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Interface Reflections[1]

This paper supports the claim that the autonomy–of–syntax thesis must be given up in favour of a model in which the computational system is allowed to interface with discourse–related phenomena in order to arrive at a complete interpretation. The evidence for this claim is derived mainly from the area of pronominal reference, an area of crucial interest for the interface discussion since pronouns are elements subject to variable interpretations, so that utterances containing them cannot be interpreted merely in terms of their truth–conditional semantics. I first discuss the pro–drop parameter and its putative interaction with pragmatics. I then turn to overt pronouns and their characterisation in Government & Binding theory. The various types of pronouns are discussed, and it is concluded that, contrary to what is implied by Principle B of the Binding Theory, the class of pronouns is non–unitary. Definite NPs behave similarly, so that both classes are basically ambiguous, with an in–built appeal to discourse factors. More evidence is drawn from the area of presupposition and quantifier–variable binding. The final section contains some speculations regarding the relation between language and thought.

1. Introduction

The tenet of the radical autonomy of syntax has often shown itself to be a problematical notion in view of the wayward behaviour of syntax with respect to specific lexical phenomena. For earlier — and frequently cruder — formats of generative grammar, in which alternate forms of a sentence were often assumed to be transformationally related, the so–called *spray/load* alternation proved to be a stumbling block for an autonomous syntax: the prepositions involved in this alternation, as exemplified in (1), are locative *on* and material

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with, with their own semantics: other prepositions cannot randomly be substituted:

(1) a. Isabella sprayed lacquer on her hair
     b. Isabella sprayed her hair with lacquer
     b'. *Isabella sprayed her hair around lacquer

     c. Isabella loaded mayonnaise on her pita
     d. Isabella loaded her pita with mayonnaise
     d'. *Isabella loaded her pita at mayonnaise

This well–known fact flies in the face of any treatment that derives the alternating variants by syntactic movement of the locative PP and the material PP, deleting at the same time one P and substituting a different P, which, however, cannot be just any P given the ungrammaticality of (1b') and (1d'). Thus, the choice of the prepositions involved appears to be sensitive to non–syntactic, i. e. lexical information and this fact would eventually lead to a rigorous redrawing of the demarcation lines between the syntactic component and the lexicon.

Chomsky's treatment of the autonomy of syntax has always been more circumspect; in his (1982) discussion with Rini Huybregts and Henk van Riemsdijk concerning the generative enterprise, he introduced the distinction between *external* and *internal* autonomy, where external autonomy is stated to be a property of 'formal grammar', i. e. the computational system. This part of the grammar, which covers syntax and its interfaces with PF and LF, is taken to be an autonomous system. This does not imply, however, that it is totally cut off from all other systems: 'Undoubtedly, the system interacts with other systems, but the interaction is more or less in the periphery.' (Chomsky 1982:115).

Chomsky's position on external autonomy validates his long–standing claim concerning what Botha (1989:118) has elegantly phrased as 'the existence of a self–contained computational faculty of mind'. In the Principles and Parameters approach of Government & Binding Theory, a principle such as Subjacency, which forbids movement of a constituent across more than one bounding node, is therefore considered to be an integral part of the computational system, and not 'derived from, say, one or more general principles of perceptual processing' (Botha 1989:118), which it would have to be in a non–autonomous approach to the computational system.

This article purports to be an addition to the growing body of evidence that the autonomy–of–syntax thesis must be given up in favour of a model in which the computational system is allowed to interface with discourse–related phenomena in order to arrive at complete interpretation. Discourse–related phenomena are usually accredited to pragmatics. Pragmatics is customarily defined as having to do with 'the factors that influence a speaker's choice to say something the way she does, and the hearer's interpretation of what has been said, and what was meant by it'. (Green 1989:159). What I want to do in this article is look at where pragmatics trades with formal syntax as represented by

the theory of Government and Binding. The attitude towards pragmatics held by the majority of formal linguists has generally been one of dismissal, however. If a particular phenomenon in a language is too ill–behaved or wayward to fit into existing phonological, syntactic or semantic components of the grammar, it is generally carted off to pragmatics and can thus either be dismissed or is simply not worth worrying about.

It would be a considerable gain in orderliness if pragmatics could somehow be made to fit into a modular system, either as an externally modular theory itself or as an internally modular component, i. e. with respect to (some of) its own components. Leech (1983:21) holds that syntax and semantics are rule–governed but that pragmatics is principle–controlled. And Sperber & Wilson (1986) point out that pragmatics cannot be a module given the indeterminacy of the predictions and explanations it offers and the global knowledge it calls upon. If, given these properties, pragmatics does not appear to be externally modular, could it then perhaps be internally modular in the sense that there are conceptually distinct subcomponents that operate simultaneously to yield a single account of a given phenomenon, as is the case, for example, with the passive in GB theory? Such internal interactions have in fact been proposed for pragmatics and the area of pragmatics has consequently been divided into various subfields like conversational pragmatics, functionalist pragmatics and perhaps even psycholinguistic pragmatics. I will not take a stand in this ongoing debate but simply take pragmatics to be, as Stalnaker (1972:383) defines it, 'the study of linguistic acts and the contexts in which they are performed'.

One of the central concerns of pragmatics is deixis or indexicality, i. e. expressions whose meaning can best be viewed as a function of context to individual by assigning values to variables for speaker, hearer, time and place of utterance, style or register, etc. Tense/aspect markers and words such as *I*, *you*, *here*, *there*, *now*, *then* are typical indexicals. Since these elements are subject to variable interpretations, the utterances of which they are a part cannot be interpreted merely in terms of their truth–conditional semantics. Pronouns are therefore of crucial interest for the interface discussion we are concerned with here. Let me begin the discussion with a review of the pro–drop parameter, which has been put forward as a candidate in which syntactic and pragmatic principles are intertwined. The mechanics of pro–drop are discussed in section 2, and the interaction with pragmatics in section 3.

2. The pro–drop parameter

In general, sentences are subject–predicate constructions. In tensed clauses, the subject NP shows agreement with the tensed verb. The subject NP is obligatory in tensed clauses in languages like English and Dutch, and of the Romance languages, in French. Italian and Spanish may have tensed sentences without an overt pronominal subject NP:

(2)   a.   Parliamo Italiano.
               We speak Italian

b. *Speak Italian. (= 'we speak Italian')
c. Hemos trabajado todo el dia.
    We have worked all day
d. *Avons travaillé toute la journée.

Not realising the subject lexically in tensed clauses is called pro–drop. The expression of the subject in languages is a central property, and is hence unlikely to be language–particular. It should be obvious that the explanation of this conspicuous difference between languages involves variation of a universal property. The usual strategy in GB–theory is to investigate whether variation in the lexicalisation of the subject position can be shown to be related to other properties of the language, so that pro–drop would be a consequence of the choice of a value for a parameter in Universal Grammar (i. e. realisation of the subject as a lexical element). There are at least two sets of phenomena which are relevant to pro–drop; free inversion and long–distance extraction of the subject of embedded sentences. These facts are illustrated in (3) and (4):

(3) a. Gianni crede che è partito Mario.
         Gianni believes that is left Mario
     b. Juan dijo que estaba agotado el libro.
         Juan says that was sold out the book

     c. *John says that was sold out the book.
     d. *Jean dit qu'est parti Pierre.

(4) a. Chi credi che verra a visitarci?
         Who believe–you that will come to visit here
     b. Quien dijiste que salió temprano?
         Who do you say that left early

     c. *Who do you think that left early?
     d. *Qui a–t–il dit que va venir ce soir?

On the assumption that the normal place for the subject is preverbal, a subject pronoun appears to be omissible in three specific contexts in Italian and Spanish: in tensed sentences, in sentences in which the subject is postverbal and in embedded sentences from which the subject has been removed by long–distance extraction. We may now start a search for some principle X in Universal Grammar that sees to it that specific grammars contain the [+X] value of the parameter (say Italian and Spanish), while other grammars select the [–X] value of the parameter. The determination of the value of X has the presence or absence of the properties in (2)–(4) as a direct consequence.

In the matter of language acquisition the question is how the language–learning child can determine the value of parameter X as it applies to their own language. This can only be done on the basis of positive evidence. An English child will not be offered the ungrammatical English sentences in (2)–(4). This is not in itself sufficient to determine that X must have the minus value, since the absence of tensed sentences with a non–lexical subject in English might be a coincidence. The child is never offered the ungrammatical sen-

tences as (indirect) negative evidence. The Spanish child, on the other hand, can immediately infer the positive value of X, since a Spanish sentence of the type in (2) will almost certainly be offered to the child as positive evidence, from which they may infer that the structures in (3) and (4) also belong to their language. The English child requires a markedness corollary; as long as there is no positive evidence pointing to the contrary, the child opts for the unmarked value of the parameter, i. e. [–X]. The Spanish child will eventually ascertain that Spanish is [+X], selecting the marked value of the parameter.

This looks like a tidy procedure, but a note of caution should be sounded. Syntactically, the correlation of the occurrence of preverbal empty pronominal subjects with the possibility of the occurrence of postverbal subjects in pro–drop languages is a more complex phenomenon than appears at first sight. A more precise look at long–distance extraction in the Romance languages reveals that what looks like long–distance extraction of a preverbal subject in effect takes place from the postverbal subject position rather than from the preverbal. The facts of Italian *ne*–cliticisation are telling in this respect:

(5) a. Qui pensi che ha telefonato?
         Who think–you that has telephoned
     b. Gianni *(ne) ha letti tre.
         Gianni of–them has read three
     c. Due studenti sono arrivati.
         Two students are arrived
     d. Sono arrivati due studenti.
         Are arrived two students
     e. due (*ne) sono arrivati.
         Two of–them are arrived
     f. *(Ne) sono arrivati due.
         Of–them are arrived two
     g. Quanti pensi che *(ne) sono caduti?
         How many think–you of–them are fallen

(6) a. *Wh$_i$ [... [$_{CP}$ che [t$_i$... V...]]]
     b. Wh$_i$ [... [$_{CP}$ che [... V t$_i$...]]]

The argument runs as follows: (5a) shows once again that a finite embedded clause in Italian may occur without a lexical subject. In (5a) the questioned subject of the embedded clause *qui* has been extracted across the lexical complementiser *che* and placed in sentence–initial position. Italian has a clitic element *ne* that is obligatory if an NP with a quantifying specifier, such as a numeral, occurs in object position without a lexical head noun. This is shown in (5b). If a quantified NP is used as the subject, the situation is slightly more complicated. Subjects are either preverbal or postverbal, as shown in (5c) and (5d). If, however, the subject is a quantified NP with an empty head noun, *ne* is obligatorily present if the subject is postverbal, and obligatorily absent when the subject is preverbal. This is shown in (5e) and (5f). The main verb in the embedded clause in (5g), *caduti*, is ergative, i. e. it has a derived subject at

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S–structure. At D–structure the NP headed by the quantifying determiner *quanti* occupies a postverbal position as the internal argument of the verb.[2] The prediction is now that if extraction is from preverbal position, *ne* would have to be absent. If extraction is from postverbal position, however, we would predict that *ne* would have to be present, and as (5g) shows, this is the case. Consequently, extraction cannot be from preverbal position. This implies that (6a) cannot be the structure of (5a) and (5g); rather (6b) must be the relevant structure.

All this shows that, at least as far as Italian is concerned, the relation of pro–drop to whether or not long–distance extraction of the subject is possible is no longer obvious. As a viable alternative it has been proposed to establish a connection between the rich inflectional morphology of Italian and Spanish and the presence of pro–drop on the one hand, and the impoverished verbal morphology of English and the absence of pro–drop, on the other. There is an obvious correlation between the morphological richness of the verbal paradigm and the occurrence of pro–drop. In the present tense finite paradigm of Italian and Spanish the features for person and number (the agreement features) are spelled out in the various verb forms, while English only realizes a separate morphology on the 3rd person singular form. English requires a spelled–out agreement relation between the subject and tensed inflection. The interpretation of the nominal features for person, number and gender in Italian does not require an overt pronominal subject, verbal inflection sufficing for this purpose. The dependency in English can be captured by taking the inflection node in English to be insufficiently specified for the relevant features, therefore requiring a lexical antecedent to license the appropriate inflectional features. The inflectional node (INFL for short) would thus be anaphoric in English, requiring a lexical antecedent (an overt subject) for its identification. In Italian, INFL is fully specified itself for nominal features, and can hence be said to be pronominal, not requiring a lexical pronominal to identify it. In this way the pro–drop parameter can be reduced to a difference in the binding requirements of INFL: if a finite INFL is anaphoric, it requires a lexical subject to bind it; if INFL is pronominal, a lexical subject is optional.

3. The putative interaction of pro–drop with pragmatics

The nature of the pro–drop parameter has now been sufficiently illustrated, and I will turn to what has been taken to be the contribution of pragmatics to this parameter. The question is: what role is played by pragmatic information in the fixing of the parameter, as compared with structural information like the relative strength of INFL? Hyams (1986) has proposed that in their acquisition of their mother tongue, English children start out from the unmarked setting of the parameter and assume from the start that English is pro–drop,

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2   There is a vast literature on the treatment of ergativity in generative grammar. For a representative specimen see Burzio (1986).

and hence have to learn on the basis of positive evidence that it is not. What is this evidence? The evidence is structural in that English has expletive subjects such as *it* and *there*, but Hyams argues that the evidence is also partly pragmatic, specifically in that English exploits what Chomsky refers to as the *Avoid Pronoun Principle*. The effect of this principle is shown in (7):

(7) a. John would much prefer eating alone.
     b. John would much prefer his eating alone.

(7a) is preferred to (7b) if *his* is to be construed as coreferential with *John*. Chomsky (1981:227) described the Avoid Pronoun Principle as one of those principles that 'interact with grammar but do not strictly speaking constitute part of a distinct language faculty, or, at least, are specific realizations in the language faculty of more general principles... '. For Hyams the Avoid Pronoun Principle is 'a universal pragmatic principle' and she claims that it operates in the fixing of the pro–drop parameter. I quote her argument in (8):

(8) (by hypothesis the child) operates under the Avoid Pronoun Principle, and hence, expects that subject pronouns will be avoided except where required for contrast, emphasis, etc. In English contrastive or emphatic elements are generally stressed. Once the child learns this, any subject pronoun which is unstressed might be construed as infelicitous ... the child could then deduce that if the referential pronoun is not needed for pragmatic reasons, it must be necessary for grammatical reasons, i. e. a null pronominal is impossible, and hence, AGR is not PR0.

(Hyams 1986:94)

Hyams states explicitly that the avoid–pronoun strategy interacts with the acquisition of pro–drop and that English cannot be pro–drop on this account. A pragmatic principle (i. e. Avoid Pronoun) would thus constrain the production and consequent interpretation of an utterance whose syntactic structure must have been noticed by the child first in order for the pragmatic principle to find a domain of application. But there is also a more universal corollary: if we accept that Avoid Pronoun and the acquisition of pro–drop interact in the way sketched above by Hyams, this implies that the Avoid Pronoun Principle is somehow grammaticalised across languages, and it follows as a cross–linguistic fact that (some) languages contain functionally superfluous elements. This claim would seem to be very hard to substantiate, given the lack of prima–facie evidence.

It seems that the appeal to Avoid Pronoun in the fixing of the syntactic pro–drop parameter is none too strong: if this case is considered at face value, the development of the grammar need not be dependent on interaction with pragmatics.

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4. Other cases of the interaction of syntax with pragmatics

Let us now look at other areas where interaction of syntax and pragmatics has been suggested. Consider the imperative first. There have been attempts to take the imperative subject restriction out of the syntactic component and place it squarely in pragmatics. Is this purely a matter of pragmatics? While it is true that the 2nd person pronoun is conventionally associated with the addressee, this is not an absolute fact.[3] In the case that speaker and hearer fall together in one individual, as is the case when I look at myself in the mirror at seven o'clock in the morning, I still can only say *Shave yourself, man* and never **Shave myself, man*. Note that the ungrammatical variant cannot be ruled out on pragmatic grounds, because the addressee is present in the discourse. The agent in an imperative sentence, whether or not overtly represented, clearly not merely denotes the addressee, but it also needs to count in the syntax as having the nominal feature of 2nd person. This restriction is clearly pragmatically motivated but has become conventionalised as a fact in the grammar of English.

A more interesting area to show the interaction of discourse and syntax is anaphora. An anaphoric expression is an expression whose interpretation is determined by some other element. This dependency has been investigated thoroughly in Government & Binding Theory. Let us assume that a pronoun gets its value in sentence semantics, which I take to be a specification of the truth conditions of that sentence. Pragmatics then provides an account of how sentences are used in utterances to convey information in context, and so pragmatics accounts for everthing else there is in the sentence apart from its truth–conditional content. This is aptly summarised in Gazdar's (1979) dictum in (9):

(9)   SEMANTICS = TRUTH CONDITIONS
        PRAGMATICS = MEANING minus TRUTH CONDITIONS

On the truth–conditional view the semantic content of a sentence is the link between a sentence of a language and its propositional content, which is the information about the world it succeeds in conveying. Propositional content is assigned to a sentence on the basis of the truth–theoretic content, roughly the meanings, of the expressions it contains and the syntactic configuration. In addition, the semantic component of the grammar should be capable of characterising such relations between sentences as, for example, entailment or synonymy. Grice's work has provided considerable support for the view that semantics should be concerned with articulating propositional contents associated with sentences but that utterances in fact convey far more than what is expressed by the mere words of the sentence. Consider (10):

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3   For a discussion of the English imperative in the perspective of Government–Binding theory, see Beukema & Coopmans (1989), in which a more sophisticated discussion of the possibilities for the subject in imperative constructions is provided.

(10)   A: What's that new Pizza House like?
        B: All the cooks are Italian
        A: Let's go there then

<div align="right">(Kempson 1988:140)</div>

B takes A's question to be a question not about the place, but about the food. B's answer is not about food at all; it mentions a nationality, which is acceptable to A as information about food, however. A considerable amount of indirect information is handled below the surface of the conversation and is never explicitly expressed. Kempson notes that this indirect information handles such premises as provided in (11):

(11)   If you ask a question about a house that serves food, you ask about the food served there. People who cook a dish associated with their country of origin cook it well. Pizza is an Italian dish.

In his work, Grice has stated that the Cooperative Principle comes into play to determine the additional information (the implicatures) which might be deduced by the hearer from an utterance beyond its truth–conditional content, on the assumption, as Grice notes, that speakers do not say what is false, irrelevant, too much or too little. Indirect information is conveyed when these maxims seem to be flouted so that additional assumptions have to be made by the hearer in order to understand the speaker as uttering something meaningful, relevant and truthful.

4.1 Anaphora and the binding theory

I noted above that pronouns and anaphoric expressions in general are subject to variable interpretations, so that the utterances of which they are a part often transcend truth–conditional semantics. I want to discuss this area in somewhat greater detail now, and intend to show that it is incorrect to maintain that pragmatics is totally divorced from sentence grammar. I will show that in the area of anaphora the principles of grammar interact with the principles of pragmatics to determine propositional content. This is a position which is not easy to reconcile with existing positions, where truth–conditional semantics belongs to the grammar and where pragmatics is an unconnected component.

Government–Binding theory should account for the following facts concerning pronominals:

- pronominal coreference can be established across an in principle unlimited distance:

(12) $John_k$ said that Pete had suggested that Charles had heard that ... my photograph of him_k had come out very well.

- at the same time, a minimal distance is required:

(13)   *$John_k$ saw him_k in the mirror

In Government–Binding theory, the occurrence of pronominal coreference is limited to an indication of the conditions under which pronominal coreference is *not* allowed: in (12) the grammar merely says that the pronoun *him* may refer to any male human being that is not called *John*. The licensing conditions for pronouns are given in (14):

(14) a. The pronoun is not coindexed with any NP in the sentence.
 b. The pronoun is coindexed with an NP, but this NP is outside the binding category of the pronoun.
 c. The pronoun is coindexed with an NP inside the binding category of the pronoun, but the NP does not c–command the NP.

These facts are illustrated in (15)–(17):

(15) a. He_k came in.
 b. $John_k$ said he_x came in.

(16) My $parents_k$ knew [$_{CP}$ that I respected $them_k$]

(17) [$_{IP}$ [$_{NP}$ [$John_k$]'s father] often beats him_k]

Two constituents α and β enter into a binding relationship if they are coindexed and if α c–commands β. We define the binding category as follows:

(18) XP (a maximal projection) is a binding category for α if XP is the minimal XP that
 contains α <u>and</u>
 contains an opacity factor, where subject and [+ finite] count as opacity factors

The examples given in (15)–(17) indicate that a pronominal must not be bound, i. e. is free, in its binding category. This requirement is one of the binding principles of the Binding Theory, and is generally known as principle B; it is presented in (19):

(19) <u>Principle B of the Binding Theory:</u>
 A pronominal is free in its binding category

The free nature of the pronominal is clearly illustrated in (15)–(16) shows that the binding category is the embedded CP, and that the pronominal is free inside that CP, while (17) indicates that the binding category, i. e. the node IP dominating the clause, contains both the coindexed NP and the pronominal, but the coindexed NP does not c–command the pronominal.

The important thing here is not so much the formulation of Principle B of the Binding Theory but rather the fact that it essentially treats the class of pronouns as unitary. However, if we take the truth–theoretic properties of pronouns as basic, we can no longer regard the class as unitary. As Kempson (1988) has noted, there are at least five different types of pronoun if we base ourselves on their truth–theoretic content

(20) *Referential pronouns*
 She_x is very handsome.

Charles$_k$ thinks that everybody suspects that he$_x$ is very clever.

(21) *Coreferential pronouns*
Charles$_k$ thinks that he$_k$ is very clever.
After her$_k$ usual second sleeping pill, Isabella$_k$ fell asleep.

(22) *Bound–variable pronouns*
[$_{NP}$ Every farmer]$_k$ worries that he$_k$ produces too much milk. (he = each one of the farmers)

(23) *E–type pronouns*
Most people that buy a new car treat it well. (it = the new car that each of the people in question have bought)

(24) *Lazy pronouns*
My grandfather put his paycheck under the bed, but anyone with any sense puts it in the bank. [it = their paycheck)

Referential pronouns refer directly to a non–linguistic entity in the discourse. Pronouns are coreferential when their reference to a non–linguistic entity is in virtue of their coreference with some linguistic expression elsewhere in the discourse (the antecedent). Bound–variable pronouns do not refer to a fixed entity at all but may pick out various individuals in virtue of their dependence on some quantifying expression in the sentence. E–type pronouns are neither bound–variable pronouns nor pronouns whose value is fixed by coreference, while finally, lazy pronouns are not identical in truth–theoretic content to their antecedent, but appear rather to be modelled on the linguistic form of that antecedent.

When we view this array of data we cannot but arrive at the conclusion that an English pronoun is in principle ambiguous, a set of discrete lexical items. There have been attempts to reduce this kind of ambiguity, but any analysis of the meaning of pronouns in terms of their truth–theoretic content (referential, bound–variable, E–type or lazy) cannot give a unitary explanation of pronominal anaphora. As has been noted by Kempson and others, this ambiguity is not restricted to pronominals. It is also found in definite NPs, NPs which have the article *the*. Consider the following examples, some of which I borrowed from Kempson (1988):

Referential

(25) *The man in the corner* coughed.

Coreferential

(26) John stepped into the room and *the poor bugger* was crying.

Bound–variable

(27) Of every house in the area that was inspected, it was later reported that *the house* was suffering from subsidence problems.

E–type

(28)   Everyone who acquired a copy later discovered that *the copy* was not quite like the original.

Bridging cross–reference

(29)   John walked into the kitchen. *The windows* were dirty.

Note that (29) is slightly different from (25)–(28). In (29) the use of *the*, the marker of definiteness, does not mark coreference with a preceding NP, but rather a link of association with some preceding expression, a link based on our world–knowledge and established via the addition of background knowledge. Note incidentally that this raises the problem of whether we should incorporate the entire range of our encyclopedic knowledge in our representation of lexical structure. As with the pronouns, definite NPs appear to be basically ambiguous, with an in–built appeal to discourse factors.

4.2 The presupposition projection problem

Arguments about systematic meaning relationships between sentences also bring out the interrelation of syntax and pragmatics. Consider (30) and (31):

(30)   Joan went to the performance of Carmen.

(31)   There was a performance of Carmen.

These sentences are related by what has been called presupposition. This arises with definite NPs, which presuppose the existence of the object referred to by the definite NP, and with factive verbs like *regret* which presuppose the truth of their complement:

(32)   Joan regrets that Philip is married.

(33)   Philip is married.

The relation between these pairs is clearly brought about by the definite NP *the performance of Carmen* and the verb *regret*. If meaning relations between sentences are the concern of the semantic component of the grammar, the grammar itself should be able to characterise presupposition relations between sentences. There is a problem here, however, since it appears that such a (recursive) characterisation is sensitive to the context in which the presupposing sentence is contained; sometimes the presupposition is preserved under embedding, sometimes it is not. This is the well–known presupposition projection problem:

(34)   If Bill stayed at home, Joan went to the performance of Carmen.

(35)   If Bill has staged a performance of Carmen, Joan went to the performance of Carmen.

(34) takes the truth of (31) for granted, which (35) does not. Compare also the following sentences:

(36)   If Bill is in love with Sue, then she regrets that Philip is married.

(37)   If Philip is married, then Sue regrets that Philip is married.

Again (36) presupposes (33), which (37) does not. These odd differences in the constancy of presupposition relations arise as a result of the interaction between the lexical items *the* and *regret* on the one hand and the connective *if* on the other hand. Sentence embedding is a rule of grammar, of syntax, and thus the kind of relatedness between sentences that we have observed has to be sensitive to information contained in the grammar. But there is more to this: it can be shown that relatedness between sentences, which requires them to have access to syntactic information, in addition needs to have access to real–world knowledge of the type manipulated in bridging cross–reference. Gazdar (1979) has provided the following pair of sentences:

(38)   If the President invites George Wallace's wife to the White House, he'll regret having invited a black militant to the White House.

(39)   If the President invites Angela Davis to the White House, he'll regret having invited a black militant to the White House.

(38) is an utterance about the wife of a racist politician in the state of Alabama in the early seventies. (39) is about the black American militant Angela Davis in the same period. But can the black militant in the main clause of (38) be presumed to be Mrs Wallace? If we have a sense of history, we would consider it most unlikely, and we would consequently not take the black militant in (38) to be Mrs Wallace. But we have seen that the factive verb *regret* presupposes the truth of its complement, i. e. it will be taken for granted by the speaker of (38) that the President has invited a black militant to the White House. However, a speaker who knows that the name Angela Davis refers to this well–known militant would certainly not be taking for granted the truth of the President having invited a black militant to the White House. Note that there is nothing in one's knowledge of language, i. e. in the processing of the linguistic structures provided, that distinguishes between (38) and (39); it is the knowledge of the people described that the speaker is trading on.

4.3 Quantifier–variable binding

Pronominal reference and presupposition projection thus turn out to be two areas where a unitary account cannot be given exclusively by the rules of grammar but needs to be supplemented by rules of the pragmatic component. A further problem area is quantifier–variable binding. Anaphoric expressions, whether they are pronouns or definite NPs, are subject to a syntactic restriction, i. e. they can only occur in a particular syntactic configuration. We have already seen that pronouns are either construed as bound variables or as referential. Bound–variable pronouns are dependent on an antecedent for their value while referential pronouns are not dependent on an antecedent but take their reference directly from some entity in the discourse situation. If a pronoun is a variable, it is dependent on some operator, for example a quantifier c–commanding the anaphoric pronoun:

(40)   Every soprano thinks that she will lose her voice.

(41)   She thinks that every soprano will lose her voice.

In (40) the quantifier *every*, which is part of the quantitied NP *every sopra-no*, has proper scope over the variable *she* since it c–commands the pronoun. In (41) *she* cannot be a variable since it not bound by a c–commanding opera-tor. We have seen in (27) that a definite NP can also be anaphorically depend-ent on a quantifying expression. This dependency is also subject to c–com-mand:[4]

(42)   Every computer in that batch needed the disc drive to be replaced.

(43)   The disc drive needed every computer in that batch to be replaced.

(42) can be interpreted as the disc drive of each individual computer being faulty and in need of replacement, so that the referent of *the disc drive* ranges over the same set as that of *every computer* where the coreferentiality would be based on bridging cross–reference properties accessed by the definite NP *the disc drive*. But (43) cannot so be interpreted: there is just one disc drive involved here. (42) thus allows a bound–variable reading in which the disc drive is each computer's disc drive. This dependency between *the disc drive* and *the computer* is not construed under identity but by the additional premise that computers have disc drives. This additional premise is a pragmatic phe-nomenon. Quantifier–variable dependencies, which are to be syntactically char-acterised as falling under some definition of c–command, thus need to be made sensitive to pragmatic premises necessary to establish bridging cross–reference. Again, the issue arises here as to whether we should include all of our ency-clopedic knowledge in our lexical specifications if we wish to give a unitary, grammatical, account of these phenomena. Or should we accept that quanti-fier–variable dependencies cannot be handled entirely in the province of the grammar?

Three areas have now been isolated where a unitary account of the phe-nomena — pronoun ambiguity, systematic meaning relationships and syntactic restrictions on interpretation — inescapably leads to the conclusion that there needs to be more than rules of grammar or principles of grammar to arrive at full utterance interpretation.

When put this way, the issue involves, among many other things, a decision as to what precisely can be called a grammar. Could we perhaps devise a modular theory of the grammar that includes a pragmatic component? We might, for example, maintain that linguistically relevant information is present at various levels in the grammar: structural information as encoded in the

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4   The examples in (42) and (43) were provided in a lecture given by Ruth Kempson at the University of Nijmegen, The Netherlands, on February 1, 1990. (43) is either gibberish or it has a non–real–world interpretation for most speakers of English that I have consulted. How-ever, it is meant to illustrate in the first place that definite NPs showing bridging cross–ref-erence are also subject to c–command of an appropriate quantifier. The interpretation of (42) as crucially involving only one disc–drive is probably also bound up with a different meaning of *needed*.

syntax, lexical–semantic information, which is encoded principally in the lexicon and in the computational rules of the LF component, and pragmatic information, the one "component" functioning either as the input for the other, or working in tandem with the other "components". However, if we adopt this tack, we will be forced to admit at a certain point that pragmatic information particular to a lexical item is part of the definition of that lexical item.

5. Language and thought

In the final part of this paper I would like to put forward some speculations on the relationship between language and thought. What does it mean to have knowledge of language? Chomsky (1986:10) views knowledge of language, or the language faculty, as 'one "module" of the mind'. It is not unusual in contemporary cognitive science to embrace the notion of modularity. If we wish to accept modularity, we should first define whether we want our theory to be externally modular, i. e. operating only on a specific domain of information and having principles of operation that do not reach outside that domain, or internally modular, i. e. analysable into distinct, but interacting subsystems. Government & Binding theory is internally modular: it has two subsystems; a rule component, comprising the lexicon, the syntax, PF and LF, and a principles component, comprising bounding theory, θ–theory, binding theory, government theory, case theory and control theory. Fodor (1983) has devised a theory that views the language faculty as a processing system, i. e. an input–output system that acts on external stimuli and converts these into a representation of grammatical (and possibly logical) form. Note that modularity, either of the external or of the internal kind, is simply an instance of what Pylyshyn (1980:121) has dubbed:

(44)   "a central goal of explanatory theories" namely "to factor out a set of
       phenomena, a problem, or system into the most general and
       perspicuous components, principles or subsystems"

Whether one views the grammar as externally modular or internally modular, the fact remains that the output of the grammar seriously underdetermines any possibility to represent the content of what is licensed by the grammar. This has been the main thrust of the argument; the evidence provided by the ambiguity of pronouns and the interaction between syntactic constraints and pragmatic processes undeniably points to underdetermination. To overcome this underdetermination, the output specification of the grammar must be enriched to determine the intended interpretation of a sentence in its context. It has recently been suggested that such an enrichment can be provided by the principle of relevance.[5]

Sperber & Wilson (1986) also claim that a grammar is an input system in the sense of Fodor, providing a mapping (or translation) from a charac-

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5   See Kempson (1988) for more details on pronominal anaphora in a Relevance framework. For
     the original statement of the Principle of Relevance see Sperber & Wilson (1986).

terization of the sequence heard, — a phonological representation of an expression of natural language — onto a logical configuration, an expression in the language of inference required by the central cognitive mechanism (the language of thought). Fodor's view holds that we process the information presented by the world around us by the construction of mental representations, i. e. propositions. Technically, the central cognitive mechanism is a system of mental representations, the language of thought, and the claim is that cognitive processes such as inference — inference strategies take the hearer from the speaker's utterance to the speaker's communicative intention — can be characterised syntactically. As we have seen above, for example in the case of the bridging cross–reference examples, the grammar does not provide enough of the necessary clues, i. e. it underdetermines the representation of the content attributable to the string determined by the grammar. In the case of the real–semantic ambiguity of pronouns, the underdeterminacy tenet could be implemented as follows: the grammar only makes available a categorization of the class of elements and an indication of the requisite locality, while the interpretation is provided by pragmatic processes. Sperber & Wilson propose that there is just one principle to enrich the output specification of the grammar: the principle of relevance:

(45)   The Principle of Relevance
        Every utterance conveys the assumption that the speaker believes
        their choice of words is such as to make immediately accessible to the
        hearer (i. e. with the least processing effort possible) an interpretation
        which gives rise to the intended inferential (or other cognitive) effect.

Thus, the choice of representation to assign a value to the pronominal is controlled by the principle of relevance, i. e. with the least effort for the maximum effect, in conjunction with a locality requirement intrinsic to pronominals: Principle B of the Binding Theory. All anaphoric uses of pronominals depend on the assumption that the value to be assigned to the pronoun is a cognitive representation which is retrievable with least processing costs for the effects intended. The grammar provides but an incomplete conceptual basis of interpretation of an utterance, not the interpretation itself. Consider here once again the examples in (6):

(6)   a. John would much prefer eating alone.
        b. John would much prefer his eating alone.

Relevance theory can deal with these examples virtually automatically: minimize processing costs and maximize the contextual implications of the sentence. On this account (6b) would simply contain more words than (6a) and would therefore be more complex (by the presence of *his*). It would follow naturally from a relevance account of these examples that *his* conveys information that is not recoverable from the empty category, i. e. the non–lexical subject of *eating alone*, specifically that the antecedent of *his* is not *John* but some other person present in the discourse.

Sperber & Wilson hold that the interpretation of an utterance invariably involves establishing both its explicit and its implicit content, that is estab-

lishing what proposition the utterance has actually expressed (i. e. establishing its logical form), and accessing the context (i. e. a set of extra propositions), all additional information being available to the hearer at minimal processing cost. If it is the case that anaphor–antecedent relationships are established pragmatically, (on the assumption that both pronominal and definite NP anaphor–antecedent relations constitute a unitary and pragmatic phenomenon), rather than syntactically, the "additional information" available to the hearer must be accessible too, and at low cost at that.

The sentence in (46), which illustrates again the phenomenon of bridging cross–reference, also brings out what additional information amounts to:

(46)   I walked into the cathedral. *The stained–glass windows* were spectacular.

All anaphoric expressions pragmatically guarantee that an antecedent is available from the discourse. If no antecedent is explicitly provided, neither by the discourse nor by the visual scene, it is assumed that the context provides it as additional information. In (46) no mention is made of windows in the first sentence. However, the fact that the speaker uses the definite NP *the stained–glass windows* in the second sentence in (46) is taken as a guarantee that such a representation is accessible in the discourse. Now, the hearer only has the words *cathedral* and *window* available. The concept *window* entails as part of its information that windows are for looking out of rooms, halls, houses, cathedrals etc. and a cathedral is a kind of room, so the hearer would assume as part of the additional information that the cathedral would have windows. The fact that a definite article is used in *the stained–glass windows* indicates that the hearer does make use of this additional premise. Explicit content just as much as implicit content has been used in the identification process.

We have seen in (42) that bridging cross–reference can interact with quantifier–variable binding:

(42)   Every computer in that batch needed the disc drive to be replaced.

What this sentence means is that for every computer–disc drive pair the disc drive needed to be replaced in the computer. The quantifier *every* in *every computer* has to bind the new variable introduced by the additional information contained in *the disc drive* i. e. that computers have disc drives. What is this variable? Suppose that quantifying NPs have a variable assigned as part of the argument structure in logical form, that is in the semantic representation of the sentence. This variable is accessible only in the c–command domain of the associated quantifier. A partial representation of the LF–structure of (42) is provided in (47):

(47)   [IP every computer$_k$ [IP t$_k$ INFL [VP V [CP [IP the disc drive$_k$ ...]]]]]

The use of the definite article in the NP *the disc drive* introduces the additional premise that computers make use of disc drives. The quantifier *every* thus also binds the variable associated with the (data frame) of this definite NP.

6. Conclusion

In this article we have discussed the distinction between a number of properties that are intrinsic to language itself and those belonging to the general cognitive mechanism. The contribution of semantics to utterance interpretation has been taken to consist in those properties of interpretation that are rule–governed and invariant from context to context. Given this view of the role of syntax and semantics (i. e. formal syntax) in utterance interpretation, the role played by pragmatics in the process of utterance interpretation consists in linking the output of formal syntax to the discourse context. That full utterance interpretation cannot be achieved without linking formal syntax to discourse context has been the main thrust of this article. If this proves to be feasible, this article will have contributed to the growing body of literature suggesting that the tenet of a fully autonomous formal syntax is a fallacy.

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Razmišljanja o sučelju

U ovom radu zastupa se tvrdnja da tezu o autonomiji sintakse treba napustiti u korist modela u kojem se računalni sustav može sučeliti s pojavama koje se odnose na diskurs kako bi se došlo do potpune interpretacije. Dokazi za tu tvrdnju uglavnom potječu s područja zamjeničke referencije, koje je od ključne važnosti za raspravu o sučeljima, jer su zamjenice elementi podložni varijabilnim tumačenjima tako da se iskazi koji ih sadrže ne mogu interpretirati isključivo s obzirom na istinosno–uvjetnu semantiku.