

Remarks on PRO_{arb}

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1. Introduction

While in the past thirty years we have learned a lot about the syntax and semantics of controlled PRO, little progress has been made in our understanding of the syntax and semantics of PRO_{arb}. Syntactically, it is still unclear whether PRO_{arb} is “free”, that is, uncontrolled, as the seminal studies on Control (Williams 1980 and Chomsky 1981) suggested, or whether it is controlled, as a series of subsequent studies claimed. Semantically, we do not know exactly what its semantic contribution is: is it “generic” (Williams 1980 and others), or generic *and* first-personal (Moltmann 2006)? And if it is generic, why does it show up as specific in certain contexts? Last but not least, we do not even know whether PRO_{arb} really exists: Chierchia (1988) argues against the existence of PRO_{arb} on semantic grounds, Hornstein (1999) identifies it with small *pro* mainly on syntactic grounds.

This paper is an attempt to give a sense of these issues. We will be mainly concerned with the questions related to Control and the semantics of PRO_{arb}, assuming that there exists a syntactic formative corresponding to PRO_{arb}. In reviewing the main ideas on PRO_{arb} we will first face a purely empirical question: In which syntactic environments does PRO_{arb} occur? Even in this respect PRO_{arb} raises problems, since what sometimes has been labeled “PRO_{arb}” is in fact – as we take – an instance of implicitly controlled PRO, whose meaning recalls the “arbitrary” interpretation. Adjunct Control is a case in point. Although the similarities between Adjunct Control and “Arbitrary Control” (as following Landau 2000, we will call the “cases where no argument in the sentence, either overt or implicit, is understood as the controller”) may not be accidental, we will

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leave these cases out of the scope of this article and focus on the prototypical occurrences of PRO_{arb} , namely subject clauses.

This paper is organized as follows. After considering the distributional properties of PRO_{arb} , we will discuss some ideas concerning the syntax and the semantics of PRO_{arb} . As for the syntax of PRO_{arb} we will show that even the cases where a general consensus holds about PRO_{arb} as thematically controlled, are not so doubtless. We will then analyze the semantic properties that have been singled out in the literature on PRO_{arb} and show that even in this respect some facts may have been misinterpreted. We will then discuss some issues concerning a class of predicates that rules out infinitive arguments (and PRO_{arb}) – namely, epistemic modals. Finally we will present some remarks on the *de se* reading that PRO_{arb} apparently displays.

2. Empirical framework

PRO_{arb} has been claimed to occur in a wide range of environments:

A. Infinitival clausal argument of different categories of adjective: “psychological” (examples (1)a), “evaluative” (examples (1)b and c), *deontic* modal adjectives (examples (1)d and e):

- | | | |
|-----|---|---------------------------|
| (1) | a. It is fun [PRO_{arb} to play baseball] | (Epstein 1984) |
| | b. It is important [PRO_{arb} to get an A in math] | (Chomsky 1981) |
| | c. [PRO_{arb} to walk alone at night] is dangerous | (Bhatt and Izvorski 1998) |
| | d. It is necessary [PRO_{arb} to go] | (Roepers 1987) |
| | e. [PRO_{arb} to take the exam] is obligatory | (Moltmann 2006) |

B. Infinitival clausal argument of “causative” verbs:

- | | | |
|-----|---|----------------|
| (2) | a. [$PRO_{arb/1}$ to behave oneself/himself in public] would help Bill ₁ | (Manzini 1983) |
| | b. [$PRO_{arb/1}$ to behave oneself/himself in public] would help Bill ₁ 's development | (Manzini 1983) |

C. Infinitival indirect questions (‘wh-complements’):

- | | | |
|-----|--|----------------|
| (3) | a. It is unclear [how PRO_{arb} to behave oneself] | (Chomsky 1981) |
|-----|--|----------------|

- b. John asked [how PRO_{arb} to behave oneself] (Manzini (1983))

D. Copulative structures:

- (4) [PRO_{arb} making a large profit] requires [PRO_{arb} exploiting the tenants]
(Epstein 1984)

E. Adjunct clauses (rationale, temporal, absolutive or *without*-clauses):

- (5) a. Boats are sunk [PRO_{arb} to collect the insurance] (Bhatt and Pancheva 1998)
 b. [Before PRO_{arb} entering the basement], the stairs were washed (Manzini 1986)
 c. The game was played [PRO_{arb} wearing no shoes] (Roeper 1987)
 d. The president was elected [without PRO_{arb} considering his competence]
 (Roeper 1987)

In the environments (A) and (B), other constituents within the infinitival clause may enforce the arbitrary interpretation of PRO:

- (6) a. It is dangerous for babies_i [PRO_{arb} to smoke around them_i] (Kawasaki 1993)
 b. It helped John_i [PRO_{arb} to teach him_i Spanish] (Kawasaki 1993)

Finally, the presence of PRO_{arb} is banned in Obligatory Control infinitives PRO_{arb}:

- (7) a. *John wanted [PRO_{arb} to be quiet] (Landau 2000)
 b. *John remembered [PRO_{arb} not to smoke around the babies] Landau (2000)

Whether all or just some environments involve PRO_{arb} is a debated question. While the environments in (A), (B), (D) and (E) have been claimed to involve PRO_{arb}, *wh*-infinitives are probably instances of Partial Control (Landau 2000). It is nonetheless debatable whether the environment in (A), (B), (D) and (E) all involve Arbitrary Control as defined by Landau (2000). We will address the question in the following section.

3. The Syntax of PRO_{arb}

Although in a series of seminal works on Control (Williams 1980, Chomsky 1981, Manzini 1983) PRO_{arb} was claimed to be “free”, that is, uncontrolled, later works privileged the opposite solution. Examples (1) and (5) have been taken as evidence that Arbitrary Control is in fact Control by an implicit argument (Epstein 1985, Bhatt and Izvorski 1998), which may be assigned different theta-role: the experiencer role (examples (1)a, b), the benefactive (examples (1)c-e), or the agent (examples (5)).

This idea also predicted that monadic predicates cannot take an infinitival clause as their argument, since a controller for PRO would be missing and PRO would be uncontrolled. Since epistemic modals are monadic, the ungrammaticality of the following examples was interpreted as evidence in favor of the thematically controlled theory of PRO_{arb}:

- (8) a. *To play baseball is certain.
 b. *It is probable [PRO to go]

In other environments, however, it is unclear whether PRO_{arb} is controlled or not. A general agreement is missing whether an implicit argument occurs in examples (3) and (4). Bhatt and Izvorski (1998) classify the examples in (3) as an instance of implicit Control, Landau 2000 as Partial Control. Bhatt and Izvorski (1998) consider example (4) as involving Implicit Control, too, but Lebeaux (1984), Cinque (1988), Landau (2000), Moltmann (2006) label such example as a case of Arbitrary Control. Finally, as far as we know, the examples in (2) and (6) have never been claimed to involve Implicit Control. Manzini (1983) and Landau (2000) interpret them as real instances of Arbitrary Control.

Finally, a general consensus is also missing on the mechanisms of Control involved in the above examples. Epstein (1985) and Bhatt and Izvorski (1998) claim that PRO_{arb} is controlled by an implicit argument, Lebeaux (1984) and Kawasaki (1993) have hypothesized that A'-positions may be involved in the Control relation. We will briefly review these viewpoints.

3.1. Control Theories of PRO_{arb}

Building on examples like (1)a, the intuitive interpretation of which is that playing baseball is fun *for whoever plays baseball*, Epstein (1984) proposes that PRO_{arb} is controlled by an implicit argument, which may be made overt by a *for*-clause:

(9) It is fun for Lucy to play baseball.

Epstein suggests the possibility that in general PRO *must* be controlled by an implicit argument. This idea, he argues, would explain the difference in status between sentences like (1)a and sentences involving epistemic modals (see (8)), which disallow *for*-clauses. The availability of a *for*-clause is the only diagnostics to show that a covert argument occurs. This diagnostics builds on the observation that if in a given structure an argument satisfying a theta-role *can* occur, then it must occur, since the theta-grid of a predicate is invariable. Thus, if there is no overt argument in that structure, that argument must be covert.

Lebeaux (1984) claims that PRO_{arb} is controlled as well. Differently from Epstein, however, he claims that Control on PRO_{arb} is not thematic. Rather, an adjunct within the binding domain of PRO_{arb} controls it. Thus, while Epstein claims that PRO_{arb} is controlled from an A-position, Lebeaux claims that it is controlled by an A'-position. This allows him to explain data that do not include any implicit controller, like the examples involving an indirect question (see example (10)a below), the so-called “linked reading” structures (copulative structures, see example (4)), and the examples where PRO_{arb} does not seem to co-vary with an implicit argument, as in the following example:

(10) a. John knows [how PRO_{arb} to solve the problem].
 b. [What PRO_{arb} to do] is unclear.

In the sentence in (10)a the main predicate does not have any implicit argument Controlling PRO, since the argument structure of *know* has two positions and PRO may not be interpreted as controlled by *John*. In (10)b PRO does not necessarily co-vary with the implicit argument of *unclear*.

Bhatt and Izvorski (1998) improve Epstein’s theory of PRO_{arb} in that they claim that Arbitrary PRO is always controlled by an implicit argument *à la* Williams (1985) in the immediately higher clause. They extend their proposal to generic passives and propose a solution for the data that apparently could not be reduced to Epstein’s thematically con-

trolled PRO_{arb} theory – namely, the *wh*-complement infinitives, and to the so-called ‘linked readings’.

In their view, all these environments do include an implicit argument controlling PRO. As for the passives and the ‘linked reading’ structures, they apply the *for*-clause diagnostic test as a piece of evidence in favor of their claim:

- (11) a. Ships are sunk [PRO_{arb} to collect insurance]
 b. Ships are sunk by their owners_{*i*} [PRO_i to collect insurance]
- (12) a. [PRO_i to know him] is [PRO_i to love him]
 b. For Pat_{*i*}, [PRO_i to know him] is [PRO_i to love him]

As for PRO_{arb} occurring in *wh*-complement infinitives, they observe that *wh*-complements are implicitly modals. Particularly, the modality involved is deontic. A sentence like (10)a can be paraphrased as follows: “John knows how one should/could solve the problem”. Similar consideration may explain the intuitions about the sentence in (10)b. Thus, they claim that the argument of the implicit deontic modal controls PRO.

3.2. Analytical remarks

Despite Bhatt and Izvorski’s theory is able to explain a larger set of data than previous theories, some problems remain unsolved:

- a.** Under the hypothesis that an implicit argument appears in every environment where PRO_{arb} occurs, it must be postulated that an implicit argument occurs in the sentences in (2) and (6). However, every theta-role appears to be assigned in these sentences.
- b.** In examples involving the ‘linked readings’, the question arises, what theta-role do predicates like *be*, *mean*, *entail*, *require* assign to the argument that can be made overt through a *for*-clause? The question is not faced directly in Bhatt and Izvorski (1998). They only point out that such a role is not an evidential role (in the sense of Schweikert 2005), since it cannot be paraphrased as *in x’s opinion*.¹ Moreover, such a theory should explain why an implicit controller occurs in the examples in (2), in (4), and in (6), but it

¹. Bhatt and Izvorski (1998), n. 17.

does not in (8). However, if there is no implicit argument in (8), why should there be one in the other examples?

c. There is no general agreement on the presence and on the role of implicit arguments in some of the examples where an implicit argument is postulated. We focus on the case of deontic modals.² Bhatt (1999) and Wurmbrand (1999) argue that the bearer of the obligation or of the permission (which in (1)d,e is assumed to be implicit in thematically controlled PRO_{arb} theories) is not syntactically represented in some contexts. Consider the following example:

(13) There must be fifty chairs in this room by 5 p.m. (said to a caterer)

(Bhatt and Izvorski 2006)

². As for Control in adjunct clauses the presence of a implicit controller is also doubtful. Let us consider first rationale clauses. Examples that have been claimed as involving an implicit agent may have been misinterpreted, since in many cases PRO_{arb} does not seem to need a controller, or a potential controller cannot Control PRO_{arb}:

- (i) a. The shopwindow has a big sale sign in it [(in order) PRO_{arb} to attract customers] (Farkas 1988)
 b. *The ship was sunk [PRO_{arb} to become a hero] (Lasnik 1988)

As for temporal clauses, absolutive clauses, and clauses introduced by *without*, the idea that the implicit agent obligatorily Controls PRO_{arb} has often been argued (Borer 1989, Clark 1990, Hornstein 1999). However, the implicit agent seems to have some restriction belonging exclusively to these structures, as the [+human] feature observed by Manzini (1986). Kawasaki (1993) claims that the [+human] restriction reflects the fact that adjunct Control is not agent Control but rather ‘topic Control’, i.e. the reference of PRO is determined by the current discourse topic, which is established pragmatically. Kawasaki proves this claim observing that definite NPs, but not indefinite NPs, can Control PRO_{arb} in an adjunct:

- (ii) After collecting some money, a bank account was opened by the/*a businessman.

Definite NPs refer to an entity already present in the discourse, while indefinite NPs introduce new entities. Thus, only definite NPs can work as discourse topic. Moreover, subjects work as topic easier than objects. Thus, PRO_{arb} can be controlled by subjects better than by objects:

- (iii) a. John harassed many women. ??After talking to the manager, complaints were filed.
 b. Many women were harassed by John. After talking to the manager, complaints were filed.

Finally, if the discourse topic is salient enough, it can Control PRO_{arb} without even being represented grammatically:

- (iv) After pitching the tents, darkness fell quickly.

Here the “obligee” is not represented syntactically –at least, not as an argument of the matrix predicate. Thus, at least in some cases, the obligee or the permittee of a deontic modal do not have an obvious syntactic realization. Wurmbrand (1999) even suggests that the relation of obligation and permission involved in deontic modality is not encoded through theta-roles, but rather through pragmatic roles. Note that such roles *can* Control PRO_{arb} in a rationale clause:

(14) There must be some time [PRO_{arb} to organise supply and demand].

PRO_{arb} is here licensed despite no implicit argument, is present.

The question then arises, what licenses PRO_{arb} . Whatever licenses it, must occur in the sentences where PRO_{arb} appears, but it must be absent in sentences where PRO_{arb} is ruled out –as in (8)– unless the ungrammaticality of (8) is due to completely different reason than the presumed illegitimacy of Control on PRO_{arb} .

All in all, the claim that PRO_{arb} is thematically controlled by an implicit argument does not appear to be supported by strong evidence. While examples involving an implicit experiencers, like (1)a and b, appear to be compatible with the theory of Control by an implicit argument quite naturally (although the only evidence argued in favor of this view is the optionality of a *for*-clause), the other examples are hardly explicable through such theory.³ In examples involving “evaluative” and modal predicates (sentences (1)b, c, d, e), an implicit argument may not be there, and if there is one, the co-variance of the implicit argument and PRO is not obligatory (see example (6)a). The question is then,

³. It didn't escape our notice that structural considerations may explain why only implicit experiencers are the only implicit arguments that PRO_{arb} obligatorily co-varies with. An argument satisfying the experiencer theta-role is merged above an arguments satisfying the causer theta-role (Belletti and Rizzi 1988, Pesetsky 1995, Schweikert 2005). Infinitives are assigned the latter role. Thus, experiencers c-commands PRO :

(i) [Exp... [PRO_{arb} ...]]

Causer arguments, in their turn, c-command the theme, the benefactive, and the patient – thus, infinitives c-command implicit benefactives/patient, but PRO_{arb} does not:

(ii) [[PRO_{arb} ...] Th/Ben/Pat...]

Whether these structural properties determine the co-variance of PRO_{arb} and the argument of the main verb is a challenging question.

when thematic Control does not hold, how does PRO_{arb} get its interpretation? Is it uncontrolled or is it A'-controlled?

In the examples in (2) PRO_{arb} does not seem to be thematically controlled as well, since all theta-roles of the matrix predicate appear to be discharged. Here, again, PRO_{arb} may be “free” or A'-controlled. In examples (3)-(5), finally, there is no compelling evidence in favor of a thematic Control analysis. The only proof in favor of such proposal has been claimed to be the availability of an overt argument in place of the implicit argument which PRO_{arb} appears to co-vary with. However, PRO_{arb} may not co-vary with such overt argument. Thus, on one hand, Control by an implicit argument is not to be taken for granted – an overt argument may not control obligatorily PRO_{arb}, so why should an implicit argument? On the other hand, PRO_{arb} appears not to need a thematic controller at all. Some considerations from the domain of semantics point to the same conclusion.

4. The Semantics of PRO_{arb}

Despite the different claims on the syntactic mechanisms concerning PRO_{arb}, a substantial uniformity characterizes PRO_{arb} from a semantic viewpoint: in all environments illustrated in section 2 the interpretation of PRO is “generic” (more properly, kind-referring), if the sentence is generic, specific (more properly, object referring), if the sentence is episodic, no matter if there is an implicit controller (see Cinque 1988,⁴ Kawasaki 1993, Bhatt and Izvorski 1998).⁵ Let us illustrate this point through a couple of examples discussed in Krifka *et al.* (1995):

⁴. Cinque (1988) claims in fact that PRO_{arb} is interpreted as a ‘quasi-universal quantifier’. As far as we understand, the term ‘quasi-universal’ is equivalent to the term ‘generic’.

⁵. Cinque (1988) observes that in its ‘quasi-existential’ reading, the reference of PRO_{arb} can be specified by the context or it may correspond to a 1st person plural pronoun ‘we’. He also notes that ergative, psych-, movement, copulative, passive, and raising predicates can only induce a 1st person plural interpretation, although a different interpretation cannot be excluded contextually:

(i) Partire in ritardo (*mi pare fosse stato Carlo) ha significato perdere tutto.

‘To leave late (I think it was Carlo) meant to lose everything.’

Analyzing this problem, however, would lead us too far away from the aims of the present paper.

- (15) a. [PRO_{arb} chewing tobacco] (usually) upsets John.
 b. [PRO_{arb} chewing tobacco] upset John.

Sentence (15)a can be generally paraphrased as ‘if one chews tobacco, this generally upsets John’. Sentence (15)b can instead be paraphrased as ‘someone chewed tobacco and this upset John’. This double interpretation holds even in environments where PRO_{arb} has sometimes been claimed to be controlled (examples from Bhatt and Izvorski (1998):

- (16) a. [PRO_{arb} to write haiku] is fun.
 b. Yesterday, [PRO to write haiku on the grass] was fun.

Sentence (16)a is generic, sentence (16)b is episodic.⁶ Thus, even if we admitted that an implicit argument controlled PRO_{arb}, the semantics of this argument would display no difference with respect to uncontrolled PRO_{arb}.⁷ The question is then, how is the index ‘arb’ to be interpreted?

Moreover, PRO_{arb} has been claimed to be first-personal (in the sense of Castañeda 1966, 1967) and, at the same time, generic. To illustrate:

- (17) a. It is nice [PRO_{arb} to walk in the park].

⁶. Other semantic properties have been sometimes discussed in the literature. First, Manzini (1986) claims that PRO_{arb} can only refer to human beings. To illustrate, consider the following sentences:

- (i) a. [PRO_{arb} rotolare giù da una collina] è pericoloso.
 [PRO_{arb} to roll down the hill] is dangerous.
 b. [PRO_{arb} essere efficienti] è importante.
 [PRO_{arb} to be effective] is important.

The only possible interpretation of the sentences in (i) is that PRO_{arb} has [+human] features. We will keep these property of PRO_{arb} outside the scope of the present investigation.

⁷. Epstein (1984), Lebeaux (1984), and Bhatt and Izvorski (1998) labels by ‘PRO_{arb}’ only the occurrences of PRO with a generic interpretation, assuming that under the existential reading the reference of PRO is not ‘arbitrary’, but rather pragmatically specified by the discourse context. In what follows, we will use of the term ‘arbitrary PRO’ to refer to PRO in contexts as those illustrated in section 2, and specify within the discussion whether its interpretation is generic or specific.

- b. Yesterday it was nice [PRO_{arb} to walk in the park].
 c. John said it is nice [PRO_{arb} to walk in the park].

Moltmann observes that intuitively such sentences express an evaluation on the part of the speaker. In uttering (17)a and b, there is a natural reading in which the speaker is expressing a personal judgment about the kind of events “walking in the park” ((17)a) and as a specific occurrence of such kind of event ((17)b). More generally, such sentences convey an evaluation on the part of the agent of the context (the speaker in sentences (17)a, b, the subject of an attitude predicate, as in (17)c, which does not presupposes that the speaker find it nice to walk in the park), based on her/his own (actual or imaginary) experience. At the same time, Moltmann claims that the former sentence expresses a generalization concerning any typical person.

As far as we know, the only formal attempt to account for these properties has been worked out by Moltmann (2006), who claims that like the English impersonal pronoun *one*, PRO_{arb} introduces a variable that is obligatorily bound by a sentential generic empty operator (hosted in [spec; CP]).⁸ In Moltmann’s view, the fact that different occurrences of *one*/PRO_{arb} may co-vary without either having scope over the other is a piece of evidence in favor of her analysis. The examples in (4), here repeated, may be taken as illustrating this property:

(18) [PRO_{arb} making a large profit] requires [PRO_{arb} exploiting the tenants].

Here the two PRO_{arb}’s corefer. However, the PRO_{arb} in the higher clause does not c-command the one in the lower clause. Thus, the covariance of the higher and of the lower PRO_{arb} cannot result from a binding relation of the higher on the lower PRO_{arb}. Assuming that co-reference is obtained here as a scope phenomenon,⁹ the co-variance of the two PRO_{arb}’s may only be the result of the presence of an operator c-commanding and binding both PRO_{arb}’s.

We note, however, that *one* and PRO_{arb} do differ in at least one respect: PRO_{arb} can have a specific reading, while *one* cannot. This may be accommodated within Moltmann’s proposal by claiming that in episodic sentences the existential sentential operator bind-

⁸. I refer to Moltmann (2006) for the formal details of his theory.

⁹. This is in fact an assumption only, since binding is not the only way to get covariance (see Safir 2005).

ing the event variable of the main predicate, binds PRO_{arb} as well (although for some reason it cannot bind the impersonal pronoun *one*). Such an assumption is costless, since in a davidsonian framework (Davidson 1967, Higginbotham 1983, Parsons 1990), an existential operator does bind the event argument of a predicate.

Note that Moltmann's theory has two theoretical implications. First, PRO_{arb} is *always* controlled, though (second implication) it is *not thematically controlled*, since a sentential operator binds it. In other terms, PRO_{arb} is claimed to be A'-controlled (as in Lebeaux's 1984 and Kawasaki's 1993 theories).

This may not be the last word, however. We know indeed that that kind-level predicates (as *common*, *rare*, *widespread*, etc.) apply felicitously to gerunds and to infinitives (Krifka *et al.* 1995):

- (19) a. Getting into troubles is very common/rare/widespread among the youth today.
(Carlson 1977)
- b. For people to love their children is common.

This diagnostics shows that gerunds and infinitives can be interpreted as referring to kinds – particularly, to kinds of events. This explains why even in contexts where the apparent controller of PRO_{arb} is explicit, the interpretation of a gerundive or of an infinitival is kind-referring. Consider for instance the following sentence (from Krifka *et al.*):

- (20) Chewing tobacco calms John down.

This sentence normally asserts that whenever John chews tobacco, this (usually) calms him down. The gerundive clearly refers to a kind of events, which has as realizations single events of chewing tobacco by John.

Thus, the generic operator binds the event variable of an infinitival (or gerund) clause, rather than PRO_{arb} . This is shown even by another diagnostics of genericity (Krifka *et al.* 1995). In generic sentences a frequency adverb like *always*, *generally*, *habitually* does not convey a “significant” change in meaning. Consider for instance the following sentences:

- (21) a. Dogs bark.
b. Dogs generally bark.

In the latter sentence the semantic contribution of the adverb is minimal – it only underlines that there may be exceptions. When this diagnostics is applied to PRO_{arb} a relevant change in meaning is determined:

- (22) a. [Playing baseball] is fun.
 b. [Playing baseball habitually] is fun.

The two sentences have different truth-conditions. While the first one may assert that an event of playing baseball is generally fun, the second asserts that the *habit* of baseball-playing is fun. Thus, one may consider the first sentence as false while considering the second one true and vice versa.

We take then that PRO_{arb} does not have a “generic” or “specific” interpretation in itself. This rather appears as a by-product of some other computation. But how is it interpreted? A possible answer to this question may be as follows. Since the kind-referring interpretation holds when a nominal is under the scope of a generic operator, gerunds and the infinitives, rather than PRO_{arb} itself, appear to be subjected to the generic operator. Under this view, the semantics of PRO_{arb} should be redefined. Two options are available: first, PRO_{arb} is interpreted by existential closure; second, it is interpreted as a lambda-operator, as in predicational approaches to Control (Lewis 1979, Chierchia 1984, among the others). In both cases, the “generic”/“specific” interpretation of PRO_{arb} may turn out as a by-product of the binding of the whole non-finite clause. We suppose there is good reason to prefer the second option. The evidence is the fact that the scope ambiguities one would expect if PRO_{arb} were bound by an existential operator are missing.¹⁰ Consider the following sentences:

¹⁰. We note that although implicit arguments are usually considered as an existential operator, they do not give rise to scope ambiguities, as quantifiers generally do. Consider the following sentences containing an implicit agent:

- (i) Every ship has been sunk.
 (ii) Every ship has been sunk by an angry dismissed insurance company employee.

Sentence (ii) is ambiguous between the *de dicto* ($\forall > \exists$) and the *de re* interpretation ($\exists > \forall$): under the first interpretation for any ship there is an angry dismissed employee, under the second interpretation, one and the same angry dismissed employee sank every ship ($\forall > \exists$). No such ambiguity appears to hold with respect to (i), in which the universal quantifier has always wide scope. Thus, the nature of the implicit agent remains quite mysterious.

- (23) a. Every student said that answering his questions was of great help to him.
 b. Every student said that it was of great help to him that a teacher answered his questions.

Intuitively, sentence (23)b has two readings:

- (23) b'. $\forall x \exists y$ x said that answer (y, x's questions, e) & e helped x
 b''. $\exists y \forall x$ x said that answer (y, x's questions, e) & e helped x

Under the first reading, for every student there is a teacher who answered his questions. Under the second reading, one and the same teacher answered every student's questions.

Sentence (23)a does not display such scope ambiguities. The only available interpretation is the one in which the universal quantifiers takes scope over the existential operator:

- (23) a'. $\forall y \exists x$ x said that answer (y, x's questions, e) & e helped x
 a''. $*\exists y \forall x$ x said that answer (y, x's questions, e) & e helped x

Observing that a second sentential operator can also appear within a non-finite argument (see Zucchi 1990, Krifka *et al.* 1995),¹¹ we propose that, in a davidsonian framework, an appropriate logical form for sentences containing PRO_{arb} may be as follows:

- (24) a. '**Generic**' PRO_{arb}
 $GENe P(e, \wedge GEN/\exists e'\lambda x Q(e', x));$
 b. '**Specific**' PRO_{arb}
 $\exists e P(e, \wedge GEN/\exists e'\lambda x Q(e', x));$

To any of the above formulas an argument may be added to the main predicate. We propose that when such an argument is implicit, it is in its turn interpreted as a lambda-

¹¹. To illustrate, consider the following sentence (adapted from Krifka *et al.* 1995):

- (i) [Smoking so much habitually] (generally) impresses Mary.

The infinitive predicate is generic (more properly habitual), the main predicate can be either generic or specific.

operator. This would explain why Control apparently holds between an implicit argument and PRO_{arb} . Our proposal predicts that they should get co-valued. If the argument is overt, PRO_{arb} *can* be interpreted as bound by such an argument, perhaps through the topic-Control mechanism proposed by Kawasaki (1993).

5. Epistemic modals

Thematically controlled PRO_{arb} supporters have often claimed that the ungrammaticality of sentences like (8) has to be interpreted as evidence in favor of their theory, since, as PRO_{arb} must be controlled, the absence of a controller in these sentences dooms its occurrence.

Under the account we are discussing here, PRO_{arb} is not thematically controlled (it may even not be controlled at all). If so, the unavailability of infinitival complements in epistemic modal contexts cannot be due to the absence of a potential controller. So why are sentences like (8) ungrammatical?

First, observe that the lack of an implicit controller does not rule out PRO_{arb} in itself, since, as we have shown, there are sentences in which PRO_{arb} occurs despite an implicit argument is missing. Second, if the interpretation of PRO_{arb} indirectly depends on sentential operators, the theory here investigated predicts that structures that are devoid of such operators cannot host an infinitive or a gerund argument. Under such a hypothesis, epistemic modal sentences should be devoid of sentential operators.

As it turns out, this seems to be the case. Iatridou (1990) observes that epistemic modal predicates (“metaphysical modality” predicates, as she dubs them) are incompatible with past or future tense auxiliaries:

(25) #It was/will be probable that John stole the tape.

She claims that epistemic modals are temporally independent, that is, they lack a time variable, which explains why they are incompatible with tense.

We may add that genericity diagnostics (Krifka *et al.* 1995) shows that epistemic modals are incompatible with generic operators as well:

(26) #It is usually possible that John has left.

Sentential operators are incompatible with epistemic modals exactly because epistemic modals lack a time variable. Thus, since infinitival clauses have a time variable that must be bound by a sentential operator, the ungrammaticality of (8) may be reinterpreted as a superficial effect of the lack of this operator in sentences having an epistemic modal predicate.

6. Conclusive remarks

In the present article we have reviewed the main ideas on the syntactic and semantic properties of PRO_{arb} and we hope we have shown that a great deal is still to be achieved in our understanding of PRO_{arb} . We have shown that the presence of an implicit argument, if any, does not seem to be related to Control of PRO_{arb} , and that there is no compelling evidence to claim that PRO_{arb} is thematically controlled, since there are cases where no implicit argument can plausibly be claimed to occur. The remaining possible alternatives are that in some cases it appears to be A'-control (Kawasaki's 1993 Topic Control), or that a lambda-variable, it is uncontrolled. On the semantic side, its "generic" or "specific" interpretation appears to raise as a by-product of mechanisms responsible for the interpretation of an infinitive and of the whole sentence.

We would like to conclude this paper with a final speculation concerning the first-personal interpretation. We have said that Moltmann (2006) observes that sentences in which PRO_{arb} occurs have a natural reading in which the agent of the context is expressing a personal evaluation. In subsequent work (2008 among others), she observes that sentences containing a subject infinitive are relative-truth sentences, a kind of sentences whose truth-conditions are relative to a standard of taste, morality or knowledge of the individual who utters the sentence or to whom an evaluation towards a certain propositional content is attributed. All seems to suggest that the "evaluator", which we take as a pragmatic role, plays a crucial role in the interpretation of sentences containing PRO_{arb} and perhaps of PRO_{arb} itself, and may be the source of the first personal interpretation. The way the evaluator enters the computation of semantics of the sentence is still to be made clear, but a direct Control by the evaluator on PRO_{arb} seems to have little plausibility in our view, since PRO_{arb} is not simply interpreted as the speaker (in the easiest case). In uttering *It is nice to walk in the park*, the speaker is not asserting that she or he is the only person who finds it nice *his* walking in the park. This is the interpretation we would expect were the evaluator Controlling PRO_{arb} , but, crucially, this does not reflect

our intuitions, since in saying this sentence, we are also stating something that in our view seems to hold for any typical person.

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