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The Role of Discourse Prominence in the Resolution of Referential Ambiguities Evidence from co-reference in Italian

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1. Abstract

In this paper, I investigate the role of discourse prominence in the resolution of referential ambiguities displayed by anaphoric null subject pronouns (*pro*) and relational nouns (RNs) in Italian. I advance the hypothesis that, in case of referential ambiguity (when more than one discourse referent qualifies as possible antecedent), the preferred antecedent for *pro* (or RN) is the most prominent discourse referent available. I will refer to this hypothesis as the Discourse-Prominence Hypothesis of Antecedent Assignment (DPH). To support the DPH, I present evidence from two questionnaire studies on intra-sentential anaphora and RNs in Italian. Experiment 1 investigates the DPH with respect to the resolution of anaphoric *pro* in Italian. This experiment shows that the preferred antecedent for Italian *pro* is the DP that realizes the most prominent discourse referent (Topic), independently of its syntactic position (subject/object). Experiment 2, tested the DPH on the interpretation of ambiguous RNs. The results of this experiment showed an interesting trend in the direction predicted by the DPH, however, the data was not statistically significant. Overall, both experiments provide evidence against a purely syntactic account of referential ambiguity resolutions and support the idea that information about the prominence status of discourse referents influences the processor in resolving referential ambiguities.

2. Some analogies between pronouns and relational nouns

An anaphoric pronoun is probably the prototypical case of a linguistic expression whose full meaning is determined by making reference to a previous referring expression. A classic approach consists in treating pronouns as variables co-indexed with their antecedents, from which they inherit their referent. An example is shown in (1) below.

(1) Mary_i went to the hospital because she_i wasn't feeling so well.

In the sentence above, the presence of the same index on the pronoun and the subject of the main clause indicates co-reference.¹ By being variables, pronouns admit the so-called bound-variable readings when their antecedent is a quantified-phrase. An example is shown in (2) below.

(2) [Every woman]_i thinks she_i is beautiful.

The presence of the same index on the pronoun and its antecedent tells us that the reading under discussion is one in which the pronoun ‘looks back’ to its antecedent for interpretation, rather than being assigned a salient individual in the extra-linguistic context. Under this reading, there is no particular woman’s beauty under discussion; the sentence simply says that every woman is such that she thinks herself to be beautiful: if Sue is a woman, then Sue thinks herself to be beautiful, if Lucy is a woman, then Lucy thinks herself to be beautiful and so on.

In a way similar to pronouns, relational nouns (henceforth, RNs) do not have a fully established meaning by themselves. RNs include kinship terms like ‘wife’, ‘uncle’, ‘grandparent’ etc. as well as other terms that do not form an easy identifiable class such as ‘king’, ‘enemy’, ‘capital’, etc. Intuitively, in order to be a wife or an enemy, one needs to be a wife or an enemy *of somebody*. For example, if Richard the Lion-hearted considered Robin Hood his enemy that didn’t make Robin Hood everyone’s enemy. Therefore, Robin Hood will be an enemy only with respect to Richard the Lion-hearted and maybe some others. According to Barker (1991), unlike other common nouns that denote sets of entities, a RN like ‘enemy’ denotes the set of pairs $\langle x, y \rangle$ such that x is the enemy of y . Compare the denotations of a common noun like ‘human’ in (3a) and that of the RN ‘enemy’ in (3b) below.

(3) a. $\llbracket human \rrbracket = \{x \text{ such that } x \text{ is human}\}$
 b. $\llbracket enemy \rrbracket = \{\langle x, y \rangle \text{ such that } x \text{ is the enemy of } y\}$

The extension of a common noun like ‘human’ consists of the set of entities that are human. The extension of a RN like ‘enemy’ consists of the set of enemy-pairs $\langle x, y \rangle$ (things like $\langle \text{Robin Hood, Richard the Lion-Hearted} \rangle$, $\langle \text{Saddam Hussein, George W. Bush} \rangle$, etc) such that x is an enemy of y .

“In general, a relational noun is one such that an entity qualifies for membership in the extension of the noun only by virtue of there being a specific second entity which stands in a particular relation to the first, and where the relation is determined solely by the noun’s lexical meaning.”

(Chris Barker, 1991)

¹ Of course, co-indexing is not mandatory. A pronoun can also be interpreted deictically. In that case, its referent would be some salient individual in the extra-linguistic context.

Discourse Prominence and Referential Ambiguities

For simplicity, I will refer to the second argument of the relation (y) as the ‘relatum’ of the RN. As in the case of pronoun antecedents, the relatum of a RN can be provided by the linguistic context, consider (4)-(6):

- (4) The baseball team lost an important match. The captain was furious.
- (5) Britney Spears got married recently. The fans don’t seem to like her husband.
- (6) ‘The Grizzly man’ will be showing at the theatre tomorrow. The director was interviewed at the radio today.

Under the most salient readings of (4)-(6), the underlined RNs are interpreted as referring back to the subject of the preceding sentence, generating the following interpretations: ‘the captain *of the baseball team*’, ‘The fans *of Britney Spears*’, ‘The director *of The Grizzly Man*’. This behavior closely resembles that of anaphoric pronouns. In the case of anaphoric pronouns, it is the referent of the pronoun itself that is found in some previous linguistic expression. In the case of RNs, it’s the second element of the relation (relatum) that is identified with the referent of some previous linguistic expression.

As in the case of pronouns, RNs admit bound-variable readings when the antecedent is a quantified phrase, as shown by this famous example from Partee (1989), also discussed by Stanley (2000):

- (7) Every species has members that are small.

The sentence in (7) has an interpretation according to which for every species S there is a member *of* S that is small². According to this interpretation, the relevant set of members co-varies with the species taken under consideration.

In conclusion, RNs show interesting analogies with pronouns for the kind of referential dependencies they instantiate:

- (i) The referent of a pronoun and a RN’s relatum can be provided by the linguistic context.
- (ii) Both pronouns and RNs admit bound-variable interpretations.

This parallel between anaphoric pronouns and RNs is not new in the semantics literature (see, for example, Stanley (2000)). However, to my knowledge there exists no psycholinguistic work focusing on possible analogies between the processing of anaphoric pronouns and RNs. This paper is meant to provide some insights on this topic.

² Here I am ignoring the ambiguity regarding the adjective *small* discussed in Partee (1989).

3. Italian pronouns, some background

In Romance pro-drop languages, like Spanish and Italian, personal pronouns occurring in subject positions can be realized in two ways: either covertly, through the use of a phonetically null pronoun (henceforth, *pro*) or overtly, by a phonetically overt pronoun. It has been shown in the literature (Calabrese 1985, Cardinaletti & Starke 1994), that the two pronominal forms display several asymmetries. Consider (8a-b), below.

- (8) a. Gianni_i partira' quando *pro*_i avra' finito il lavoro.
 b. ?* Gianni_i partira' quando **lui**_i avra' finito il lavoro.

In (8a), *pro* successfully refers to the subject of the matrix sentence (*Gianni*) while, the use of the overt pronoun in (8b), generates an unacceptable sentence.³ According to Cardinaletti & Starke (1994), the contrast exhibited by (8a-b) can be explained by saying that speakers of Italian systematically prefer *pro* to the overt pronoun because it represents the most economical choice available.

Cardinaletti & Starke argue for the existence of three classes of pronouns: strong, weak, and clitic, with the latter two being grouped as deficient with respect to strong pronouns. They define structural deficiency as the lack of a set of properties (features) caused by missing syntactic structure: while strong pronouns have a fully articulated CP structure, similar to an enriched VP structure, weak pronouns are realized as the head of a maximal projection and clitic pronouns project a head only. In this way, they argue, the preference for *pro*, exemplified in (8), follows directly from a principle that they call Minimise structure, illustrated in (9) and (10) below.

- (9) Minimise structure (Cardinaletti & Starke, 1994)
 A smaller structure is obligatorily chosen, if possible ⇒
 The most deficient form must be chosen if it can be chosen.
- (10) Choice of a pronoun (Cardinaletti & Starke, 1994)
 The strong form is impossible where the deficient form is possible, and the strong form is possible where the deficient form is independently excluded.

In processing terms, Cardinaletti & Starke's theory makes the following prediction: since *pro* is the preferred choice by default (because it's the most economical form), sentences containing *pro* should be easier to process than corresponding sentences with an overt pronoun. Following Carminati (2002), I will refer to this hypothesis as the Economy Hypothesis.

Carminati (2002), however, showed that the Economy Hypothesis is not tenable. She tested sentences like (11a-b) in a self-paced reading study, and found that sentences

³ The sentence in (8b) would be perfectly acceptable if the pronoun was not co-indexed with the subject.

with *pro* were not indiscriminately easier to process than the corresponding sentences with the overt pronoun.

(11) a. Subject bias

Quando Vanessa ha visitato Giovanna in ospedale, *pro/lei* le ha portato un mazzo di fiori.

“When V. visited G. in hospital, *pro/she* brought her a bunch of flowers.”

b. Object bias

Quando Vanessa ha visitato Giovanna in ospedale, *pro/lei* era già fuori pericolo.

“When V. visited G. in hospital, *pro/she* was already out of danger.”

The results of this experiment show that sentences containing *pro* are read much faster than those with overt pronouns only when *pro* is pragmatically resolved in favor of the subject, as in condition (a) (reading times for main clause in condition (a) *pro*: 1844ms, overt pronouns: 2666ms). However, when *pro* is pragmatically biased to the object, as in condition (b), the reading times become much slower (reading times for main clause in condition (b) *pro*: 2352ms, overt pronouns: 2236ms). These results are problematic for the Economy Hypothesis. According to this hypothesis, the two conditions should not differ and sentences with *pro* should always be read faster than sentences with overt pronouns.

Carminati’s alternative account is that the asymmetries displayed by *pro* and pronouns in intra-sentential anaphora are due to the fact that the two pronominal forms have different antecedent biases, with *pro* preferring the most prominent antecedent in the context, and the overt pronoun a less prominent one, if there is any. From now on, I will refer to this hypothesis as The Division of Labor Hypothesis.⁴ Furthermore, Carminati argues that in intra-sentential anaphora the most prominent antecedent in the sentence is identified in positional terms as the highest Spec-IP in the sentence (i.e. the preverbal position of the subject):⁵

Position of Antecedent Hypothesis (PAH) for intra-sentential anaphora

A null pronoun *pro* prefers to retrieve an antecedent in the (highest) SpecIP, whereas overt pronouns prefer an antecedent in a lower syntactic position.

Assuming Carminati’s Position of Antecedent Hypothesis (henceforth, PAH), we can account for both sets of examples (8a-b) and (11a-b). In (8b), the use of the overt pronoun is marked to refer to *Gianni*, because *Gianni* is in the highest Spec-IP and, according to

⁴ Carminati’s Division of Labor hypothesis assumes Ariel’s (1994) accessibility theory, according to which the more content an expression contains, the better it becomes at retrieving a less salient referent and the less content it has, the more successful it is in retrieving a highly salient referent.

⁵ The distinction between Spec-IP and subject is crucial for Carminati: her results also showed that pre-verbal and post-verbal subjects pattern differently (only the pre-verbal ones are good antecedents for *pro*) though, non-canonical subjects - such as dative subjects or quantified DPs - are good antecedents for *pro*, provided they occupy Spec-IP.

the PAH, *pro* is the preferred form to refer to an entity in that position. In (11a), the context of the sentence forces the resolution of the pronominal in favor of the preverbal subject (Spec-IP). In this case, *pro* represents the best choice and, indeed, in Carminati's experiment, subject-biased sentences with *pro* were read much faster than the corresponding sentences with overt pronouns. In (11b), instead, the context of the sentence forces the resolution of the pronominal in favor of the object (DP in a lower position). In this case, the use of *pro* is marked (as shown by slower reading times in Carminati's experiment) and the overt pronoun constitutes a better choice. According to the PAH, the slower reading times are due to a process of reanalysis: the processor first assigns an antecedent to the pronominal, according to its antecedent-bias then it has to revise this initial assignment when the context makes it implausible.

Further evidence in support of the PAH, comes from a questionnaire study in which Carminati tested the interpretation of Italian pronouns in fully ambiguous sentences like (12) and found that, despite the grammaticality of both interpretations, subjects showed a strong preference in interpreting *pro* as referring to the DP in subject position (80% of the times), and the overt pronoun as referring to the DP in the complement position (83% of the times).

- (12) Marta scriveva frequentemente a Piera quando *pro/lei* era negli Stati Uniti.
'Marta wrote frequently to Piera when *pro/she* was in the United States.'

Carminati's PAH appeals to a primarily syntactic notion of antecedent preferences. According to this hypothesis, strictly configurational factors, relative to the syntactic structure of the sentence, are sufficient to the processor in the first stage of antecedent assignment in intra-sentential anaphora.⁶

"When the parser encounters the pronoun (null or overt), it makes a provisional assignment according to its antecedent preferences (based on syntactic positions); if subsequent information in the sentence disconfirms the initial assignment, the pronoun needs to be re-interpreted as taking a different antecedent. (...) Any subsequent revision of this initial assignment is expected to be reflected in some kind of processing effort, such as longer reading times in on-line studies (...) The representation that the processor consults in the first stage of antecedent assignment in intra-sentential anaphora is essentially syntactic in nature."

(Carminati, 2002)

The fact that Carminati is employing a structural-based notion of prominence, rather than a discourse-based one, forces her to constrain the PAH into the domain of intra-sentential anaphora. Extending the PAH to the domain of extra-sentential anaphora would incur

⁶ The PAH also makes the important prediction that the referential status of the DP sitting in the Spec-IP position does not matter: a fully referential DP, a non referential quantified DP, or a dummy element, should all be possible antecedents for *pro*, provided that they are in the Spec-IP position.

into the objection that detailed syntactic information regarding the sentence just processed might no longer be available after sentence boundaries.

“There is some evidence from psycholinguistic research (Bever and Townsend 1979, Garnham et al. 1998) suggesting that memory for surface representations fades as the phrases of a sentence are semantically interpreted, and, in particular, that at clause boundaries there is an abrupt decay in the verbatim recall of material from the previous clause. Thus, while we can assume that the processing of intra-sentential anaphora involves accessing a level of representation where the linear arrangements of the words and the hierarchical relations between phrases in the sentence are maintained, the same cannot be said for extra-sentential anaphora. Rather, for the latter type of anaphora, it is more likely that the processor has access to an enriched level of representation, what has been loosely called the ‘discourse representation’.”

(Carminati, 2002)

In this paper, I argue for a different account compatible with Carminati’s findings, namely that *pro* is preferably linked to a constituent in the Spec-IP position because Spec-IP is the usual location of the most prominent discourse referent (Topic); however, if prominence manipulations intervene in changing the prominence status of discourse referents, suggesting that the current Topic does not correspond to the DP in Spec-IP, the preference for co-reference with this position is overridden. More explicitly, this hypothesis, henceforth the Discourse-Prominence Hypothesis of Antecedent Assignment (DPH), argues that in case of referential ambiguity (when more than one discourse referent qualifies as possible antecedent), the preferred antecedent for *pro* is the most prominent discourse referent available (or Topic).

Of course, the DPH and the PAH will have overlapping predictions every time the DP representing the Topic, is sitting in the highest Spec-IP. In order to discriminate between the two proposals, we need to see how subjects interpret *pro* in sentences where the Topic does not coincide with the referent introduced by the DP in Spec-IP. This is exactly the purpose of Experiment 1.

4. Experiment 1: prominence manipulation and anaphora

The basic idea behind this experiment was to observe how subjects establish the antecedent of a pronominal form in a context in which the most prominent discourse referent is not sitting in the highest Spec-IP position. In order to ‘move’ the topical entity from its default position, a prominence manipulation strategy was created. An example is shown in (13a-b) below, modeled after Carminati’s fully ambiguous contexts (example (12)).⁷

⁷ By fully ambiguous contexts, I mean contexts in which pragmatic information does not intervene in biasing the interpretation of the pronoun towards a particular antecedent.

- (13) a. Francesca sta cercando casa a Roma. Dopo che **Cristina** ha mostrato l'appartamento a **Francesca**, *pro* ha parlato per mezz'ora della sua vita.
- ‘Francesca is looking for an apartment in Rome. After Cristina showed the apartment to Francesca, *pro* talked about her life for half an hour’
- b. Francesca sta cercando casa a Roma. Dopo che **Cristina le** ha mostrato l'appartamento, *pro* ha parlato per mezz'ora della sua vita.
- ‘Francesca is looking for an apartment in Rome. After Cristina *her-* showed the apartment, *pro* talked about her life for half an hour’

In both passages above, the first sentence introduces an individual by proper name (Referent 1, henceforth R1). In the second sentence, a new individual is introduced in subject position (Referent 2, henceforth R2), while R1 is repeated in a complement position. Crucially, in one case R1 is re-instantiated by a full DP (13-a) while, in the other case, it is re-instantiated by the clitic *le* (13-b). Both (13a-b) are fully ambiguous, in the sense that neither pragmatic nor grammatical cues (like gender-number features) disambiguate the interpretation of the pronominal towards one or the other antecedent. Intuitively, (13a) and (13b) are slightly different though: while in (13a) *pro* is preferably interpreted as referring to the individual in Spec-IP (R2: *Cristina*), in (13b) its preferred interpretation shifts in favor of the subject of the previous sentence (R1: *Francesca*).

I argue that the difference between (13a-b) is due to a prominence manipulation instantiated by the clitic. What the clitic pronoun does in (13b) is to reinforce the DP it co-refers with (and, consequently, the discourse referent introduced by that DP). As a consequence of this reinforcement, the preference towards the DP sitting in the highest Spec-IP is overridden and *pro* is preferably interpreted as referring to an entity in a lower syntactic position (the clitic). On the other hand, following psycholinguistic evidence, I assume that a full DP does not reinforce the DP it co-refers with.⁸ Consequently, in the condition without the clitic (13a), *pro* is expected to co-refer with the DP in Spec-IP (R2: *Cristina*).

Notice that Carminati's PAH cannot distinguish between cases like (13a) and (13b), since the criterion she uses to identify the best antecedent for *pro* in fully ambiguous contexts is based on configurational factors. According to the PAH, in absence of disambiguating pragmatic biases, *pro* should be interpreted as referring to the DP in Spec-IP (R2) in both conditions. The fact that a clitic, instead of a full DP, is the

⁸ Gordon et al (1993), among others, have shown that full DPs, when used to co-refer to prominent antecedents in the discourse, generate an increase in reading times (the so-called repeated name-penalty). According to the authors, this fact can be explained by saying that the main purpose of a full DP is to introduce new discourse referents in the model, rather than establish co-reference.

competing antecedent sitting in a lower syntactic position shouldn't make a difference, since what really matters is the position itself, not what is filling that position.

While the DPH concerns only the interpretation of *pro* and RNs, in Experiment 1 I also included overt pronouns to test whether their interpretation is affected by discourse-prominence manipulations as well.⁹ According to Carminati's PAH, overt pronouns in fully ambiguous contexts are biased towards a DP in a lower syntactic position since this position usually hosts a less prominent discourse referent (recall that the PAH assumes the Division of Labor Hypothesis, according to which overt pronouns like less prominent antecedents than their null counterparts). If the resolution of overt pronouns is also influenced by discourse prominence factors, then one might expect them to drop their default preference for the DP in the lower syntactic position when this position hosts the Topic, as in (13b). For simplicity, I will refer to this hypothesis as the Anti-Topic Hypothesis. Alternatively, one might follow Carminati's PAH and say that there exists a strong default bias for the DP in the lower syntactic position and discourse prominence does not play a role in the first stage of antecedent-assignment. Under this view, the reader/hearer will provisionally assign the antecedent denoted by the DP in the lower syntactic position to the overt pronoun, regardless its discourse-prominence status.

4.1 Materials

Experiment 1 was a questionnaire study. The experimental materials consisted of twenty short passages, each composed of two sentences. An example is shown in TABLE 1.

TABLE 1
Example of Stimulus Material (Experiment 1)

Context clause Introducing R1	La signora Rossi è una persona molto maleducata che non merita alcun riguardo. 'Mrs Rossi is a very rude person that doesn't deserve any regard.'
Subordinate clause	
R2/R1-clitic.	Quando Maria la incontra per strada, ... 'When Maria her-sees in the street, ...'
R2/R1-full DP.	Quando Maria incontra la signora Rossi per strada, ... 'When Maria sees Mrs Rossi in the street, ...'
Main clause	
<i>pro</i>	... pro fa sempre finta di non vederla. '... <i>pro</i> pretends not to see her'
overt pronoun	... lei fa sempre finta di non vederla. '... <i>She</i> pretends not to see her'

⁹ We have seen that in languages where pronouns can be realized either overtly or covertly, the two pronominal forms do not obey to the same constraints on interpretation. Therefore, a hypothesis about the interpretation of null pronouns, like Italian *pro*, does not necessarily carry over to account for the interpretation of overt pronouns as well.

The first sentence introduced an individual by proper name (R1) and provided contextual information for the critical sentence. The second sentence was formed by a preposed subordinate clause followed by a main clause. In the subordinate clause, a new individual (R2) of the same gender and number of R1 was introduced in the Spec-CP position (the highest specifier in the tree), while R1 was repeated in complement position. The crucial manipulation regarded the way in which R1 was re-instantiated in the second sentence: clitic-pronoun vs. full DP. Finally, the subordinate clause was followed by a main clause with either a null or an overt pronoun in subject position. Care was taken to create contexts in which either referent was a pragmatically plausible antecedent for the pronoun. An example of the four conditions is shown in TABLE 2.

TABLE 2
Conditions of Experiment 1

Conditions	Example
condition a (clitic/ <i>pro</i>)	La signora Rossi è una persona molto maleducata che non merita alcun riguardo. Quando Maria la incontra per strada, <i>pro</i> fa sempre finta di non vederla. ‘Mrs Rossi is a very rude person that does not deserve any regard. When Maria <i>her</i> -sees in the street, <i>pro</i> pretends always not to see her.’
condition b (clitic/pronoun)	La signora Rossi è una persona molto maleducata che non merita alcun riguardo. Quando Maria la incontra per strada, <i>lei</i> fa sempre finta di non vederla. ‘Mrs Rossi is a very rude person that does not deserve any regard. When Maria <i>her</i> -sees in the street, <i>she</i> pretends always not to see her.’
condition c (full DP/ <i>pro</i>)	La signora Rossi è una persona molto maleducata che non merita alcun riguardo. Quando Maria incontra la signora Rossi per strada, <i>pro</i> fa sempre finta di non vederla. ‘Mrs Rossi is a very rude person that does not deserve any regard. When Maria sees <i>Mrs Rossi</i> in the street, <i>pro</i> pretends always not to see her.’
Condition d (full DP/pronoun)	La signora Rossi è una persona molto maleducata che non merita alcun riguardo. Quando Maria incontra la signora Rossi per strada, <i>lei</i> fa sempre finta di non vederla. ‘Mrs Rossi is a very rude person that does not deserve any regard. When Maria sees <i>Mrs Rossi</i> in the street, <i>she</i> pretends always not to see her.’

In addition to 20 experimental items, 20 fillers were created. Ten of these fillers were the stimuli for Experiment 2. The other 10 fillers were mixed cases. Half of them involved pronoun interpretations in different contexts, the other half involved ambiguities of the following type: ‘after Carlo came back home, he was much calmer/there is less space in the house’.

4.2 Participants and Procedure

32 Italian native speakers completed the questionnaire via e-mail. Four counterbalanced versions of the questionnaire were created and 8 people completed each one. In this way, everyone was confronted with all conditions but no one saw one sentence in more than one condition. Subjects were instructed at the beginning of the questionnaire to read the sentences and answer a question asking for their interpretation of the pronoun. The instructions, as well as the rest of the experimental items, are given in Appendix A.

4.3 Hypothesis and Predictions

The crucial aspect under investigation in this experiment was the interpretation of the subject null pronoun (*pro*) in the main clause. The pronoun in this clause could in principle refer to both DPs in the subordinate clause: the new DP introduced in subject position (R2), or the DP/clitic in complement position (R1). According to Carminati’s PAH, the interpretation of *pro* should not vary across conditions and *pro* should show an overall preference for antecedents in subject position (R2). According to the DPH, on the other hand, the preference for Spec-IP antecedents should decrease when this position does not host the current Topic, as in the clitic condition.

As for the overt pronouns, we are testing two competing hypothesis, the Anti-Topic hypothesis and Carminati’s PAH. According to the PAH, the overt pronoun should show an overall preference for the DP in the lower syntactic position (R1) in both conditions. According to the anti-Topic hypothesis, the preference for R1 antecedents should decrease when R1 is topical, as in condition b.

4.4 Results and Discussion

The results of the questionnaire confirmed the predictions for *pro* made by the DPH. As shown in TABLE 3, subjects chose Spec-IP-antecedents for *pro* only 35% of the time in condition a (clitic), compared to 71% of the time in condition c (full DP). Overt pronouns, on the other hand, were preferably interpreted as referring to the DP in complement position (R1) in both conditions, as generally predicted by Carminati’s PAH. However, unlike predicted by the PAH, the two conditions - clitic vs. full DP- differed in the strength of the preference for R1 antecedents. As shown in TABLE 3, Spec-IP antecedents were chosen only 16% of the time in condition b (clitic) and 27% of the time in condition d (full DP). ANOVAs showed both main effects as well as the interaction to

be significant: (DP vs. clitic by subject: $F(1,31) = 33.639, p < 0.001$; by item: $F(1,19) = 79.657, p < 0.001$; pro vs. pronoun by subject: $F(1,31) = 36.949, p < 0.001$; by item: $F(1,19) = 94.182, p < 0.001$; interaction by subject: $F(1,31) = 10.538, p < 0.01$; by item: $F(1,19) = 6.8836, p < 0.05$)

TABLE 3
Percentage of R2 choice for antecedents of pro and overt pronoun

% resolution as R2 (Spec-IP)	clitic	full DP
<i>pro</i>	35	71
overt pronoun	16	27

Carminati showed that in absence of pragmatic biases, the anaphoric dependencies of Italian *pro* and overt pronouns are resolved in different ways, with *pro* being preferably interpreted as co-referring with the DP in Spec-IP and the overt pronoun with a DP in a lower syntactic position. The data collected in this experiment, however, show that the preference for Spec-IP antecedents exhibited by *pro* is due to a more general preference for prominent discourse entities: when Spec-IP does not host the current Topic (clitic-condition), the preference for this position is significantly reduced. The overt pronoun, on the other hand showed a general preference for R1 antecedents (DP in the lower syntactic position), as generally predicted by Carminati’s PAH. Surprisingly, though, the preference for R1-antecedents increased when this position hosted the current Topic, as in condition b (clitic). This result is unexpected under the PAH and problematic for both the anti-Topic hypothesis and the Division of Labor Hypothesis. According to the last two hypotheses, the different antecedent biases displayed by *pro* and overt pronouns should be explained in terms of prominence, with *pro* liking more prominent antecedents than its overt counterpart. However, the results emerging from this study show that overt pronouns do not seem to dislike topical entities as possible antecedents, as long as they are not located in the Spec-IP of the sentence containing the pronoun.

Another point worth of notice is that contrary to Carminati’s PAH, the DPH can be easily extended to the domain of extra-sentential anaphora. By shifting the focus from syntactic positions to prominent discourse referents, one can avoid the objection, against the PAH, that detailed syntactic information might not longer be available to the parser after sentence boundaries.

To conclude, the results from Experiment 1 support the view that information about the prominence status of discourse referents influences the processor in resolving referential ambiguities displayed by Italian *pro*. At this point, it would be interesting to see whether discourse-prominence plays a role in the resolution of a wider range of referential ambiguities. The next experiment looks at the resolution of referential ambiguities involving relational nouns in Italian.

5. Experiment 2: Prominence manipulations with relational nouns

As discussed in the introduction, RNs (nouns like *governor*, *author*, *brother*, etc) have been argued to have an unpronounced variable in their lexical representation (Barker 1991, Stanley 2000), corresponding to what we called the relatum of a RN. This variable, we saw, behaves very much like a pronominal element in that it can find its antecedent in the linguistic context (examples (4)-(6)) and it admits bound-variable readings (example (7)). In Experiment 2, I investigated the processing of RNs to determine whether the assignment of a value to this variable is also influenced by the prominence status of discourse referents. The cases I tested involved fully ambiguous scenarios like the one in (14) below.

- (14) Gianni ha detto a Piero che il fratello e' uno stupido.
 Gianni has said to Piero that the brother is an idiot.
 'Gianni told Piero that his brother is an idiot.'

In (14), the RN *il fratello* (literally *the brother*) can be interpreted as Gianni's brother or Piero's brother. Both interpretations are grammatical and pragmatically plausible. The goal of the experiment was to test whether the resolution of RNs in fully ambiguous contexts like (14) above is also influenced by discourse prominence.

5.1 Materials

Experiment 2 was a questionnaire study. The experimental items were made up of ten passages consisting of two sentences followed by two disambiguating continuations. The critical manipulation was the same as in Experiment 1 (clitic vs. full DP). An example is shown in TABLE 4 below.

TABLE 4
Example of Stimulus Material (Experiment 2)

<i>Context clause</i> R1	Britney Spears era ai Grammy Awards quest'anno. 'Britney Spears was at the Grammy Awards this year.'	
<i>Second sentence</i>		
<i>R2/R1-clitic.</i>	Quando Christina Alguilera l'ha insultata davanti ai giornalisti, i fans... 'When CA her-insulted in front of the journalists, the fans'...	
<i>R2/R1-full DP.</i>	Quando Christina Alguilera ha insultato Britney Spears davanti ai giornalisti, i fans... 'When CA insulted Britney Spears in front of the journalists, the fans'...	
<i>Possible continuations</i>	a. non hanno gradito (..didn't like it)	b. hanno applaudito (...clapped)

Each passage is composed of two sentences. The first sentence introduced an individual by proper name (R1) and provided contextual information for the critical sentence. The second sentence was formed by a subordinate clause followed by two disambiguating continuations. In the subordinate clause, a new individual of the same gender and number of R1 is introduced in subject position (R2), while R1 is repeated in complement position as a clitic or as a full DP. After the subordinate clause, a relational noun is used to start a new sentence. At this point, the passage is interrupted and subjects were asked to choose between two possible continuations. The continuations provided pragmatically disambiguate the interpretation of the RN in favor of one or the other referent (R1/R2).

The crucial aspect under investigation in this experiment was the interpretation of the ambiguous RN in the two conditions (clitic vs. full DP). Care was taken to create contexts in which either referent was a pragmatically plausible antecedent for (the relatum of) the RN.

5.2. Participants and Procedure

The same subjects involved in experiment 1 were instructed to read each passage and choose between the two continuations provided. Two counterbalanced lists of the questionnaire were created and 16 people did each one. The experimental items were distributed in a way that no participant could see the same experimental item in both conditions. The order of presentation of the possible continuations was also counterbalanced across the items.

5.3 Hypothesis and Predictions

The goal of this experiment was to see whether in fully ambiguous contexts (when more than one discourse referent qualifies as possible antecedent for the variable/relatum) the relatum of a RN was preferably interpreted as co-referring with the DP hosting the Topic, regardless its syntactic position (subject vs. object). In other words, I wanted to see whether this variable behaved in a way similar to Italian *pro*, by changing its preferred antecedent from one condition to the other according to the prominence status of eligible antecedents. More explicitly, if the assignment of a value to the variable/relatum of a RN is influenced by prominence manipulations in the same way *pro* is then, we would expect more continuations favoring R2 antecedents (closest subject) in the conditions where R2 is topical (full DP), than in the conditions where R2 is no longer topical (clitic).

5.4 Results and Discussion

The results, summarized in TABLE 5, show that we find less continuations disambiguating the RN in favor of the closest subject (R2) when this position does not host the current Topic (as in condition a), however the data was not statistically significant (by subject: $t(31)= 1.49$, $p= 0.15$; by item: $t(9)=1.76$, $p=0.11$).

TABLE 5
Conditions and percentage of R2 choice for antecedents of RNs

Condition	Resolution as R2 (%) - R1 choices in parenthesis
(a) clitic	35 (65)
(b) full DP	57 (43)

In Experiment 2, I tested the DPH on RNs by applying the same prominence manipulation strategy that was used in Experiment 1 (clitic vs. full DP). The results showed an interesting trend in the direction predicted by the DPH, with more answers favouring the discourse referent that was promoted by the prominence manipulation (continuations favouring R1 correspond to 65% of the answers in the condition that employs the clitic manipulation versus 43% in the condition without the prominence manipulation). However, the data was not statistically significant. Therefore, we can only conclude that this study contributed suggestive but not conclusive evidence in favour of the idea that the DPH is at work in the resolution of ambiguous RNs.

6. Conclusions

The main point under investigation in this paper was the role of discourse prominence in the resolution of referential ambiguities. Two instances of referential ambiguities have been investigated: the interpretation of Italian *pro* (and pronouns) in intra-sentential anaphora and the interpretation of RNs. The results of Experiment 1 show that anaphoric *pro* is preferably resolved in favor of the most prominent discourse referent, or Topic, independently of its syntactic status (Spec-IP/object). The results of Experiment 2 show a parallel trend for the resolution of ambiguous RNs; the data, however, was not significant. Overall, both experiments provide evidence against a purely syntactic account of referential ambiguity resolution and support the idea that information regarding the prominence status of discourse referents influences the processor in resolving referential ambiguities.

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Appendix A (Italian)

Istruzioni:

Quello che devi fare per questo questionario è molto semplice. In alcuni casi, ti verrà presentata una frase e poi fatta una domanda relativa alla frase che hai appena letto. **Quello che devi fare tu**, in questi casi, è leggere la frase e rispondere alla domanda. Alcune volte, potrai non essere sicuro della risposta. Sforzati di rispondere in ogni modo. Dopo aver risposto, indica quanto sei sicuro della tua risposta marcando uno dei numeri sulla scala in basso:

Esempio

(1) Gianni non ha più visto Carlo dopo che si è trasferito.

D: Chi si è trasferito?

Completamente sicuro 1 2 3 4 5 Per niente sicuro

1= sono completamente sicuro della risposta.

3= non sono sicuro, ma è quello che mi viene più naturale.

5= non sono per niente sicuro, è stato difficile decidere.

In altri casi, invece, ti verrà presentata una frase e due possibili continuazioni. Il tuo compito è di scegliere quale tra le due continuazioni sembra più coerente con la frase che hai appena letto.

Esempio

(2) Carla non ha invitato Franca al matrimonio. Quando lei si è presentata ugualmente le amiche...

a. hanno detto che ha fatto bene.

b. hanno detto che è stata un'insolente.

Appendix A (English)

Instructions:

What you have to do for this questionnaire is very simple. In some cases, you will have to read a sentence and answer a question regarding its interpretation. Sometimes you might not be certain of your answer. Try to provide an answer anyway. After answering, indicate how sure you are about your answer by checking one of the numbers in the scale below:

Example

- (1) Gianni non ha piu' visto Carlo dopo che si e' trasferito.
'Gianni never saw Carlo again after he moved away.'

D: Chi si e' trasferito?

Q: Who moved away?

Completely sure 1 2 3 4 5 Really unsure

1= I am completely sure of my answer.

3= I am not so sure, but I felt this was the most natural interpretation.

5= I am not sure at all. It was very difficult to decide.

In other cases, you will have to read a sentence and two possible continuations. Your task is to indicate which of the two possible continuations fits better with the preceding sentence.

Example

- (2) Carla non ha invitato Franca al matrimonio. Quando lei si e' presentata ugualmente le amiche...

Carla didn't invite Franca to the wedding. When she showed up anyway, *the friends...*

a. hanno detto che ha fatto bene.
'said she did the right thing'

b. hanno detto che e' stata un'insolente.
'said she was shameless'

Material items from Experiment 1

- (1) Maria va a fare la spesa al supermercato sotto casa ogni mattina. Quel giorno, mentre Rosa le stava dando il resto/stava dando il resto a Maria, *pro/lei* si accorse che un uomo stava rubando una bottiglia di vino.
“Maria goes grocery shopping every morning at the supermarket by her house. That day, while Rosa was giving her/Maria change, *pro/she* noticed that a man was stealing a bottle of wine.”
- (2) Luisa aveva un dente cariato che le faceva molto male. Quando Carla l’ha chiamata sul cellulare/ha chiamato Luisa sul cellulare alle 5.30 del pomeriggio, *pro/lei* era sull’autobus diretto in centro.
“Luisa had a cavity that was causing her lots of pain. When Carla called her/Luisa on the cell-phone at 5.30 pm, *pro/she* was on a bus directed downtown.”
- (3) La signora Rossi è una persona molto maleducata che non merita alcun riguardo. Quando Maria la incontra/incontra la signora Rossi per strada, *pro/lei* fa finta di non vederla.
“Mrs Rossi is a very rude person that doesn’t deserve any regard. When Maria sees her/Mrs Rossi in the street, *pro/she* pretends not to see her.”
- (4) Marta ha la passione per i dolci. Quando Lucia l’ha invitata/ ha invitato Marta per una tazza di te, *pro/ lei* stava preparando una torta.
“Marta has a passion for desserts. When Lucia, invited her/Marta for a cup of tea, *pro/she* was making a cake.”
- (5) Patrizia ha l’abitudine di andare al teatro in centro una volta al mese per vedere quali sono i nuovi spettacoli in programma. Quando Francesca l’ha incontrata/ ha incontrato Patrizia fuori al teatro, *pro lei* aveva da poco comprato il biglietto per il prossimo concerto di Paolo Conte.
“Patrizia goes to the theatre downtown once a month to see what are the new shows on schedule. When Francesca saw her/Patrizia outside the theatre, *pro/she* had just bought a ticket for the upcoming concert of Paolo Conte.”
- (6) Luca aveva l’abitudine di fumare in ufficio. Il giorno in cui Carlo gli ha chiesto/ ha chiesto a Luca di smettere di fumare, *pro lui* era d’umore nero.
“Luca used to smoke in the office. The day in which Carlo asked him/Luca to stop, *pro/he* was on a terrible mood.”
- (7) Lina si è trasferita a Roma dopo aver finito l’Università’. Quando Paola l’ha conosciuta/ ha conosciuto Lina, *pro lei* aveva da poco divorziato.
“Lina moved to Rome after college. When Paola met her/Lina, *pro/she* had just divorced.”

- (8) Vania aveva appena ricevuto una promozione al lavoro. Mentre Simona le mostrava/mostrava il nuovo ufficio a Vania, *pro/lei* aveva un sorriso sarcastico stampato in faccia.
“Vania had just got a promotion at work. While Simona was showing her/Vania the new office, *pro/she* had a sarcastic smile on her face.”
- (9) Il signor Rossi ha l’abitudine di portare il cane fuori a fare una passeggiata ogni giorno. Quel giorno, quando il signor Bianchi l’ha salutato/ ha salutato il signor Rossi, *pro* lui a momenti finiva sotto una macchina.
“Mr Rossi takes the dog out for a walk every day. That day, when Mr Bianchi greeted him/Mr Rossi, *pro/he* was almost getting run over by a car.”
- (10) Tiziana oggi aveva il compito in classe di matematica. Dopo che Sabina le ha passato/ ha passato il compito a Tiziana, *pro* lei si e’ sentita in colpa.
“Tiziana had a math quiz today. After Sabina passed her/Tiziana the solution, *pro/she* felt guilty.”
- (11) Daniela ultimamente ha perso un documento importante per l’ufficio. Dopo che Monica le ha rimproverato/ha rimproverato questa cosa a Daniela davanti ai colleghi, *pro/ lei* si e’ sentita davvero in colpa.
“Recently Daniela lost an important document for the office. After Monica yelled at her/Daniela about this in front of other colleagues, *pro/she* felt really guilty.”
- (12) Veronica il sabato pomeriggio vuole andare a fare shopping. Quando Barbara l’ha accompagnata/ ha accompagnato Veronica per negozi, *pro/lei* si e’ comprata un paio di scarpe.
“Veronica likes going shopping on saturday afternoon. When Barbara went out with her/Veronica, *pro/she* bought a pair of shoes.”
- (13) Gianna la domenica va in centro con la macchina. Quando Carla l’ha superata/ ha superato Gianna all’incrocio, *pro/lei* ha suonato il clacson per salutare.
“Gianna goes downtown by car on sunday. When Carla passed her/Gianna at the intersection, *pro/she* honked to say hi.”
- (14) Ugo e’ sempre in mezzo ai guai. Quando Roberto gli ha dato un pugno/ha dato un pugno a Ugo sabato scorso, *pro/ lui* era ubriaco.
“Ugo is always in trouble. When Roberto punched him/Ugo last saturday, *pro/he* was drunk.”
- (15) Mario e’ uscito con la macchina nuova sabato scorso. Quando Giulio gli ha graffiato la macchina/ ha graffiato la macchina a Mario al parcheggio, *pro/lui* ci e’ rimasto molto male.
“Mario went out with his new car last saturday. When Giulio scratched his/Mario’s car in the parking spot, *pro/he* felt really bad.”

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- (16) Francesca sta cercando casa a Roma. Dopo che Cristina le ha mostrato l'appartamento/ha mostrato l'appartamento a Francesca, *pro/lei* ha parlato per mezz'ora della sua vita.
"Francesca is looking for an apartment in Rome. After Cristina showed her/Francesca the apartment, *pro/she* talked about her life for half an hour.
- (17) Vito ha da poco trovato un nuovo lavoro. Quando Pietro gli ha fatto quello sgarbo/ha fatto quello sgarbo a Vito, *pro/lui* era arrivato al limite di sopportazione.
"Vito has recently found a new job. When Pietro started being rude at him/Vito, *pro/he* couldn't take it any longer."
- (18) La signora Luisa e' un'esperta di punto a croce. Quando la signora Maria le ha mostrato il nuovo centro tavola/ha mostrato il nuovo centro tavola alla signora Luisa, *pro/lei* ha detto che quello era il centrino piu' bello della casa.
"Luisa is an expert of embroidery. When Maria showed her/Luisa her new work, *pro/she* said it was the best in the house.
- (19) La signora Carloni spia gli altri condomini di nascosto. Quando la signora Petroni l'ha vista/ha visto la signora Carloni affacciata al balcone, *pro lei e'* entrata subito dentro per non farsi vedere.
"Mrs Carloni secretly spies on her neighbours. When Mrs Petroni, saw her/Mrs Carloni on the balcony, *pro/she* run inside to hide."
- (20) Flavia aveva fatto domanda per fare la commessa da Max Mara. Quando Laura le ha offerto il lavoro/ ha offerto il lavoro a Flavia, *pro lei* aveva in dosso un tailleur elegantissimo.
"Flavia applied for a job as shopping assistant at Max Mara. When Laura interviewed her/Flavia, *pro/she* was wearing a very elegant suite."

Appendix B: Material Items from Experiment 2

- 1 La *Omnitel* stava per andare in banca rotta qualche anno fa. Quando la *Vodafone* l'ha rilevata//ha rilevato la *Omnitel*, il presidente ha dovuto pagare i debiti// si e' dovuto dimettere.

'*Omnitel* was on the verge of bankruptcy. When *Vodafone* bought it/ *Omnitel*, the president... had to pay the debts// had to resign.'

- 2 *La prima indagine di Montalbano* e' stato tra i libri piu' venduti dell'inverno 2004. Quando *Niente di vero tranne gli occhi* l'ha superato//ha superato *La prima indagine di Montalbano* in numero di copie vendute, l'autore... ha dichiarato di essere sdegnato//ha dichiarato di essere lusingato.

'*La prima indagine di Montalbano* has been a bestseller in the winter 2004. When *Niente di vero tranne gli occhi* passed it/ passed *La prima indagine di Montalbano* in number of copies sold, the author...declared to be outraged// declared to be flattered.'

- 3 *I diari della motocicletta* era dato tra i possibili vincitori a Cannes 2004. Quando *Fahrenheit 9/11* l'ha battuto// ha battuto *I diari della motocicletta*, il regista... ha dichiarato che parte degli incassi saranno devoluti ad una campagna di protesta anti Bush// ha dichiarato che la giuria ha espresso un voto politico anziche' di qualita'.

'*The motorcycle diaries* was given as the winner of Cannes 2004. When *Fahrenheit 9/11* beat it/ beat *The motorcycle diaries*, the director...declared that part of the incomes will be donated to a protest campaign against Bush// declared that the jury expressed a political vote instead of a quality one.'

4

La Juve quest'anno e' terza in classifica. Quando il Chievo l'ha battuto//ha battuto la Juve in casa, l'allenatore... non ha voluto rilasciare dichiarazioni// ha dichiarato di aver ottenuto un risultato importante.

Juventus soccer team this year is in third position. When Chievo beat it/beated Juventus, the coach...didn't want to talk to the press// declared that he had obtained an important result.'

- 5 Britney Spears era candidata a ricevere il disco di platino ai Grammy Awards. Dopo che Christina Aguilera le ha soffiato il premio//ha soffiato il premio a Britney Spears, il manager...

Britney Spears was a candidate for the platinum record at the Grammy Awards. After Christina Aguilera won the prize instead of her//won the prize instead of

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Britney Spears, the manager...

- a. ha rinnovato il contratto con la Virgin, visto il successo.
'renewed the contract with Virgin, considered the success.'
- b. ha rotto il contratto con la Virgin.
'didn't renew her contract with Virgin.'

- 6 Il Signor Rossi e' stato a capo dell'azienda dal '75. Quando il signor Bianchi gli e' succeduto//e' succeduto al signor Rossi, il segretario...

Mr Rossi has been the chief of the company since 1975. When Mr Bianchi succeeded him//succeeded Mr Rossi, the secretary...

- a. si e' licenziato perche' non poteva pensare di lavorare con uno come Bianchi.
'resigned because he couldn't imagine to work with someone like Bianchi.'
- b. si era illuso che Bianchi lo portasse con se nel nuovo ufficio.
'wrongly assumed that Bianchi would transfer him to the new office.'

- 7 Britney Spears era ai Grammy Awards quest'anno. Quando Christina Aguilera l'ha insultata// ha insultato Britney Spears// davanti ai giornalisti, i fans....

Britney Spears was at the Grammy Awards this year. When Christina Aguilera insulted her/insulted Britney Spears// in front of the journalists, the fans

- a. hanno applaudito.
'clapped.'
- b. non hanno gradito
'didn't like it.'

- 8 Tom Cruise e' un noto playboy. Quando Penelope Cruz l'ha schiaffeggiato// ha schiaffeggiato Tom Cruise// in una nota via di Los Angeles, l'autista

Tom Cruise is a notorious playboy. When Penelope Cruz slapped him//slapped Tom Cruise in a popular street of LA, the driver...

- a. ha protetto il suo cliente dicendo di non sapere nulla.
'protected his client saying he didn't know anything.'
- b. ha detto che da tempo Penelope lo aveva assunto per pedinare Cruise.
'said that Penelope had hired a detective to follow Cruise.'

- 9 Cristian era al parco a giocare con gli amici. Quando Giovanni l'ha insultato//ha insultato Cristian, il fratello....

Christian was at the park playing with his friends. When Giovanni insulted him//insulted Christian, the brother....

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- a. ha detto che l'avrebbe picchiato se non la smetteva subito
'said he would beat him up if he wouldn't stop.'
- b. ha aggiunto che l'avrebbe picchiato se non andava a giocare da un'altra parte.
'added that he would beat him up if he was not going to leave soon.'

10 Luisa si era presa una sbronza terribile all'ultima festa scolastica. Quando Carla l'ha invitata// ha invitato Luisa// alla sua festa di compleanno, la madre...

Luisa got terribly drunk at the last school party. When Carla invited her//invited Luisa at her birthday party, the mother...

- a. non voleva che la invitasse.
'was against the idea of inviting her.'
- b. non l'ha fatta andare per punizione.
'didn't let her go.'