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► **To cite this version:**

Alda Mari, Lucia Tovenà. An additive and a scalar particle: the case of the Italian 'neppure' and its French counterparts. J.P. Montreuil et C. Nishida. *New Perspectives on Romance Linguistics*. Vol. 1: Morphology, Syntax, Semantics, and Pragmatics., John Benjamins, pp.187-200, 2006. <ijn_00354446>

HAL Id: ijn_00354446

https://jeannicod.ccsd.cnrs.fr/ijn_00354446

Submitted on 19 Jan 2009

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A UNIFIED ACCOUNT FOR THE ADDITIVE AND THE SCALAR USES OF ITALIAN *NEPPURE*

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Neppure is an additive and scalar particle of Italian that is used to add negative information. Examples (1) and (2) illustrate the two readings in adnominal (a) and adverbial (b) positions.

- (1) a. *Giovanni non ha mangiato la verdura e neppure la frutta*
“John did not eat the vegetables or the fruits.”
b. *Non telefonava e neppure scriveva*
“S/he did not phone and did not write either.”
- (2) a. *Non ha mangiato neppure il dolce*
“S/he did not eat even the dessert.”
b. *Non ha neppure sentito parlare del film!*
“S/he did not even hear about the film!”

As noted by König (1991:63), simple sentences with additive particles (i) presuppose that at least one alternative value satisfies the predicate and (ii) entail the corresponding sentence without the particle. The second half of (1a), for instance, presupposes that there are items other than fruit that John has not eaten—one (the vegetables) is overtly mentioned in the first half, others may have been mentioned in the preceding discourse or be part of the common knowledge. It entails that he has not eaten fruit. Similarly, the second conjoint in (1b) presupposes that John has not accomplished other actions, one of which is phoning, and entails that he has not written. Sentences with scalar particles involve a specific scalar conventional implicature (König, 1991:98). Not only do they presuppose that alternative values under consideration in a context satisfy the predicate, but also that these values are ordered. They also entail the corresponding sentence without the particle. (2a) presupposes that there are other items that John has not eaten. These were less likely to be eaten than the dessert. Similarly, (2b) presupposes that actions other than hearing

about the film, e.g. seeing it, did not take place and implicates that hearing was the most likely.

It is generally argued (e.g. Karttunen and Peters 1979; Rooth 1992 and König himself), that the contribution additive and scalar particles make to the semantic content of a sentence is rather limited. They are presuppositional items that affect the felicity conditions of the utterances. In this paper we show that *neppure* provides a more consistent contribution to the interpretation of the sentence. It adds negative information, thus potentially affecting the truth value of the clause that hosts it, and poses a strong constraint on scales. We propose a unified account for these uses. We show, as tacitly accepted, that in both uses *neppure* focuses on an element that is understood as a member of a class/series and adds negative information. But we also show that in both interpretations *neppure* sets a temporary closure in the speaker's state of knowledge. At a given point in time, it marks that all possible relevant negative facts relative to a class have been checked out. The difference between additive and scalar *neppure* lies in the way the class/series is built and not in the presence vs. absence of a presupposition concerning an ordering on the class.

Our analysis makes the prediction, crucial for the Italian data that the presence of an overt antecedent preferably correlates with the additive reading, but the absence of antecedent always correlates with the scalar reading. Note that the scalar reading is compatible with the presence of antecedents (3) and that the sentence is infelicitous if perceived lexical or cultural orderings are flouted (4).

- (3) *Non ha studiato il capitolo e neppure l'ha letto*
 "He didn't study this chapter and he did not even look at it."
- (4) *#Non ha letto il capitolo e neppure l'ha studiato*
 "He did not look at this chapter and he did not even study it."

In this paper, following the terminology in Krifka (1998) and Rullmann (2003), we call *associate* the nominal or the verbal expression to which *neppure* applies. The sentence containing *neppure* is called *host clause*. The entity or event of the same type as the associate and which is overtly present in the context is called *antecedent* and the sentence that hosts it is the *antecedent clause*. In the case of additive *neppure*, the context proposition and the host clause may be part of the same sentence (1a) and (1b).

Sections 1 and 2 constitute the core of the paper and contain our two main claims. In section 1 we state the **principle of negative information**, arguing

that *neppure* adds negative information (1.1) and introduces the presupposition that for other elements in the context we have negative facts of the type asserted of the associate (1.2). Section 2 is devoted to the discussion of the **epistemic closure principle** and is articulated in four subsections. We first show that, in both its additive and scalar uses, *neppure* sets a temporary endpoint (2.1). We claim that this endpoint is agent oriented and discuss previous accounts of the notion of endpoint in correlation with the mandatory scalar reading. Secondly, we argue that in both uses, *neppure* closes the class or the series (2.2) and propose a way to model this situation. In section 2.3, we show how the set is closed respectively for additive and scalar interpretations. We claim that in the additive case the set is defined extensionally by overt enumeration of the members of the class, whereas with scalar *neppure* the set is built intensionally by setting a criterion for membership and imposing an order to support the inferences. In the first case all needed information must be available, while in the second, some information must be accommodated. Some mix cases are discussed in section 2.4. Section 3 briefly concludes this paper.

1. *Adding negative information and triggering negative facts*

The first hypothesis that we need to investigate is that *neppure* presupposes a class or a series of negative facts and adds negative information.

1.1 *Neppure contributes negative information*

Neppure can occur in postverbal position when the verb is negated (5a) and (5c) but is out when the verb is not negated (5b).

- (5) a. *Non ha fatto I compiti neppure Daniele*
 “Not even Daniele did the homework.”
 b. **Ha fatto I compiti neppure Daniele*
 “Did the homework neppure Daniele.”
 c. *Non ha fatto neppure i compiti*
 “He did not even do the homework.”

In preverbal position *neppure* can be the only negative word in the clause: it contributes a sentential negation and the following verb must not be negated (6a), otherwise the sentence is marginal (6b), as it is standardly the case in the negative concord marking system of Italian. For some speakers it can somewhat be rescued via a double negation reading.

- (6) a. *Neppure Daniele ha fatto i compiti*
 “Not even Daniele did the homework.”
 b. **?Neppure Daniele non ha fatto i compiti*
 “Not even Daniele did not do the homework.”

When it comes to the interpretation of data such as (5) and (6), the two labels of NPI or NC-word concur. We claim that *neppure*'s function of adding negative information is naturally lexicalized via an NC-word, because this type of realization warrants that the host clause is always negative, but we agree that the precise nature of the function and the realization can (and should) be proved separately.

Clear evidence in favor of the specialization for negative information is constituted by the requirement that a negative fact of a similar nature to that asserted relatively to the associate is presupposed relatively to the antecedent, but no precise constraint on the shape of the antecedent clause comes with it.

Support for the analysis in terms of a lexicalization as an NC-word comes from examples (7) through (12). As we can see, *neppure* can constitute a negative fragment answer (7), something NPI cannot do, and requires clausemate negation when in postverbal position (8), whereas polarity sensitivity is not a clause-bound phenomenon.

- (7) *Ha mangiato almeno? Neppure*
 “Did s/he eat, at least? Neither that/Not even that.”
 (8) **Non ho detto che ha mangiato neppure la pera*
 “I did not say that he ate neppure the pear.”

Next, *neppure* is not acceptable under negative predicates as in (9) that are well-known licensors for NPIs, and is out also in other standard licensing contexts such as questions (10), the antecedent of conditionals (11) and *troppo* as in (12).

- (9) **Dubito che neppure Luisa scriva*
 “I doubt that even / not even Luisa writes.”
 (10) **Ha mangiato neppure la pera?*
 “Did s/he eat even the pear?”
 (11) **Se mangia neppure la pera, la situazione è grave*
 “If s/he eats neppure la pera, it is a serious situation.”

- (12) **Sembra troppo stanco per fare neppure i compiti*
 “He seems too tired to do even the homework.”

Of course, examples (9)–(12) could be invoked to support a characterization as strong NPI. However, besides the ongoing discussion of whether the characterization as NPI or NC is more appropriate than the other, what matters for us, for the purposes of this paper, is that *neppure* brings with it negative information. In particular, it brings with it the presupposition that there are, in the context, some other entities or events relatively to which a negative fact holds of a nature analogous to that described in the host clause.

1.2 *Presuppositions and scalar items*

Neppure is a focus-marking particle. Since Jackendoff (1972) and Rooth (1985) it is assumed that focus elements project a class of alternatives. The focus semantic value of a phrase of category *S* is the set of alternative values to its semantic value, plus its ordinary semantic value.

- (13) *Giovanni non ha invitato neppure Luisa*^F
 “Giovanni did not invite even Luisa.”
Ordinary semantic value: $[[\text{luisa}]]^{\circ} = \{\text{luisa}\}$
Focus semantic value: $[[\text{luisa}]]^F = \{\text{luisa}, \text{maria}, \text{serena}\}$
- (14) *Giovanni non ha neppure telefonato*^F *a Luisa*
 “Giovanni has not even called Luisa.”
Ordinary semantic value: $[[\text{telefonato}]]^{\circ} = \{\text{phone}\}$
Focus semantic value: $[[\text{telefonato}]]^F = \{\text{phone}, \text{write}, \text{e-mail}\}$

Following (Rooth 1992 :93), and in agreement with much literature on scalar particles, we assume that the constraint introduced by the focus interpretation is a presupposition. Let Γ mark the position associated with focus, for expression ϕ , in the syntactic tree.

- (15) *Presupposition with focus for scales (constraint on sets):* $\phi \sim \Gamma$
 presupposes that Γ is a subset of the focus semantic value for ϕ and contains both the ordinary semantic value of ϕ and an element distinct from the ordinary semantic value for ϕ .

For *neppure* α , rule (15) gives: $[[\text{neppure } \alpha]]^F = \Gamma \subset S$.

We must add that, for ordered sets, Γ satisfies the scalar implicature: with respect to (13), for instance, if Luisa had a certain level of probability of being invited by Giovanni but turned out not to be, other people who had a lower probability of being invited also were not invited for sure.

Let us derive some consequences. First of all, given its additive negative nature, *neppure* introduces the presupposition that there is (at least) one entity/event in the context relatively to which it holds a negative fact of a nature similar to that asserted of the associate. *Neppure* satisfies *Negative Information Principle*:

(16) **Negative Information Principle:** Increase negative information.

Second, as other focus semantic particles, *neppure* affects the felicity conditions of the utterances by imposing constraints on the focused element and on the context (Karttunen and Peters 1979). Differently from other focus semantic particles, though, it is also able to affect the truth conditions of the host clause, since it can express negation, see (6) above.

Third, Rooth's rule of presupposition associated with focus (15) introduces a constraint on scales, without any specification. It does not constrain the set of alternatives to be ordered, nor does it specify constraints regarding the position of the focused element on the scale. In particular, it is neutral with respect to the necessity of closing the set of alternative values by identifying this position with one extreme of the scale. *Neppure* adds this information: it sets an endpoint and closes the scale. The next section is devoted to the discussion of these two issues.

2. *Epistemic closure*

In the rest of the paper we show that given a speaker's state of knowledge, *neppure* signals that *a negative fact has been asserted of an entire class*. In other terms, it signals that the negative information contributed concerns an entire class. In order to show that this is the case, we need to answer the question of how *neppure* ensures that all the elements of the class have been checked out. We proceed in two steps. First we show that *neppure* sets an endpoint in 2.1. Second, in 2.2 we show that all the elements in the class, given the speaker's state of knowledge, satisfy principle (16). Then, we show in section 2.3 how the closure is differently obtained for additive and scalar *neppure*. Since the notion of endpoint is more crucial for scalar *neppure*, we concentrate particularly on this use.

2.1 *Neppure sets an endpoint*

We hypothesize that *neppure* always sets an endpoint, but this seems to be straightforwardly contradicted by the following example:

- (17) *Maria non ha vinto neppure le semifinali di Wimbledon!*
 “Maria did not win even Wimbledon semifinals!”

The semifinals are not an endpoint *per se* in a tournament. However, the information conveyed by the sentence goes beyond the simple pointing which stage of the tournament was not reached and includes that Maria has a level of tennis playing such that she could have won the semifinals, and possibly even the finals. In other terms, the semifinals are the greatest lower bound of success for Maria and thus an end-point on the scale of tennis matches that she is most likely to win.

In order to better capture this point let us consider previous accounts of the notion of endpoint and scalar implicatures, which have tried to explain why the scalar reading is mandatory in the absence of antecedents.

2.1.1 *Worldly scales and relevance: previous accounts.* Schwenter and Vasishth (2000) study two pairs of scalar additive particles in Spanish, i.e. *incluso* and *hasta*, and in Hindi, i.e. *-bhii* and *-tak*. The elements of each pair often are interchangeable and are said to translate as English *even*. The difference, according to them, is that *incluso* and *-tak* require their host clause to be more informative than another similar proposition already accessible in the context, like *even* does, whereas *hasta* and *-bhii* do not. As revealed by the pointer to *even*, ‘accessible’ means ‘inferrable’ rather than ‘overtly present’. Next, they set up a correspondence between requiring an accessible alternative and not being an inherently endpoint marking particle vs. not requiring an accessible alternative and being an inherently endpoint marking particle. *Hasta* is thus predicted to be incompatible with ‘semifinals’ in the counterpart of example (17) because the associate (semifinals) is not an inherent endpoint. In our view, contextual information is not relevant for licensing weaker scalar particles specialized for unbounded scales, as opposed to context free strong scalar particles specialized for bounded scales. The choice of marking the most informative point can be explained via a Gricean maxim, and the contextual scales speakers reason with may well be truncated, i.e. end with non-inherent endpoints. However, contextual information is crucial for building the set, hence the main difference is between there being an overt antecedent from which to get information directly or having to rely on inferences to reconstruct the set.

One should wonder whether relevance theory would be more appropriate. Kay (1990) had already explored this line of thought. For (17), it predicts that it is more relevant to mention the semifinals since one can predict that she has not won the finals either. One should not conclude from the fact that she has not won the finals, that she has not even won the semifinals, as it was minimally expected from her. Note, however, that this is standard for scalar inferences (see Horn (1972), Fauconnier (1975) and followers).

This account raises some problems *per se* and in relation with *neppure*. First, it is not clear why one should mention one stronger alternative and not the strongest. Indeed, to assert that Mary won even the semifinals when one knows she won the final is at least infelicitous if not downright unacceptable. Saliency can hardly lead to selecting a different alternative. Moreover, Kay, and Schwenter and Vasisht after him, reason with worldly scales and, as we are suggesting, the endpoints with which scalar particles correlate, are not necessarily given by the external reality. Finally, his account does not provide us with any anchor for explaining what is common between additive and scalar uses of *neppure*.

König (1991) tries to explain the relation between the additive and the scalar uses of focus particles in the light of the greater relevance theory of Kay and suggests (König 1991:64) that they share the same presupposition: at least one of the alternative values under consideration in a context satisfies the complex predicates. Under the additive interpretation the alternatives are overtly mentioned, under the scalar interpretation, since only the associate of the particle is usually mentioned, it is the most relevant. The alternative values are triggered on the basis of their degree of informativeness, which is lower than that of the associate on the scale of relevance. Since the complex predicate applies to the most relevant alternative, it must also apply to the less relevant, as standard scalar reasoning goes.

König's work marks a step forward in the individuation of the common core of the additive and the scalar uses. However, apart from their sharing the same existential presupposition, it is not clear what else additive and scalar *neppure* share. In other terms, one should make clear what positive contribution they make to the interpretation.

2.1.2 Neppure introduces the strongest possible argument in the conversation. Our analysis of (17) leads us to make the hypothesis that *neppure* does not introduce a 'more informative proposition' but the strongest possible argument on an agent oriented scale. As we noted, (17) conveys the information that Maria has not fulfilled the minimal requirements for her

standards. Given Maria's world, one could conclude that this competition is not worth mentioning at all.

The statement is the strongest that can possibly be made from the point of view of the speaker. The semifinals are an endpoint for both the speaker and the hearer in relation with their understanding of Maria's world.

Example (18) can be analyzed similarly. It is generally assumed that the service is a difficult move for anybody but a professional tennis player. For such a player, it is (one among) the minimal requirement(s) for disputing a match. Consequently, if uttered about a professional tennis player the sentence is interpreted in the way just described. If uttered of an amateur tennis player, it is almost uninterpretable.

(18) *E non sa neppure servire!*
 "And he cannot even serve!"

For the professional tennis player, sentence (18) tells that the service is the greatest lower bound of technicality he must ensure. It is not an endpoint *per se*, however.

Again, the ending point is not fix and universal, but has to be considered in relation with the context and speaker's state of knowledge, and the nature of the entity denoted by the associate.

The provisional conclusion we draw is that scalar *neppure* marks its associate as a contextual or temporary endpoint in a series or a class. Marking an endpoint means to make sure that the facts have been checked for the entire class. If the endpoint is inherent, this is not problematic. If this is not an inherent endpoint, and since it is always possible to build speaker-oriented situations in which the associate can be seen as an endpoint, one must that a temporary endpoint is, in fact, an endpoint.

Since this amounts to claiming that *neppure* signals that a negative fact has been checked out for all the elements of a class or a series, we have now to show that all the elements of the class or the series have to satisfy negative information principle and this for both the scalar and the additive use.

2.2 *Extensional and intensional definition of a set and notion of closure*

In the previous section we have identified the notion of closure with that of flexible endpoint on a descriptive basis for scalar *neppure*. However, it can be extended to the additive use and can be associated with a precise algorithm of identification of the class or a series. In particular, it can be considered as the outcome of a specific procedure for building the class and of checking that

the negative fact is satisfied by the elements relevant for the speaker. This procedure is the positive contribution of *neppure*.

Given a context C , a model, in that context, is a triple $\langle E, D, f \rangle$ where E is a set of entities (restricted under speaker's state of knowledge and C), D a set of semantic dimensions and f a function that assigns to each entity a value on a semantic dimension. The semantic dimension is identified on the basis of the lexical contribution of the associate and of the antecedents (if present). Their images on this semantic dimension are determined semantically and pragmatically.

Let x be the ordinary semantic value of the focused phrase α ($[[\alpha]]^o = x$), E the focus semantic value of the phrase $[[neppure \alpha]]^F$ and $d = f(x)$.

E is the union of the ordinary semantic value of the phrase and the set A of its alternative values ($E = \{x\}, A$).

This definition of E is meant to provide the maximal extension of the class/series. It follows that the set of alternatives that satisfy negative information (i.e., the set A) is closed.

Our claim is that by stating how the set A is construed, we can show how it comes to be closed. The procedure for defining the elements and closing the class/series is the specific contribution of *neppure* to the meaning of the sentence.

This procedure is different for the additive and the scalar uses. In the additive case the set is built by enumeration (extensional criterion). For all the elements that are mentioned, including the associate of *neppure*, the value of f is the same. In the scalar case, the procedure requires the individuation of a closure point, a criterion for membership, and the order (intensional criterion).

$$(19) \quad \begin{aligned} [[neppure_{\text{additive}} \alpha]]^F &= \{ a_1, a_2, \dots, a_n \mid f(a_1) = f(a_2) = \dots = f(a_n) = d \} \\ [[neppure_{\text{scalar}} \alpha]]^F &= \{ a \mid f(a) < d \} \end{aligned}$$

Let us develop this in more detail.

2.3 Additive and scalar interpretations: construction and closure of the class

Under the additive interpretation, the set is defined extensionally. The entities denoted by the antecedents and the associate of *neppure* are members of an unordered set. The antecedents are mentioned in the antecedent clause(s). Antecedent clause(s) do not necessarily form a single sentence with the host clause, as in examples (1), but might be found in a larger portion of discourse preceding it. We have also noted that the presence of antecedent(s)

is compatible with the scalar use (see (3)). This is a mixed interpretation and we come back to it in section 2.4.

For the additive interpretation, without any scalar inference, we assume that all the elements have to be mentioned or be made available by the context. Since they all are assigned the same value as the associate on a semantic dimension, no other criterion of membership is provided. It follows that the closure is also obtained extensionally by mentioning explicitly all the members relatively to which the relevant negative fact that is presupposed can be verified. The speaker assumes then that negative information has been provided for all the relevant members of an unordered set.

For additive *neppure*, crucially, it is known information that there are other entities/events relatively to which a negative fact of the relevant type is verified, namely the entities and events mentioned in the antecedent propositions (or made available by the context). The additive interpretation is epistemically transparent. The scalar interpretation instead requires updating the information state (Zeevat 1992).

In the scalar interpretation the associate determines the nature of the dimension. In other terms, by its content, it determines the characteristic of *E*.

The closure is thus intensionally determined. Since the establishment of an order on the semantic dimension turns out to be the procedure to identify elements other than the associate, and since for all and only the elements whose positions on the dimension are entailed by the position of the associate it can be guaranteed that the presupposed negative fact stands verification, the associate also sets a temporary endpoint.

Moreover, the closure is temporary, since it is accepted to hold in the particular context and nothing in the nature of the associate necessarily makes it deserve the privileged position of endpoint in another context. In this way, the series is closed under speaker's state of knowledge.

It follows that, contrary to the case of additive interpretation, two pieces of information need to be accommodated. First, since it is the property introduced by the associate that is relevant to retrieve the nature of the scale, its use as a criterion of membership is accommodated. Second, the presupposition that the property predicated of the associate applies to at least another entity is deemed satisfied in the absence of an antecedent. That the series need to be closed (together with adding negative information and setting an endpoint) is part of the specific contribution of the meaning of *neppure*.

Before we straight out the main prediction of our account, let us state the epistemic closure principle:

- (20) **Epistemic closure principle.** Convey an assessment in the information state of the speaker's knowledge based on the associate and the closure of the class.

Neppure imposes a condition for the interpretation of the sentence given in (21):

- (21) $[[neppure]] = \lambda x \lambda Pneg : \exists a \in E [a \neq x \wedge Pneg(a)] \wedge \forall y \in E [y \neq x \rightarrow f(y) \leq d].Pneg(x)$

We can now state the prediction concerning the correlation between the absence of antecedents and the mandatory scalar reading as follows: an antecedent, when present, provides an element in the set besides the associate. In the scalar interpretation, the associate provides the criterion for retrieving the series. In both cases, the set is temporarily closed under the speaker's state of knowledge.

2.4 *More on the correlation*

The prediction states that there is a correlation between the presence of antecedents and the *preference* for an additive reading, and the absence of antecedents with the *mandatory* scalar reading, let us go through the steps of the explanation.

The presence of antecedents is also compatible with the scalar reading. There is an important difference with additive reading, though: in this case, the entities denoted by the antecedent(s) on the semantic dimension have to be assigned a value equal to that of the associate, on that semantic dimension. This is not the case for the scalar reading, where the order of the antecedents must respect the order on the scale. Recall (3) and (4), where the scale had to follow lexical ordering. The scale can also follow a cultural ordering:

- (22) *Non ha votato per le regionali e neppure per le nazionali*
 “He has not voted for the regional, and not even for the national election.”

- (23) (#)*Non ha votato per le politiche e neppure per le amministrative*
 “He has not voted for the national, and not even for the regional election.”

Since the national election is more important than the regional, one could expect that one should at least vote for the former. In other terms, the degree

of probability of voting for the national rather than the regional election is higher. This is why (25) is infelicitous.

The pragmatic effect obtained from deriving a scalar reading with antecedents is the strengthening of the argument. Not only the criterion is provided by the antecedent, not only the order is accommodated, but also it is verified by the overt mention of the other elements of the scale. Note that (23) and (25) are also accepted under an additive interpretation of *neppure*. Differently from the scalar interpretations (22) and (24), the additive reading is compatible with the possibility that the knowledge of the speaker is not complete, e.g. he is not aware of the possible ordering. The additive and the scalar interpretations seem to allow different continuations:

(24) *Non ha votato per le politiche e neppure per amministrative. Avrà forse votato per il referendum?*

“He did not vote for the regional or for the national elections. Has he maybe voted for the referendum?”

(25) *Non ha votato neppure per le politiche. (#)Avrà forse votato per il referendum?*

“He did not vote for the national or for the regional elections. Has he maybe voted for the referendum?”

This observation points to the fact that intensional closure is stronger than the enumeration of the elements that satisfy negative fact.

3. Conclusion

In this paper we have provided a unified account for the additive and scalar uses of Italian *neppure*. We have defended two claims. First, *neppure* focuses on an element that is understood as a member of a class or a series, i.e. shares the existential presupposition found in positive additive particles. What is special is that it adds negative information in the sense that it signals that the negative fact asserted of the associate licenses inferences about related negative facts (Negative Information Principle). Second, it signals that the knowledge relative to a class of negative facts can be considered complete with respect to a certain state of speaker’s knowledge (Epistemic Closure). The additive and scalar interpretations result from the different procedure adopted to verify the existential presupposition and to comply with the principles of Negative Information and Epistemic Closure.

A major issue still open at present is what, in the nature of *neppure*, enables it to cover both interpretations and cannot be found, for instance, in

the French negative additive counterpart *non plus* (“neither”), that does not exhibit scalar uses. The answer perhaps lies in the difference of the negative concord rules of the two languages, a question still to be investigated.

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