Why does 2 mean "2"? Grist to the anti-Grice mill

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Normally, when one says *Jack has two children*, one means, and is taken to intend to convey, that Jack has *precisely* two children, and not, as standard logico-semantic analyses have it, that Jack has *at least* two children. Under the standard logical interpretation, the sentence is simply true when Jack has more than two children, and false only in those cases where Jack has less than two children. The problem addressed in this paper is: why should the normal interpretation of such a sentence entail that Jack does not have more than two children?

This problem is not new. It and similar problems were discussed by Grice, who proposed, in the late '60s, that linguistic communicative processes are subject to a set of conditions, the so-called 'maxims', whose functional purpose is further to streamline the flow of information conveyed in virtue of the logico-semantic properties of the sentences uttered. These maxims are presented as a set of tacitly agreed expectations between speaker and listener, some kind of silent covenant to be overridden only in non-default circumstances. One of these maxims is the 'maxim of quantity', which says that the information presented should be taken to encompass the whole relevant truth so far, to be complete to the extent that no subsequent corrections are needed that could have been built into the message as transmitted so far without extra effort or cost. For the case at hand this means that the utterance of *Jack has two children* will be taken to convey, beyond its logico-semantic content, also the *implicature* that there are no more than two children in Jack's family, since if there were, the speaker should have made that clear by specifying the exact number, thus avoiding the possible need for corrections later on.

This answer to the problem enjoys widespread popularity. The Gricean account is considered to be more or less standard, especially in formal semantics. It is commonly held, nowadays, that the semantics of natural language, which is formal and precise and based on modeltheoretic techniques developed in the context of 20th century logic, should be supplemented with a pragmatics, which has a wider margin of informality and whose function it is, so to speak, to stick a human face on the cold and apodictic formulae of the logico-semantic analyses. This state of affairs is felt, in a way, to be reassuring as those linguistic phenomena that might look as if they could pose a threat to the axiomatic peace of present-day logic as an instrument for the semantic analysis and description of natural language sentences can now be relegated to the separate and secondary discipline of pragmatics. The feeling is that the logic employed can now stay unaltered and that there is no need to start tinkering with the foundations and boundaries of modern logic. Pragmatics will make for the right fit in those cases where logic appears defective.

It is the purpose of this paper to disturb that peace. With good reason, of course, since the Gricean solution is not really very good at all. For one thing, it is based on very general notions of what makes good functional sense, notions that appear too general to be able to account for the specific phenomena that are observed. As far as they go, the Gricean maxims are clearly sensible as well as functional, and there is no need to deny that such principles as are expressed by them are indeed at work in linguistic and other communication processes. But they seem insufficient to explain what is observed to be going on.

It is not clear, for example, how the Gricean maxims could explain the fact that *or* in language is usually taken in the exclusive sense: either a or b, but not both, whereas logical *or* is inclusive: a or b or perhaps both. Yet this is a phenomenon that would typically have to be explained by Gricean principles. Or, to take a different example, the maxims seem unable to explain why a sentence like *All the girls in her class admired Joanna* is not taken to imply that Joanna admired herself, although Joanna is herself a girl in her class. The logical analysis of this sentence does, of course, entail that Joanna admired herself. But the normal natural language interpretation of the sentence takes that entailment away. And though the maxims may perhaps lead to the addition of invited inferences, or implicatures, over and above the logical entailments, they will have a difficult job removing solid logical entailments.

It thus seems that Gricean pragmatics does not provide a remedy for all cases where standard logic fails to fit. One may, of course, postulate a further source of relief for the deficiencies of standard logic, besides Gricean pragmatics, but then one begins to wonder how many theories will in the end be needed to patch up the standard logical account of natural language semantics? Wouldn't it be better to search for an all-embracing integrated theory that does the job properly? Such a theory will have to be less general and a great deal more specific than the Gricean maxims, which are nothing but general common sense. It will also have to be prepared to be nonconventional whenever convention gets in the way of a proper explanation. It is, in fact, quite likely that such a theory will have to take liberties with all the main elements in the complex of present-day theories dealing with language and its interpretation. It may well have to take liberties with established logic, with established grammar, and with established semantics. The commonsense principles invoked by Grice will always remain there to do duty whenever called upon to do so.

The facts seem to ask for a more modular approach, one that postulates highly specific procedures and structures, and predicts the kind of phenomena that are observed. The functionality of the processes and structures postulated will then either become manifest or have to be taken for granted as long as so little is known about the wider context of linguistic communicative processes. The present paper is based on the view that an integrated theory of language requires (a) a grammatical theory that relates surface structures of sentences to a level of deep structure specifying the meaning of the sentences concerned (with open access to a lexicon and to available factual background knowledge), and (b) a semantics based on discourse structures.

Both requirements involve highly specific and highly modular theories. The first requirement says that the interpretation of uttered sentences requires a level of 'deep structure' or 'semantic analysis' (SA), and thus rejects, as a matter of principle, the a priori of *surface semantics*, so ardently defended in almost all varieties of present-day formal semantics. This rejection is grounded on experience with language: there are too many cases where surface structures of sentences, if taken literally, give the wrong meaning, or hardly any meaning at all.[1] Surface semantics just does not seem to be the right strategy for tackling the problems of an adequate semantic description of natural language sentences.

Likewise for established formal semantics, which is an application of model-theory, central in 20th century logic. Requirement (b) says that the semantic

phenomena of natural language are tackled much more profitably if it is assumed that uttered sentences are, as a rule, interpreted in the light of preceding discourse and whatever world knowledge is activated by it. The information carried by each new uttered sentence in the discourse is thus added, 'incremented', to the discourse at hand. Certain systematic features of sentences are then seen to have the function of linking up sentences with specific kinds of preceding discourse. The two main kinds of phenomena envisaged in this context are those of anaphora (Kamp 1981) and those of presupposition (Seuren 1985).

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With regard to the problem of why 2 usually means 'exactly 2' and not 'at least 2' the Gricean account fails on factual grounds. We distinguish two categories of cases: (a) the cases where the interpretation 'precisely 2' is mandatory, and (b) the cases where the interpretation 'precisely 2' is preferred but not mandatory. In the former it is inappropriate to speak of implicatures since any number higher than 2 leads to falsity and not to misleading truth. What we have there is entailments, not implicatures. In the (b)-cases, any term denoting suggested or invited inferences, including the term 'implicature' will do. I prefer to speak of *default assumptions*.

In formulating an answer to these two classes of cases, we shall make use of two theoretical approaches, each developed as part of an integrated theory of human language: a grammatical analysis that relates surface structures to semantic analyses (SA), i.e. the theory of Semantic Syntax (Seuren, in preparation), and a theory of Discourse Semantics, which postulates discourse representational structures as a 'bed' for newly uttered sentences to be interpreted in. Semantic Syntax will be called upon for its analysis of cleft and contrastive accent constructions. Discourse Semantics will be of help for its treatment of anaphora phenomena.

* * *

Let us consider the (a)-cases first. Often, an utterance of the sentence *Jack has two children* is simply false, and not misleadingly true. In particular, when uttered as a reply to the question *How many children does Jack have?* the answer *Jack has two children* is clearly false, not just misleading, when he has more than two children. (If he has less than two children the sentence is anyway false, of course.) If the exchange takes place in court and the person replying is under

oath, he commits perjury and is punishable by law. Or, put differently, there is no contradiction in *Jack does not have two children, he has three* (where the negation in the first sentence is in no way metalinguistic (Horn 1985)). These are facts which the Gricean account, as a matter of principle, cannot explain as it generates, if anything, implicatures, not truth-values.

We thus have here a large category of cases where the Gricean account fails in principle. We deal with these cases by assuming a syntactically underlying form (SA) roughly amounting to 'the number of Jack's children is 2', answering the question 'the number of Jack's children is what?' This kind of analysis applies to cleft constructions as well, and the cases at hand show that cleft constructions or constructions with contrastive (focus or comment) accent may differ truth-conditionally from non-cleft, non-contrastive (i.e. canonical) constructions, contrary to commonly held views.

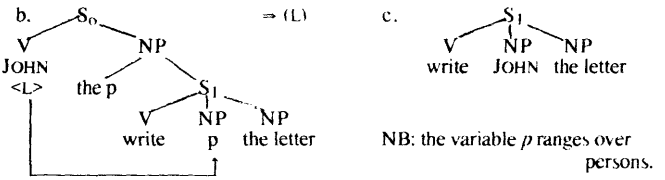
The precise grammatical treatment of these cases can only be illustrated here. The treatment is part of the theory of Semantic Syntax, which has its own foundations in method and fact, and a wide range of applicability. A full account of the grammatical treatment of clefts and related constructions would require the backdrop of Semantic Syntax as a whole, which cannot be provided within the confines of the present paper.[2] A great deal will therefore simply have to be taken for granted here.

Let us begin by sketching the derivation of a simple sentence involving contrastive accent. The sentence is (1a), with the partial SA (1b) (tenses, in particular, have been left out). The analysis is based on the theory (McCawley 1970) that English is a deep VSO-language. The surface NP-VP structure is a result of the grammatical treatment of the tenses. The SA of (1a) reads intuitively as 'the person who wrote the letter is John', i.e. with *John* as the main deep predicate, with nuclear sentence accent signalling new information (i.e. comment), and *the person who wrote the letter* as subject term denoting the topic of the corresponding question that is taken to precede the sentence either overtly or only tacitly.

The deep predicate is lowered by the cyclic rule of LOWERING to the position of the bound variable, in this case p. As this happens, the deep predicate takes along its nuclear sentence accent, thus accounting, at least in part, for the contrastive accent in the surface structure. The Lowering process leads to the loss of all higher structure above S_1, as demonstrated in (1c). This means that surface strings of words may be derived from a relatively large number of

underlying cleft constructions, depending on contrastive (comment or focus) accent.

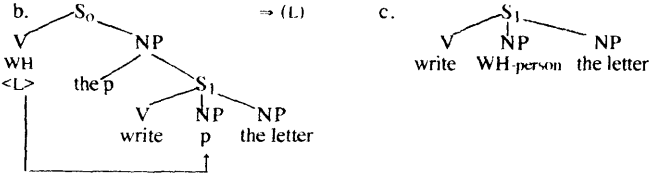
(1)a. JOHN wrote the letter (not HARRY)



Alternatively, the deep main predicate *JOHN* of (1b) is provided with the copula verb *be* and the NP *the p* is replaced by *it*, giving *it who wrote the letter is John*. Extraposition then gives the surface cleft construction *It is JOHN who wrote the letter*. Both alternatives carry the presupposition that somebody wrote the letter.

The corresponding question is (2a), with the partial SA (2b) and the structure (2c) after LOWERING. The alternative surface cleft construction is *Who is it that wrote the letter?*

(2)a. WHO wrote the letter?



This sentence again carries the presupposition that somebody wrote the letter.

In these cases the cleft analysis involves predication over individuals, i.e. zero-order predication. However, when the predication consists in assigning cardinality to sets we enter higher orders of predication. Thus, when we say that Jack sold two books, we say in effect: (a) that there is a non-empty overlap between the set of things that are books (the Q-set) and the set of things that Jack sold (the Matrix set or M-set), and (b) that the overlap has a cardinality of at least two. These two semantic entailments are captured simultaneously by the following analysis, where the predicate *2* expresses a binary relation between the set of books (the Q-set) and the set of things that Jack sold (the M-set), the

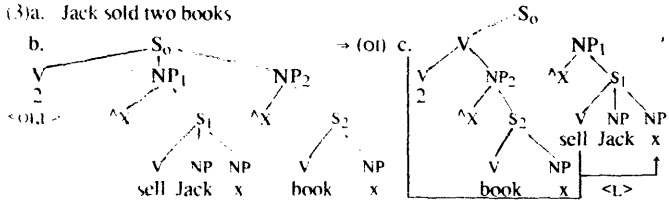
relation being subject to the condition that there is at least one subset of cardinality 2 common to both the Q-set and the M-set.

The predicate *2* is thus a member of the set of (generalized) existential quantifiers, and in particular of the plural existential quantifiers. In order to capture the plurality involved, the two terms of the predicate denote not sets of individuals but plural power sets of individuals. That is, given a set of individuals A, its power set $\mathbf{P}(A)$ is the set of all subsets of A, including the null set Ø and the singleton sets each containing just one member of A. The plural power set of A, or $\mathbf{P}_{pl}(A)$ equals $\mathbf{P}(A)$ minus Ø and the singleton sets. The simple existential quantifier ∃ ('some') now says that there is an overlap of at least one member of the Q-set and the M-set, no matter whether these are sets of individuals or plural power sets of sets. This provides a unified treatment for both the singular and the plural use of ∃, and at the same time provides a formal mould for other existential quantifiers, including the numerical predicate *2*.

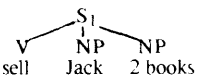
In the partial SA (3b) NP_1 stands over the M-set, and NP_2 over the Q-set. That both are plural power sets is expressed by the capital letter X with the binder ^ ('the set of all ... such that ...'). NP_1 reads as 'the set of all subsets (minus Ø and the singletons) of the set of things that Jack sold', and NP_2 as 'the set of all subsets (minus Ø and the singletons) of the set of things that are books'. The sentence says that both plural power sets have at least one member in common with cardinality 2. That is, there are at least two books that Jack sold.

The predicate *2*, like all quantifiers, induces the rule of OBJECT INCORPORATION or OI (well-known from 'open' syntax, as in *beer-drinking*), whereby the object-NP (NP_2) is incorporated into the predicate to form a complex predicate. LOWERING (L) then lowers this complex predicate to the position of the bound variable *x*. Again, as with the Lowering of the deep predicate in (1b) and (2b), all higher structure above the S lowered into disappears. (3b) thus transforms first into (3c), and then, by LOWERING, into (3d) (disregarding morphological details):

(3)a. Jack sold two books



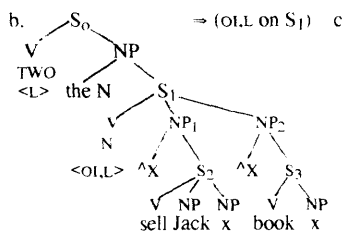
⇒ (L) d.



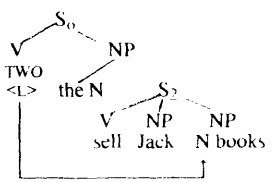
Sentence (3a) is, of course, a canonical sentence, i.e. without any contrastive accent or cleft construction. We can, however, 'cleft out' the deep predicate *2* and use a higher order variable N ranging over cardinal numbers. We then get something like 'the N such that Jack sold N books is 2', and likewise for the corresponding question 'the N such that Jack sold N books is WHAT?'. Consider the following analysis:

(4)a. Jack sold TWO books

b.



⇒ (OI,L on S_1) c.



From here on, the treatment is identical to what was proposed for (1) and (2).[3]

This solves the first category of cases where the Gricean account fails. Note, again, that sentence (4a) differs truth-conditionally from (3a), as the latter remains true when Jack sold more than two books, whereas the former does not. (4a) says unequivocally that the number of books sold by Jack was 2, and not any other number.

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Now we come to the second category of cases, those where there is a suggestion (not an entailment), that the number of Jack's children is exactly 2 and not more. These sentences have their canonical form, i.e. without any contrastivity expressed in their SA. Suppose Jack has five children, two of whom live in Kentucky while the remaining three live in Texas. Then I can say in truth *Jack has two children and they live in Kentucky*. I might even add *And he has three children and they live in Texas*. True, the first sentence suggests that Jack has precisely two children, but it does not entail that, as is shown by the fact that the added sentence is consistent with the first. Or suppose I have five colleagues in

my department, one of whom is an Englishman. Then I can say truthfully, for example, *I have a colleague, and he is an Englishman.* And I might even add *I also have one who is from India*, if that were the case.

What we have here are cases of non-specific reference (Seuren 1985:459-464). We speak of *specific reference* when the verification domain V (i.e. the partial world spoken about) contains precisely the number of individuals mentioned in the discourse, so that there can be no equivocation as to which individual is, or which individuals are, referred to when a definite referring term is used. For example, when I have precisely one colleague in my department, and I say *I have a colleague*, then the colleague mentioned is uniquely determined and any subsequent pronominal term *he*, or definite description *my colleague*, now finds its reference value in V (i.e. my department) without fail or ambiguity. Terms like *he* or *my colleague* now refer uniquely to the one and only colleague I have, simply because no other reference value is available.

Not so, however, when I have more than one colleague and I say *I have a colleague.* Suppose, as above, that I have five colleagues, one of whom is from England and another from India. The remarkable thing now is that when I say:

(5) I have a colleague. He is from England.

I not only clearly speak the truth, but the *he* in the second sentence automatically goes for precisely the one among my colleagues who is from England. The word *he* refers to that colleague not only in virtue of its anaphoric properties with regard to previous discourse, but also in virtue of the sentence in which it occurs. In other words, the pronoun *he* in the second sentence automatically selects the individual that makes that sentence true. The pronoun can refer successfully only if the sentence in which it occurs is true!

This form of reference we call *non-specific reference.* It is rather strongly marked in comparison to specific reference cases, which are unmarked. We may say that specific reference represents the *default case*, in that the listener, on hearing a sentence like *I have a colleague*, builds up a mental representation of the state of affairs in which that sentence is true. In doing that he will construct a representation in which any subsequent anaphoric expression for that colleague will refer specifically, avoiding the necessity of overriding the default by applying the non-specific reference procedure.

Clearly, this analysis is valid not only for cases of singular reference. It extends analogously to cases of reference to plural sets, introduced by plural existential quantification, as in *Jack has two children.* A subsequent pronoun

they, as in *They live with their mother*, will refer specifically only if Jack has precisely two children. If he has more than two children, the pronoun *they* will have to search for those two children of Jack's who live with their mother, hoping that Jack has indeed precisely two children who live with their mother. If not, the pronoun *they* will fail to refer till a precise fit is found in still later sentences.

It is thus the machinery of anaphoric reference in discourse that is seen to be responsible for the default interpretation that Jack has precisely two children if it is said that he has two children, without that being an answer to a previous explicit or implicit question how many children Jack has. .

In conclusion we say that the Gricean maxim is superfluous for the cases at hand, as existing machinery accounts for the phenomena more adequately and without any extra cost.

Notes

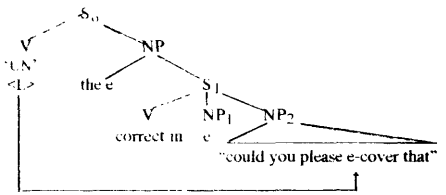
1 See Seuren (1985), chapter 2, for a collection of cases in point. Perhaps the most striking category of examples is provided by spreading or copying phenomena. A very common kind of copying is Negation Copying, as in the Cockney sentence *'E ain't never been no good to no woman*, which definitely does not mean 'he has sometimes been good to some woman', as the literal logical analysis will have it, but rather the opposite. What underlies such sentences is a perfectly well-defined grammatical process that is responsible for the repetition of one single original semantic negation at designated positions in the remainder of the sentence. A case where surface semantics will have difficulty providing any meaning at all is *He didn't kill the man until four o'clock*, which would have to correspond to 'it is not the case that he killed the man until four o'clock', if that means anything at all.

2 A book on Semantic Syntax is in preparation (Seuren, in preparation). The reader is referred to that for further information and details.

3 The Lowering analysis for contrasted elements also extends to metalinguistic cases, where a correction is made to a previous utterance. Consider, for example, the following exchange:

He: Could you please discover that?
She: Could you please UNcover that!

The second sentence is not a request or question, but a strong assertion, saying that the previous speaker made a mistake and should have said *uncover* instead of *discover*. In principle, such cases are solved by a metalinguistic analysis like the following:



where it is assumed that all higher structure above NP_2 is deleted as a result of LOWERING applied to quoted elements. The double quotes ('Quine hooks') are to be read as follows: "ab" is the string consisting of 'a', 'b'. They thus ensure that 'UN' replaces 'e'.

References

Horn, Laurence R., 1985. Metalinguistic negation and pragmatic ambiguity. *Language* 61: 121-174.

Kamp, Hans, 1981. A theory of truth and semantic interpretation. In: J.A.G. Groenendijk, T.M.V. Janssen, M.B.J. Stokhof, eds., *Formal Methods in the Study of Language*, Vol. I, 277-322. Amsterdam: Mathematisch Centrum.

McCawley, James, 1970. English as a VSO-language. *Language* 46: 286-299.

Seuren, Pieter A.M., 1985. *Discourse Semantics*. Oxford: Blackwell.

Seuren, Pieter A.M., in preparation. *Semantic Syntax*. Oxford: Blackwell.