

When Pro-Drop Languages Don't: Overt Pronominal Subjects and Pragmatic Inference

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1 Introduction

In a language that allows null pronouns, why would a speaker bother to use an overt pronoun at all? A traditional answer is that an overt pronoun contains agreement information necessary for the identification of its antecedent. But this cannot possibly be the answer in languages like Turkish, which has subject-verb agreement, but no gender; since the verb already indicates the person and number of the subject, overt pronominal subjects contain no more agreement information than null subjects; yet overt subject pronouns are common in Turkish.

Even in languages where the overt pronoun does carry additional agreement features, it is frequently used in situations where the potential antecedents cannot be differentiated through agreement features. Nevertheless, overt pronouns are far from redundant or “optional,” as traditional grammar would have it. Even in the absence of any contrast in agreement features, an overt pronoun can be interpreted differently from a null pronoun. In the following example from Greek, both of the possible antecedents are singular, masculine, and in the third-person. But the null pronoun in (c) must pick out the subject of the previous sentence, *Aris_i*, while the overt pronoun in (c') must pick out the object, *Gianis_k*.

- (1) a. O *Aris_i* diplose tin efimerida_j.
'*Aris_i* folded the newspaper_j.'
b. ϕ_i Tin_j efere sto Gianis_k.
'(He_i) brought it to John_k.'
c. $\phi_{i/\#k}$ den milise.
'(He_{i/\#k}) did not speak.'
c'. Aftos_{k/\#i} den milise.
'He_{k/\#i} did not speak.'

The two types of pronoun, then, can somehow select different antecedents in a given context, not through their feature content but through some other means. In this paper, I will try to shed light on the mechanisms underlying the interpretation of pronominal subjects in Greek; as it turns out, my empirical findings greatly resemble the properties reported by Di Eugenio (forthcoming) and Turan (1995) for Italian and Turkish, respectively. Thus I will tentatively extend my conclusions to these languages as well.

I will show below that in Greek, the function of the overt pronoun *aftos* is to signal that its antecedent should be, not the most “prominent” potential antecedent from the previous sentence, but something somewhat less prominent. That is, that

we should “skip” the most obvious candidate and move down to the next one. The overt pronoun signals this merely by its presence, not by any featural or referential information that it provides. In general, we can associate with each type of pronoun a method for selecting its antecedents. I will argue that these “methods” are not predictable through Gricean implicatures alone, hence they must be grammaticized, and specific to particular lexical items.

But what exactly is a “prominent” antecedent? I am not using *prominent* as a technical term! In the following sections, I show that an appropriate notion of prominence is provided within the framework of Centering Theory (Grosz *et al.* 1986, 1995); specifically, I will argue that the type of pronominal used determines where in the list of *forward looking centers* its antecedent will appear: A null subject should be construed with the “compatible” antecedent that is highest in the list (where compatibility is determined by factors like featural agreement and agentivity), while the proximal demonstrative *aftos* ‘this one’ is (almost) never used to refer to the highest element in the list; it is used instead for antecedents that are lower in the list of centers.

My analysis differs from those of Di Eugenio (forthcoming) and Turan (1995), who also work in the centering framework; they consider the crucial parameter to be the type of *centering transition* involved, rather than take position in the Cf list as the crucial parameter. As I will show, the Cf-list approach makes predictions that have fewer exceptions, and explains some otherwise puzzling findings of Di Eugenio and Turan.

2 Pronouns and the maxims of conversation

In the framework of Horn (1984), the choice among potentially coreferring expressions is affected by opposing “Q-based” and “R-based” principles of conversation:

- (2) a. The Q Principle (Hearer-based):
Make your contribution sufficient; say as much as you can (given R).
- b. The R Principle (Speaker-based):
Make your contribution necessary; say no more than you must (given Q).

Principle Q is “hearer-based,” in the sense that it serves the interpretational needs of the speaker. It licenses “upper-bounding” implicatures of the form “if S said no more, then no more is true.” Principle R is a speaker-oriented principle of minimum effort, and licenses “lower bounding” implicatures involving more than was said: *I was able to solve the problem* implies *I solved it*. The conflicting requirements of these principles are resolved according to the following schema:

- (3) The use of a marked (relatively complex and/or prolix) expression when a corresponding unmarked (simpler, less ‘effortful’) alternate expression is available tends to be interpreted as conveying a marked message (one which the unmarked alternative would not or could not have conveyed).

For example, using the non-conventional phrasing “are you able to reach the salt,” rather than the more colloquial “can you reach the salt,” has the effect of canceling the customary interpretation of this question as a request to pass the salt.

Horn (1984) discusses the application of these principles to pronominal choice, and notes their relation to the Avoid Pronoun principle of Chomsky (1981), which was intended to explain the near-complementary distribution between overt pronouns and the null pronoun PRO in English. In brief, PRO is used wherever a referent is salient enough to be recoverable; since principle R dictates the use of PRO in this case, principle Q implies that when PRO is not used, it must be because it *cannot* be used. In this way the overt forms are prevented from being construed with referents that are accessible to PRO. The same principles, *mutatis mutandis*, can account for the choice between pronominal and full-NP forms.

Enç (1986) provides a similar analysis of pronominal subjects in Turkish. She concludes that overt pronouns signal a change of topic, while a sentence with a null subject is “taken as a comment on the previous topic.” Enç defines “topic” as a proposition rather than a referential entity, and treats topic change as a special case of contrast: overt subject pronouns are used to express contrast, whether in topic choice or in the usual sense. The Gricean maxim of Quantity is responsible for associating the more complex, “marked” overt subject sentences with the extra implicature that the sentence in question is contrastive. As Horn (1984) points out, the system she describes is very close to the principles given in (2) and (3). It should be noted, however, that Enç rejects the notion that pronoun interpretation directly involves conversational implicature; she considers the association of overt pronouns with contrast to be a grammaticized convention of Turkish grammar.

2.1 Givenness

The above analyses of pronoun choice contain the unstated assumption that pronouns, null or overt, can “recover” highly salient expressions but not less salient ones. While this certainly appears to be true, it cannot be said to follow from conversational maxims. A third-person singular masculine pronoun, for example, is just as compatible with a highly salient masculine antecedent as it is with one that is familiar, but of low salience; and while a full pronoun may well be necessary for the identification of less-salient entities, a deleted salient referent can only be said to be “recoverable” because we know that non-salient (but familiar) alternatives are not candidates for deletion.

In order for the whole system to work, then, it is necessary for referring expressions to have some prior restrictions on the class of referents they can be construed with; Horn’s system can then take over and further restrict the potential interpretations, through contrastive implicatures according to (3). Gundel *et al.* (1993) propose a detailed system along such lines. They argue that the choice among referential forms is constrained by the Givenness Hierarchy of “cognitive statuses”:

IN FOCUS > ACTIVATED > FAMILIAR > UNIQUELY > REFERENTIAL > TYPE
IDENTIFIABLE IDENTIFIABLE

Each type of expression has a minimum cognitive status that is required of its antecedents. English pronouns are required to be in focus, full NPs to be (at least) uniquely identifiable, etc. By definition, membership in any status of the hierarchy entails membership in all lower statuses (but not vice versa), for example, a familiar entity is automatically uniquely identifiable, referential, and type identifiable. As a consequence, an expression that requires its antecedent to be referential is also usable for in-focus entities, etc.

Usage is said to be further constrained by the Gricean maxim of Quantity: using an expression that requires some particular cognitive status implies that an expression requiring a *higher* cognitive status would be inappropriate (this is just the principle given in (3) above). Thus the form *that N*, which must refer to an entity that is familiar or higher, is not ordinarily used for an in-focus entity because its use implies an antecedent that is familiar, but not in-focus.

Thus the domain of interpretation of a pronoun is restricted from below, but not from above, by lexically specified conditions on its minimum required “givenness”, and further restricted from above by Gricean implicatures. A pronoun is construable with any entities in its restricted domain, subject only to feature compatibility. But in Greek, overt pronouns appear to have a lexicalized *upper* bound, a finding inconsistent with the assumptions of the Givenness Hierarchy.

Gundel *et al.* (1993) also claim that the contrastive restriction of the potential domain of expressions is the result of Gricean principles; because it must be automatic and apply uniformly, it follows that two different pronouns should not be able to pick out the same entity: the existence of the simplest one should imply that the more complex one is only used for referents inaccessible to the simple one. In fact, as the authors’ own data show, the expression *that N* in English is used with activated as well as with familiar antecedents, even though English provides several expressions requiring activated antecedents, e.g., *this*, *that* and *that N*. Similar issues arise in other languages they address, and also in Greek, where the pronominal subjects are not in complementary distribution.

3 Centering theory

Centering theory models the establishment of anaphoric relationships and their effect on the speaker’s and hearer’s focus of attention. The canonical reference is Grosz *et al.* (1986), which has more recently appeared in revised form as Grosz *et al.* (1995). The following description of centering is of necessity brief and incomplete. The reader is referred to Walker *et al.* (1994) for a recent, particularly informative exposition.

Centering theory models potential antecedents at any point in the discourse

as a list of *forward looking centers* (Cf-list for short). The centers of each utterance are the available antecedents for the next utterance, and appear in the Cf list in order of prominence. Their ranking is in principle predictable from syntactic considerations alone: centers are ranked according to some variation of the following hierarchy.

SUBJECT > OBJECT2 > OBJECT > OTHER > DISCOURSE UNIT

Actually it is not entirely clear what factors determine this ranking, which is believed to be language-dependent. Turan (1994a) discusses a number of additional factors, including point of view and the thematic role of a subject or object, that may affect the ranking.¹

The most prominent center is the *preferred center* or Cp; it is assumed to be the most likely to be talked about in the next sentence.

Each utterance has a distinguished *backward looking center* (Cb). This is supposed to be the center of the current utterance that the speaker is most concerned with. It is *defined* as the highest-ranked center of the previous utterance that is also realized in the current utterance.

An example: The Cf list and Cb are marked in the following passage. (The Cp is always the first element of the Cf list).

- (4) a. Keli_i went to listen to a band_j.
 [Cf = (Keli, band). No Cb]
 b. She_i struck up a conversation with the band_j's stage manager_k.
 [Cf = (Keli, conversation, stage manager, band). Cb = Keli]
 c. He_k gave her_i some free passes for their_j next show.
 [Cf = (manager, Keli, passes, show, band). Cb = Keli]

The Cb represents the immediate center of attention, and therefore constitutes centering theory's version of the notion of *topic*.

Centering theory models discourse as a series of *centering transitions*, that is, changes in the identity of the Cb. The Cb of any utterance may or may not be the same as its Cp; it also may or may not be the same as the Cb of the *previous* utterance. These two factors determine the type of the centering transition (or just *transition*) from the previous to the current utterance, according to the following table.

	Cb(U _n) = Cb(U _{n-1}) Cb(U _n) ≠ Cb(U _{n-1})
	or no Cb(U _{n-1})
Cb(U _n) = Cp(U _n)	Continue (CT)
Cb(U _n) ≠ Cp(U _n)	Retain (RT)
	Smooth Shift (SS)
	Rough Shift (RS)

Thus sentence (4b) above corresponds to a Continue transition, since its Cb is also the Cp, and there is no previous Cb. Sentence (4c) corresponds to a Retain transition, since its Cb does not change from sentence (b), but Cb(4c) ≠ Cp(4c).

The type of transition is said to affect the coherence of the text. Continue

transitions give the most coherent discourse, followed in order by Retain, Smooth Shift, and Rough Shift. Rough Shifts are quite rare in natural discourse. Centering theory predicts that in interpreting anaphoric expressions, hearers prefer to assign antecedents in a way that maximizes the coherence of the discourse.

The centering framework has relatively little to say about the acceptability of pronouns in discourse. The *Pronoun Rule* of Grosz *et al.* (1986) states that if an utterance U_n contains any pronouns realizing a center of the previous utterance, then the Cb of U_n must also be realized by a pronoun.

The Pronoun Rule has been extended and generalized since it was formulated as above. For example, Turan (1994a) assumes the following as part of the “rules of centering theory”:

- (5) The appropriate use of a referential expression depends on the degree of salience which the antecedent in the Cf list is assigned by the speaker. Thus:
 - a. a reduced expression (i.e., a null/unstressed pronoun depending on the availability of such forms in a language) is reserved for the most salient entity,
 - b. the most explicit expression, i.e., full NP is reserved for a less salient entity.

4 Null pronouns in centering theory

The Pronoun Rule, which distinguishes between pronominal and full nominal expressions, makes no predictions about the choice between different types of pronoun. But the Gricean analysis sketched in section 2, as well as Turan’s rule (5), predict that overt pronouns are used for entities that are less “salient” than those for which null pronouns are used. The problem, once again, is to define salience in a way that allows the relative salience of two entities to be determined in a non-circular way (that is, without checking which of the two allows a more reduced anaphoric expression).

Several studies have compared overt and null pronouns within a centering framework. Turan (1994b, 1995) studies Turkish pronominal subjects, while Di Eugenio (1990, forthcoming, 1995) analyzes Italian. Both Turan and Di Eugenio show that null subjects tend to be used when a Continue centering transition is involved. Di Eugenio (1990) stated the following hypotheses:

- (6) a. Typically, a null subject signals a Continue, and a strong pronoun a Retain of a Shift.
- b. A null subject can be felicitously used in cases of Retain or Shift if U_n provides syntactic features that force the null subject to refer to a particular referent and not to $Cb(U_{n-1})$. Moreover, it is the syntactic context up to and including the verbal form(s) carrying tense and/or agreement that makes the reference felicitous or not.

Di Eugenio (forthcoming) provides a quantitative test of these rules; she finds that although most (81%) of the Continue transitions in her sample involve null subjects, a null subject is only used 56% of the time in the case of Continue transitions that follow a Retain. This subclass of Continue transitions is dubbed *Retain-Continue*. Turan (1995) found the same behavior for Turkish: Continue transitions following a Continue or a Shift favor the use of a null subject, while Retain-Continue transitions do not.

This is not the only departure from the correspondence of null pronouns with Continue transitions. Di Eugenio found that “plain” Continue transitions involved a null subject 88% of the time, a proportion which, although statistically significant, is far from categorical. Turan (1994a) examines a number of other factors that apparently interact with pronominalization in Turkish and other languages. These include surface position, grammatical role, thematic role, and point of view or “empathy”.

The analyses of Turan and Di Eugenio are similar in approach, and share the claim that the choice of pronoun is sensitive to the type of centering transition involved. They demonstrate a marked tendency for particular types of pronouns to co-occur with particular centering transitions. I found similar effects to apply to Greek, as well. But in the following section, I present quantitative results establishing that the form of pronominal subjects is determined by the position of their antecedent in the Cf list, not by the current centering transition or by the identity of the Cb.

5 The uses of Greek pronouns

A pronominal subject in Greek can be expressed either by a null, or by one of the demonstratives *aftos* ‘this one’ and *ekinos* ‘that one’. To study the conditions of their use, I collected examples of each of these types of subject² from a corpus of four Greek texts drawn from the Greek part of the European Corpus Initiative (ECI) corpus. Most of the texts were novels written in Greek or translated to Greek. One was a set of lecture notes from a university-level electronics course.

From each text, long contiguous tracts were analyzed, and from each such tract, all sentences meeting the selection criteria were collected. Overt subject pronominals are relatively rare, so for reasons of technical convenience, only instances of sentence initial overt pronominals were collected. Since null subjects are much more frequent, it was possible to accumulate a sufficient number of tokens through searching much smaller tracts of text. For this reason, this study cannot provide information about the relative frequency of the different pronoun types in Greek, but only about the range of uses of each pronoun.

Since the construction of interest was the free alternation between null subjects and overt pronouns, I collected only types of constructions which, considered in isolation, would have allowed a null subject in place of the overt pronoun. Thus

Table 1: Centering transition types, by pronoun

	CT	SS	RT	RS	(none)	Total
<i>pro</i> (3rd pers.)	87	8	7	1	8	111
<i>Aftos</i>	11	46	19	2	6	84
<i>Ekinos</i>	10	12	7	1	10	40

I discarded overt pronouns when they: functioned as the head of a relative clause; were part of a larger phrase, such as *afto to vivlio* ‘this book’; were modified by a quantifier, as in *afto monacha* ‘only this’; or when they obviously carried phonetic stress.

For each sentence, I assigned the reference of anaphoric expressions on the basis of my own intuitions as a native speaker; then I computed the relevant centers and transition types according to the Centering Algorithm as described in Walker *et al.* (1994). Forward-looking centers were ranked according to the following hierarchy:

- (7) SUBJECT > OBJECT2 > OBJECT > OTHER > DISCOURSE UNIT

Discourse deixis (see Webber (1990)) received special treatment: the antecedent of a discourse-deictic expression was assumed to be in the Cf list, but ranked lower than any overt center.

Null and overt subjects were not distinguished for ranking purposes.

Table 1 shows the distribution of centering transitions associated with each pronoun type. In ordinary text, the majority of transitions tend to be of type Continue, with moderate numbers of type Retain and Smooth Shift and a few Rough Shifts. It can be seen that, as also reported for Turkish and Italian, *pro* in Greek shows a strong, but by no means categorical, association with Continue transitions.³ The overt pronominals (especially *aftos*) show a marked, but again not categorical, dispreference for Continue transitions. It is clear, if further proof were needed, that pronoun choice is in some way sensitive to discourse context.

But this table should not be taken to prove that pronoun choice is sensitive to transition type. Indeed, table 2 shows that use of the overt pronoun *aftos* shows a much stronger, basically categorical, correlation with different parameter: the position of its antecedent in the Cf list. In particular, the antecedent of *aftos* can (almost) never be the Cp of the previous utterance.

Due to the design of the study, only sentences of type Continue and Smooth Shift could have had the Cp of the previous utterance as the antecedent of *aftos*.⁴ In table 2, a dash is used to indicate combinations that are *a priori* impossible; untested but *a priori* possible combinations are indicated with the digit zero. It can be seen that of the fifty-seven utterances that could have had Cp(U_{n-1}) as the antecedent of *aftos*, only one actually did so. This is an effect much stronger than the

Table 2: Antecedent of *aftos*, by transition type

	CT	SS	RT	RS	(none)	Total
Cp(U_{n-1})	0	1	–	–	–	1
other in U_{n-1}	11	45	19	2	–	77
other	–	–	0	0	4	4

tendency to avoid Continue transitions, observed in table 1; I will take it to be characteristic of the subject pronominal *aftos* (indeed, of all overt subject pronominals in Greek), and express it as follows:

- (8) **The Overt Pronoun Rule:** An overt pronominal subject in Greek should not be construed with the Cp of the previous utterance.

The paucity of Continue transitions in the distribution of *aftos* is a consequence of the Overt Pronoun Rule. This is because the Overt Pronoun Rule implies that *aftos* can only appear in a Continue transition if the preceding transition was a Retain or Rough Shift;⁵ since Retain and Rough Shift transitions are not very common, most Continue transitions in a text follow another Continue or a Smooth Shift, ruling out usage of *aftos*. Thus usage of *aftos* with Continue is necessarily rare. Of the eleven such examples in my sample, five were after sentences without a Cb, (which are nominally labeled “Continue” according to the table of section 3), and did not in fact involve reference to the previous Cp. The remaining six were all in sentences following a Retain. The following passage is an example of such a situation.

- (9) a. Mia mera pernouse ap’ to scholio i Elenitsa_i, opos sichna-pikna to sinithize.
‘One day Eleni_i came by the school as she often did.’
b. O kenourios_j tin_i ide proti fora ke ksipastike.
‘The new guy_j saw her_i for the first time and flipped.’
c. ϕ_j Etrekse ksopiso tis_i ke prospathise na tis_i milisi: “Despinis...”
He_j ran behind her_i and tried to talk to her_i: “Miss...”
[Cb = he_j, Cf = (he_j, she_i)]
d. I Elenitsa_i oute pou girise na ton_j di.
‘Eleni_i didn’t even turn to look at him_j.’
[Cb = he_j, Cf = (she_i, he_j) : Retain]
e. **Aftos_j** epemene.
‘He_j insisted.’ [Cb = he_j : Continue]

We find again a pattern of Retain-Continue transitions in association with overt subjects, just as observed for Italian and Turkish by Di Eugenio (forthcoming) and Turan (1995) (see section 3. As I have shown, this pattern is a direct consequence of the incompatibility of overt pronouns with Cp antecedents.

We have seen that *aftos* cannot be construed with the Cp of the previous utterance, Cp(U_{n-1}). A look at the relevant definitions will confirm that Cp(U_{n-1})

is *not* involved in the definition of centering transitions. *Aftos* is not incompatible with any of the entities that determine the centering transition: is is not prohibited from referring to the Cb of the previous utterance, and in fact does so in all the Retain cases. Similarly we see that in all the Smooth Shift cases, *aftos* is the Cb of the *current* utterance; and because *aftos* is the subject, it is always the Cp of the current utterance. Thus overt pronouns are compatible with all transition types, although their distribution is skewed because of the need to avoid Cp(U_{n-1}).

This highlights a gap in the descriptive power of the centering framework: The instantiation or not in an utterance of the previous utterance's Cp is an important consideration of this account, but does not have a formal status in centering theory. The four types of centering transition are intended to keep track of actual changes in the Cb as well as “promised” changes—in the sense that the Cp can be thought of as a hint about the identity of the Cb of the coming sentence. Thus a Cp other than the Cb promises a future change of center and causes some degradation in the coherence of the discourse. But centering theory does not track how often a promised shift actually occurs: the centering transitions are sensitive to the identity of the *current* Cp, Cp(U_n), but not of the previous Cp, Cp(U_{n-1}). And as we saw it is this center that is relevant to the analysis of pronominal anaphora.

Space does not permit a discussion of the other overt pronoun of Greek, *ekinos* ‘that one’. I will simply mention that as table 1 indicates, it is frequently used with antecedents that did not occur in the previous sentence at all (and are therefore not in the Cf list), as well as with antecedents that are a proper subset of a center of the previous sentence (are “indirectly realized,” in the centering terminology). Assuming that an entity that is not realized directly is not as accessible as one directly realized, we can consider *ekinos* to be selecting antecedents that are rather low on the Cf-list. The reader is referred to Dimitriadis (1995) for more details.

6 The null subject *pro*

Null subjects form the great majority of pronominal subjects in Greek, so it is not surprising that their use is harder to characterize than that of the overt pronouns. Since overt pronominal subjects are as we saw incompatible with a preceding Cp, ideally we would expect the null subject *pro* to always select the Cp of the previous sentence as its antecedent. But although *pro* does by and large tend to take the previous Cp as its antecedent, exceptions occur with frequency much greater than seen with the overt pronominals.

The most numerous class of such exceptions involves first and second person participants. (Note that Greek verbs agree in number and person with their subject). This behavior is not peculiar to Greek, and has been addressed in work on other languages. Turan (1994a) notes (after Di Eugenio (1990)) that *pro* can have a non-subject as its antecedent as long as the subject of the previous utterance does not match the person or number features of *pro*. In the following example (adapted

from Turan (1994a)), either the overt *aftos* or the null *pro* can be used in sentence (10b) to refer to the object of the previous sentence; but when the higher-ranked subject does not contrast in number, as in (11), the overt pronoun is required.

- (10) a. O Achmet ke o Murat kalesan ton Ali_i gia fagito.
 ‘Ahmet and Murat invited Ali to dinner.’
 b. Alla ϕ_i /aftos_i den borouse na pai giati ϕ_i iche doulia.
 But ϕ_i /he_i could not go because (he_i) was busy.
- (11) a. O Achmet kalese ton Ali_i gia fagito.
 ‘Ahmet invited Ali to dinner.’
 b. Alla # ϕ_i /aftos_i den borouse na pai giati ϕ_i iche doulia.
 But # ϕ_i /he_i could not go because (he_i) was busy.

Turan adopts a conclusion that claims, essentially, that as long as the antecedent can be uniquely identified by its φ -features, pronominal anaphora is allowed regardless of the position of the antecedent on the Cf list.

Given the self-evident fact that pronouns cannot be construed with antecedents that have incompatible φ -features,⁶ and the findings of Di Eugenio (1990) and Turan (1994a), I will assume the following working hypothesis:

- (12) **φ -invisibility hypothesis:**
 In selecting an antecedent, pronominals ignore potential antecedents with incompatible φ -features.⁷

In view of this assumption, the hypothesis that *pro* should pick out the Cp (that is, the highest element on the Cf list) of the previous utterance must be modified as follows:

- (13) ***Pro* anaphora proposal:**
Pro is construed with the highest antecedent in the Cf list that has compatible features with it.

Under this proposal, the selection of antecedents for *pro* is based on position in the Cf list, as proposed above for the overt pronominals. Centers with incompatible φ -features are simply skipped over by the selection process.

At this point it is necessary to examine the effects of the φ -invisibility hypothesis on what has already been claimed about the selection of antecedents to overt pronominals. Should the Overt Pronoun Rule be modified to say that overt pronouns never select the most highly ranked *compatible* antecedent? It turns out that such a modification would be empirically incorrect. Overt subjects can select the second highest element of the Cf list even when the top element has incompatible φ -features. Consider again passage (9). The masculine subject *aftos* in sentence (e) is construed with the antecedent *he_j*, occupying second place in the Cf list of sentence (d), even though *he_j* is the highest-ranked masculine center. (The antecedent *Elenitsa_i* would have required the feminine form *afti*). Similarly, the

Table 3: Antecedent of third-person *pro*, by transition type

	CT	SS	RT	RS	(none)	Total
Cp(U_{n-1})	79	6	4	0	–	89
other in U_{n-1}	7	2	1	1	0	11
other	1	0	2	0	8	11

singular subject *aftos* in sentence (10b) is acceptable, although its antecedent is the highest-ranked singular center in the previous sentence. Thus the Overt Pronoun Rule must continue to rule out the Cp as an antecedent for overt pronouns regardless of φ -features.

Having thus refined our expectations of the behavior of null subjects, we can put them to the test with some quantitative data. Table (3) shows the behavior of null subjects collected only from passages that did not have a first or second person participant. The results, shown in tables 1 and 3, are still not as clear-cut as those for the overt pronouns. Although there is a strong tendency for third person *pro* to be construed with the Cp of the previous utterance, there is still a significant number of exceptions, few of which can be explained by a mismatch of agreement features.

In many of the exceptional cases, another type of incompatibility seems to be involved; when *pro* is the subject of a verb that selects for a sentient or agentive subject, it appears to skip over high-ranked centers that are non-agentive. In the following example, sentence (14b) contains *two* null subjects; one of them (ϕ_i) is construed with the inanimate Cp of the preceding sentence; the other (ϕ_j) is the subject of *thought*, which requires an animate antecedent; it skips down the Cf list and selects the animate center *Max*. I should add that this passage is not at all difficult to process.

- (14) a. Ostoso to telefteo onoma_i itan afto pou travikse tin prosochi tou Max_j.
 However, the last name_i was the one that attracted Max_j's attention.
 [Cf = (name, attention, Max)]
- b. ϕ_j Skeftotan pos ϕ_i teriaze apolita sti gineka pou to efere.
 (He_j) thought that (it_i) fit perfectly the woman that carried it.

It appears that agentivity, sentience or something like that is among the features that are subject to the φ -invisibility rule (12); that is, that non-animate (or whatever) centers are ignored if a *pro* looking for an antecedent should be animate (or whatever). Assuming that this factor is also taken into account in the computation of antecedents to *overt* pronominal subjects, we can formulate the following rule, which should be considered a clarification of the φ -invisibility hypothesis (12).

- (15) **Agentivity rule:** An antecedent for a pronominal subject must match it in terms of agentivity as well as number and person.

A number of the remaining exceptions can be blamed on what Turan (1994a) describes as “discourse point of view:”

(16) **Discourse Point of View (Empathy) rule:**

In a discourse segment with a subjective point of view, entities are ranked through the represented mind of a subject of consciousness. (Turan 1994a; cf. Kuno 1976, 1989).

It must be stressed that while all the processes discussed so far concern the selection of antecedents from a fixed Cf list, the POV rule affects the construction of the Cf list itself. The ordering of the Cf list is a complex issue which is not addressed at all in this paper.

7 Conclusions

I have argued that the subject pronouns of Greek (and apparently Italian and Turkish) select their antecedent on the basis of its position on the Cf list. In particular, null subjects tend to take as their antecedent the highest-ranked center that has compatible grammatical and agentivity features. Overt subjects are incompatible with the Cp, regardless of its features.

These conditions are not mutually exclusive: it is not rare for more than one pronominal to be able to access the intended antecedent; for example, when *pro* is not construed with the Cp because of incompatible φ -features, both *pro* and the overt pronoun *aftos* are possible. Passage (10) is such an example. This has important consequences for the Gricean analysis outlined in section 2. If the incompatibility of overt pronouns with the Cp arose productively through contrastive implicatures, the result would be mutually exclusive domains of use for overt and null pronouns. But the ability to use a null pronoun for antecedents other than the Cp does not rule out use of an overt pronoun for such antecedents. It follows that Gricean implicature, although clearly involved in the organization of the whole system, cannot be productively involved in the determination of anaphoric reference. Thus, apparent instances of their operation must be the result of lexicalized, conventionalized implicatures. This is wholly compatible with Horn (1984), who considers principles P and Q to underlie a wide range of linguistic processes, synchronic and diachronic, from fast-speech phenomena to semantic shift.

Another argument in favor of a conventionalized interpretation is provided by Enç (1986), who points out that the exclusion of the Cp (the topic, in her discussion) as an antecedent of overt subject pronouns is not cancelable:

- (17) a. O Aris_i diplose tin efimerida_j.
‘Aris_i folded the newspaper_j.’
b. ϕ _i Tin_j efere sto Giani_k.
‘He_i brought it to John_k.’

- c. Aftos_{k/#i} den milise.
'He_{k/#i} did not speak.'
- d. # O Aris_i, oxi o Gianis_k.
(I mean) Aris_i, not John_k.

On the other hand it is easy to cancel the preferred interpretation of a pronoun, overt or null, in favor of one that is *lower* on the Cf list. The exclusion of the Cp for overt subjects is a built-in condition on the domain of interpretation. But the selection of an actual referent from among the possible candidates is computed on the fly, hence it can be cancelled.

In conclusion, the interpretation of pronouns is partly dependent on grammaticized properties of individual pronouns. Gricean considerations underlie the entire system, but are not solely responsible for delimiting the potential domain of pronominal interpretation.

Notes

I would like to thank Ümit Turan and Ellen Prince for their help with the work reported in this paper. An early version appeared as Dimitriadis (1995).

1. In the version of centering theory presented by Grosz *et al.* (1995), the centers in the Cf list are only required to be partially, not totally, ordered. I follow the framework of Grosz *et al.* (1986), which requires the Cf list to be totally ordered.

2. For reasons that will be discussed in section 6, I only collected null subject sentences from passages in which there was no first or second person participant, hence all tabulated instances of *pro* and all its potential antecedents are in the third person.

3. Because of the sampling method, table 1 cannot be used to derive the distribution of pronoun type for each centering transition.

4. The reason is as follows: If *aftos* picked out Cp(U_{n-1}), it would be the Cb of utterance U_n. As a sentence-initial subject, *aftos* is also the Cp of utterance U_n; we would then have Cb(U_n) = Cp(U_n), and the centering state must be Continue or Smooth Shift.

5. The explanation involves a bit of centering arithmetic. Since *aftos* is automatically the Cp when it appears sentence-initially, and in a Continue transition the current Cp is also the Cb, the antecedent of *aftos* in a Continue transition must be the Cb of the previous sentence. But by the Overt Pronoun Rule, the antecedent of *aftos* may not be Cp of the previous sentence. It is only possible to satisfy both of these requirements when the previous sentence has different Cp and Cb, that is, when the preceding transition is a Retain or Rough Shift. Thus *aftos* can only appear with Continue transitions that follow a Retain or Rough Shift.

6. An obvious qualification is necessary: a pronoun may be allowed, or required, to carry gender or number features that do not match those of the expression that introduced its antecedent.

- (i) a. I am going to dinner with my family_i.
- b. They_i are waiting for me outside.

This kind of quirk is unproblematic for centering theory, which stresses the distinction between entities (centers) and the expressions that introduce them.

7. It can be assumed for the time being that the relevant φ -features are those carried by the pronominal, if overt, and by the subject agreement on the verb. (But see below).

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