p$ is always true. Some context can be viewed as a sentential operator, e.g. epistemic contexts like *believe that* do not entail the truth of the proposition they foster: one does not always believe what is true. One can believe things which are false or undecided. Giannakidou (1997a) proposes a definition of nonveridicality that is relativised with respect to the context. She defines models construed as collections of worlds in the context set, which is itself the set of worlds compatible with what the agents believe to be true prior to any assertion. These models are relativised to individuals, so that different views can be distinguished, e.g. the epistemic status, the dream world, etc. Here a propositional operator O is *veridical* only if $Op \Rightarrow p$ in at least one model in the context. It is *nonveridical* in any other case, and it is called *averidical* if $Op \Rightarrow \neg p$ in any model in the context. While this definition is clear for attitudinal contexts, it requires some accommodation to be extended to referring expressions like NPs. For a determiner, veridicality is understood as the requirement that the denotation of the NP argument is non empty in a context, and nonveridicality is the absence of such a requirement and the possibility of having an empty denotation. Here nonveridicality is an implicature. The NPIs' requirement for averidicality of the context is argued to be met either via the presence of an averidical expression, or whenever the context gives rise to a conversational negative implicature, in the spirit of (Linebarger 1980a).

While the existentiality/veridicality approach seems natural for questions and downward monotone contexts (including negation), Tovena and Jayez (1997b) observe that it runs into problems in other cases. The hypothesis that licensing contexts are contexts that do not support any existence entailment leads to cases of underlicensing, i.e. *any* is wrongly predicted to be impossible (47), overlicensing, i.e. it is wrongly predicted to be possible (48), and indiscrimination, i.e. observations support the competing hypotheses of non-existence and non-individuation (49).

(47) Pick any card

(48) A psychologist instructing a subject:
      That is the room, cards with various shapes are scattered on the floor.

You must pick up every/??any square and then push the green button. If there are no squares, push the red one

(49) At that time any foreigner was considered as responsible for the war, ?? but there were no foreigners.

Their criticisms show that an irreferential determiner is odd whenever the interpretation derives the truth of the sentence containing it from the knowledge that specific individuals form the extension of N. They propose that *any*-phrases stand for modal *arbitrary* constants, or *A-name*s in the sense of (Fine 1985). As discussed above, Kempson (1985) exploited Fine's notion of dependency for modelling licensing facts. Tovena and Jayez aim at capturing the similarities between *any* and both a universal quantifier and indefinites. *Any* points simultaneously to an arbitrary object as well as to the set of individuals it stands for. Loosely speaking, *any* behaves as a universal quantifier with wide scope. Strictly speaking, it introduces an arbitrary constant of the same semantic type as the lexical head. This entails that *any* i) is not a universal quantifier but semantically simulates such a quantifier when considered from the point of view of individuals, and ii) introduces an additional interpretational layer, which corresponds to the arbitrary object in the terminology of Fine. Such an object is not abstracted from a set of individuals, although in each model it refers to this set. Being modal, *any* requires that the statement in which it occurs depends only on the arbitrary object, not on the exact nature of the individuals of the set associated with the object, i.e. the individual identity. So it is crucial that the set exhibits some possible variation. This is connected with the fact observed by Fine in various logical systems that truly *universal* statements cannot be enumerative. They elude any characterisation in terms of rigid (non variable) satisfaction set(s). The constraint on nonindividuation does not require non-veridicality to be satisfied. In (49), foreigners do exist, but the identity of the subset of foreigners actually regarded as responsible for the war in what could be called *considering*-events is irrelevant, which is sufficient for licensing *any*. What a generic sentence says is not that some individuals (foreigners) have a certain property (they were considered as responsible for the war), but that they have this property *in virtue* of being of a given type (foreigner). There is a sense of modal dependence between two properties, not just set-theoretic relations (intersection, subset, etc.).

6   Update

In view of the interval that has elapsed between the time the original version of this paper was provided and the scheduled date of pubblication, it would seem desirable to add the following update on the state of the art. Research has progressed in at least two domains, the phenomenon of free-choiceness with the related question of subtrigging, and the contribution of computational tools to the study of polarity sensitivity.

Studies on free-choiceness are branching out into independent research. This notion is viewed as a crucial part of the theory of determiners, and no longer as

a subphenomenon linked to NPIs. In few words, a sentence S of form $\phi(\text{Det}_{\text{FC}}$ N'), where Det_{FC} is a free–choice determiner, signals that the property ϕ is satisfied by any member of the class corresponding to N'. For the FC function, languages may use PS items, such as *any* in English and *le moindre* in French, or develop an independent series of items, as in French, Italian and Modern Greek.

The intuition that FC items are really choice insensitive has materialised into a number of recent proposals that all rely on the idea of VARIATION to account for their main properties. The central idea behind them can be summarised as the necessary but not (always) sufficient condition in (50), although they may differ in their architecture and empirical coverage.

(50)   A $\phi(\text{Det}_{\text{FC}}$ N') predication is licensed only in contexts where the N' objects which satisfy ϕ exist in different worlds or situations.

First, variation may be conceived as modal force. For Eisner (1995) and Dayal (1998), it is because *any* alludes to an unlimited set of objects (counterparts across worlds for Eisner and situations for Dayal) that it is sometimes not felicitous in sentences that purport to describe real situations, where the set of objects is (normally) limited. More in details, Eisner proposes that (PS and FC) *any* is a universal quantifier whose domain of quantification is the set of possible individuals across the different possible worlds. Unacceptable cases are analysed as attempts to 'hybridize' worlds. For example, (51) is odd because it says that any person in any possible world stole tarts in the actual world.

(51) $^{??}$The tarts were stolen by anyone

Two further aspects of Eisner's proposal are that *any* i) is predicted to fit nicely into downward entailing contexts because they do not entail the existence of any event leading to a hybrid quantification; and ii) it gets wide scope immediately over its licensor. The assumption of this particular scopal behaviour is argued to be needed anyway if one wants to get the correct scope in nondownward entailing contexts. For instance, the correct reading for (52) is (52') and not (52").

(52)   There could be anything at the bottom of this rabbit hole
       (52') : it is possible that $\forall x$ (x is at the bottom of the hole)
       (52") : $\forall x$ (x could be at the bottom of the hole)

As for Dayal, she claims that *any* is a universal quantifier over situations that obeys the constraint in (53). The notion of *contextual vagueness* is used to explain subtrigging. (53) has two main consequences. First episodic affirmative sentences without modification of the N are correctly predicted to be anomalous. A sentence such as (51) has the underlying logical form (54).

(53)   In a sentence of form $\phi(any\,\text{N})$, *any* is a universal quantifier which creates a tripartite structure: $\forall s, x\ [x \text{ is a N in } s]\ [\phi(x) \text{ in } s]$

(54) $\forall s, x$ [x is a person in s] [x stole (some of) the tarts in s]

This entails that in every situation where there was a person, this person stole (some of) the tarts. This is obviously absurd since there are situations where there is a person but no tarts. Note that, since quantification is over situations (not worlds) and the family of situations is not defined, one can imagine that it contains all the situations of the actual world, without any reference to other worlds. Second, postnominal modifiers redeem *any* phrases whenever they restrict the class of relevant situations by confining them to some temporal interval. Subtrigging does not work if there is a merely accidental connection between the properties of the modifier and the main predication. Non–accidentality is seen as a direct result of the modal quantification introduced by *any*. Quantification over possible individuals is incompatible with a kind of connection which holds only of particular individuals. A similar analysis of non–accidentality was independently proposed by (Tovena and Jayez 1999) for the French item *tout*.

Second, variation can also be conceived in terms of possible substitution (Giannakidou (1997b, 1999a, 1999b), Tovena and Jayez (1997a, 1999)). More in detail, (Tovena and Jayez 1997a) propose a unified criterion for *any* articulated in two parts, i) the interpretation of a sentence of the form *Any* N VP or NP VP *any* N is required to be conducive to a universal interpretation of form $\forall x$ N$(x) \Rightarrow \phi(x)$ for some ϕ; ii) *any* phrases must have variable reference, in order to account for the subtrigging effect. Two cases of variable reference are identified. First, the reference of the *any* phrase may vary across possible worlds. This is what happens in *Pick any card*, where the invitation/permission interpretation allows the addressee to pick any card she likes. This creates a virtual set of worlds differing only on the identity of the card which is picked by the addressee. Second, postnominal modifiers like adjectives or relative clauses do not necessarily denote a fixed set of individuals in the world where the sentence is evaluated. In contrast, unmodified N's or N's modified by prenominal modifiers refer to a fixed set of entities. Variation is then implemented as the possibility of having different subworlds, which differ with respect to the identity of the entities in the denotation of the modifiers.

As seen in section 5, Giannakidou replaces the notion of downward entailing context by non-veridicality as licensor for NPIs. As for FC items, she (1999b) imposes the two constraints that i) like NPIs they are not licensed in veridical contexts, and ii) they involve variation across the worlds. In her view, a FC item is an existential quantifier that must be evaluated with respect to a set of alternatives. The modal structure of the set of alternatives creates a space of choice among different individuals. The choice of a given individual has no effect on the truth of the sentence, which is a way to express the intuition associated with FC items. Giannakidou argues that the variation-based constraint associated with FC items entails an anti-episodicity principle. FC items are banned from sentences whose logical representations involve existential closure on an event variable. This is essential to explain why Modern Greek FC items are not to be found in negative and interrogative sentences. However, this does not apply to *any* and FC items in several other languages.

As for the contribution of computational tools, the use of corpus linguistics to study distributional restrictions on NPIs is exposing interesting properties of the set. It is felt that items are not evenly distributed over the various environments in which they are licensed. But now (Hoeksema 1997) has shown that comparable items in different languages tend to have comparable distributions in terms of sets of environments but also of frequency of occurrence in given environments. This is true in monomodal cases, where the bulk of occurrences are located in one area of the spectrum, as well as in multimodal cases. The method of subdividing NPIs in classes determined by the trigger elements can be applied also to elements that, strictly speaking, are not NPIs but have a distribution which is somewhat similar to them, such as *care* in *I don't care*. These pseudo-polarity items seem to be the set out of which future NPIs will grow as a result of a process of grammatization.

7   Concluding remarks

The phenomenon of polarity sensitivity presents several points of interest. First, a proper definition of the set of elements concerned is a first challenge to face. There are considerable syntactic differences among NPIs. Furthermore, NPIs are members of open classes. Thus, the set of NPIs cannot be identified safely by listing its members.

A second problematic issue is that of defining the behaviour of NPIs, i.e. why these elements are sensitive and to what. The many analyses proposed may be grouped in two main trends, semantic and syntactic, although some of them use mixed resources, and some refer to pragmatic notions. Initially, the semantic trend evolved in a fairly smooth way, without drastic disclaimers of fundamental points previously adopted. Recently, the identification of the licensing property with downward monotonicity (Giannakidou 1997a), or the relevance of the notion of licensing (Tovena 1996) have been rejected. Positions belonging to the syntactic trend are more articulated. They go from a transformational approach (Klima 1964) in the mid sixties, through the adoption of syntactic filters coupled with semantic or pragmatic constraints in the seventies up to the mid eighties (Baker 1970) and (Linebarger 1980a), to the more recent analyses, which appeal to surface null entities to account for the phenomenon (Progovac 1988). A basic feature of all syntactic proposals is that overt negation is considered to play a main role, which is to be defined separately as paradigmatic case. Despite the differences, there is a vast consensus on the centrality of the 'licenser–item' relation. For decades, the whole conception of negative polarity phenomena has revolved around the key figure of the licenser. But, what makes certain expressions so sensitive to so-called licensing contexts is a far less explored issue.

A characterization of the notion of PS item is still in progress. Studies often concentrate on a small set of expressions. The question of the definition of the items has been approached mainly from two sides. One mathematical way to define the object of an investigation is by identifying the minimal set of characterising properties. This is more or less the strategy adopted in analyses

belonging to the semantic school. This strategy raises the issue of the possibility of uniquely identifying the object of study. Haspelmath (1993) has shown that many of the items that could be considered of negative polarity are polyfunctional, where polyfunctionality is defined as a spectrum of related functions. On the other hand, the strategy adopted inside the syntactic school is that of identifying the class by describing the behaviour of its members. A clear shortcoming is that the behaviour described does not cover the entire distribution of the item. This is to say that the definition provided is unable to identify uniquely the group that it is meant to characterize. The general way out is to partition the data as belonging to different lexical items sharing the same form, often along the lines of an interpretive variation not necessarily clearly identified. As the emphasis of the research in this school is on the distribution of the items, and the nature of the relation between licensers and licensed elements is not submitted to thorough scrutiny, analyses concentrate on a geometrical rendering, i.e. on locality constraints.

Finally, the phenomenon of free-choiceness is gaining attention. The intuition that FC items are really choice insensitive has recently materialised into a number of proposals that rely on the idea of variation to account for their main properties. Although they may differ in their architecture and empirical coverage, they share the necessary but not (always) sufficient core condition that a $\phi(\text{Det}_{\text{FC}} \text{ N'})$ predication is licensed only in contexts where the N' objects which satisfy ϕ exist in different worlds or situations.[14]

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[14]To complete this review, it must be added that research is carried out also on the issue of how children acquire restrictions on the use/distribution of PS items, see for instance van der Wald's (1996) doctoral dissertation and references therein.

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