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Focus in complex noun phrases

Summary

In this paper I investigate the semantics of association with focus in complex noun phrases in the framework of Alternative Semantics (Rooth 1985, 1992). For the first time, I formulate the rules for deriving the alternative meanings (p-sets) of complex nouns and their restrictive modifiers such as adjectives and relative clauses. They form sets of sets of individuals (i.e. they are of type $<<e,t>,t>$). The alternative semantic function of determiners is to transform these sets into sets of individuals, i.e. they are of type $<<<e,t>,t>,<e,t>>$. However, this type cannot be derived from the type of their ordinary meaning, namely $<<e,t>,e>$ or $<<e,t>,<<e,t>,t>>$. This mismatch requires some accommodation of the general architecture of alternative semantics, which is the topic of the final section.

1. Introduction

Alternative Semantics (Rooth 1985, 1992) was developed to account for the phenomenon of association with focus as in (1) without moving the focused constituent $MARY_F$. The focused constituent rather supplies the adequate domain of quantification for the focus operator *only* by a recursive definition of the "alternative meaning" or "p-sets". However, Alternative Semantics, like other approaches to focus, does not treat definite and indefinite NPs, as in (2)-(6).

Intuitively the domain of quantification in (2) is similar to that one in (1), whereas the domain of quantification in (3) only includes professors. The latter example clearly indicates that it is not possible to analyze focus in complex NPs as focused complex NPs, as it might appear in (2). Krifka (1996, sect. 6) shows on examples like (4) that a movement approach to association with focus is not sufficient, since (4) cannot be paraphrased by "Mary is the only *y* such that Sam talked to the woman who introduced *y* to Sue" since the same woman might have introduced Bill to Sue, too.

(1) Sam only introduced MARY_F to John
(2) Sam only introduced the PROFESSOR_F to John
(3) Sam only introduced the DUTCH_F professor to John
(4) Sam only talked to the woman who introduced MARY_F to John
(5) Sam only talked to the woman who introduced the PROFESSOR_F to John
(6) Sam only talked to the woman who introduced the DUTCH_F professor to John

2. Alternative Semantics

Alternative Semantics (Rooth 1985, 1992) interprets the focus in situ and compositionally computes the alternatives that are generated by the focused expression at an additional semantic level. It distinguishes between two dimensions of meaning, the *ordinary meaning* $\| \|_O$ and the *alternative meaning* $\| \|_A$. The ordinary interpretation does not see the focus feature *F* and therefore interprets a focused expression like an unfocused one, as in (8a). The alternative interpretation of a focused expression creates the set of alternatives (or p-set), as in (8b), by the function *ALT* applied to the ordinary meaning, e.g. the alternative meaning of $MARY_F$ is the set of objects of the same type. The alternative semantics of an unfocused expression is the singleton containing the ordinary semantic value, as in (8c). The general schema (8) is instantiated for constants (i.e. proper names) in (9) and for intransitive verbs in (10).[1]

(7) $ALT(\mathbf{d}) = D_{type(\mathbf{d})}$

(7a) $ALT(\|Mary\|) = D_{type(\|Mary\|)} = D_e = \{\mathbf{b}, \mathbf{j}, \mathbf{m}, \ldots\}$

(8a) $\|\alpha\|_O = \|\alpha_F\|_O$

(8b) $\|\alpha_F\|_A = ALT(\|\alpha\|_O) = D_{type(\|\alpha\|_O)}$

(8c) $\|\alpha\|_A = \{\|\alpha\|_O\}$

(9a) $\|c\|_O = \|c_F\|_O = \mathbf{c'} \quad D_e$

(9b) $\|c_F\|_A = ALT(\mathbf{c'}) = D_e$

(9c) $\|c\|_A = \{\mathbf{c'}\}$

(10a) $\|V\|_O = \mathbf{V'} \quad D_{<e,t>}$

(10b) $\|V_F\|_A = ALT(\mathbf{V'}) = D_{<e,t>}$

(10c) $\|V\|_A = \{\mathbf{V'}\}$

The alternative interpretation of functional application is the set formed by expressions that are derived from the application of an element *X* of the first alternative set to an element *Y* to the second alternative set. For instance, the alternative meaning of the application of a predicate to a focused argument is a set of objects (propositions, properties) that are formed by functional application of the (ordinary) meaning of the predicate to the elements of the alternative meaning of the argument, as illustrated in (12b).

(11a) $\|\alpha\ \beta\|_O = \|\alpha\|_O(\|\beta\|_O)$

(11b) $\|\alpha\ \beta\|_A = \{X(Y) \mid X \in \|\alpha\|_A, Y \in \|\beta\|_A\}$

(12a) $\|V(c)\|_O = \mathbf{V'}(\mathbf{c'})$

(12b) $\|V(c_F)\|_A = \{X(y) \mid X \in \|V\|_A, y \in \|c_F\|_A\}$
$= \{X(y) \mid X \in \{\mathbf{V'}\}\ y \in ALT(\mathbf{c'})\} = \{\mathbf{V'}(y) \mid y \in ALT(\mathbf{c'})\}$

The meaning of the focus sensitive operator *only* operates on both aspects of the meaning. When applied to a VP it yields two clauses: the first consists of the ordinary semantics and the second

[1] I use an extensional semantics even though Rooth (1985) has shown that we need an intensional one. However, for the purpose of this paper the extensional semantics is sufficient.

compares all alternatives with the ordinary meaning and asserts that there is no further alternative beyond the ordinary meaning. This is illustrated by the interpretation (14) of sentence (1).

(13) $\|\text{only VP}\|_O = \lambda x\,[\|VP\|_O(x)\ \&\ \forall P\ \|VP\|_A\ P(x) \rightarrow P = \|VP\|_O]]$

(14) $\|\text{Sam only introduced MARY}_F \text{ to John}\|_O = \mathbf{introd'}(\mathbf{m})(\mathbf{j})(\mathbf{s})\ \&$
$\forall P\ \{\mathbf{introd'}(y)(\mathbf{j})|\ y\ \in ALT(\mathbf{m})\}\ P(\mathbf{s}) \rightarrow P = \mathbf{introd'}(\mathbf{m})(\mathbf{j})]]$

The semantic definition of the alternative meaning of phrases in (8), of the functional application in (11) and the semantics of *only* in (13) determine the architecture of Alternative Semantics (Rooth 1985, 14; von Stechow 1991, 815; Krifka 1996, sect. 4).

3. N and N-modifier

In order to account for focus in complex NPs, I propose the following alternative interpretations of common nouns (N), restrictive adjectives (A) and restrictive relative clauses (RC). Semantically, they are all properties and have the same type as intransitive verbs, namely <*e,t*>. Thus, they receive the same ordinary and alternative semantic values as VPs. The ordinary semantic value is a set of individuals (i.e. a property) regardless whether the expression is focused or not. The alternative semantic value of a focused noun or adjective is the set consisting of alternative properties to the property expressed by the ordinary meaning. The alternative semantic value of an unfocused noun or adjective is the singleton consisting of the ordinary semantic value. Modification of a head noun α by an adjective β is interpreted in the ordinary semantics as the intersection of the ordinary semantic value of α with the ordinary semantic value of β. The alternative value of the modification is the set consisting of sets that are formed by intersection of an element *R* (i.e. set) of the alternative set of α with an element *Q* of the alternative set of β.[2]

(15a) $\|N\|_O = \|N_F\|_O = \mathbf{N'} \quad D_{<e,t>}$ (16a) $\|A\|_O = \|A_F\|_O = \mathbf{A'} \quad D_{<e,t>}$

(15b) $\|N_F\|_A = ALT(\|N\|_O) = D_{<e,t>}$ (16b) $|A_F|_A = ALT(\|A_F\|_O) = D_{<e,t>}$

(15c) $\|N\|_A = \{\|N\|_O\}$ (16c) $\|A\|_A = \{\|A\|_O\}$

(17) $\|\alpha\ \beta\|_O = \{d|\ d\ \in (\|\alpha\|_O \cap \|\beta\|_O)\} = \|\alpha\|_O \cap \|\beta\|_O$

(18) $\|\alpha\ \beta\|_A = \{P|\ P = R \cap Q\ R\ \in \|\alpha\|_A\ Q\ \in \|\beta\|_A\}$

An N modified by a relative clause is interpreted according to the modification schemata given in (17) and (18). The relative clause RC is of type <*e,t*>, expressing a property, and can be instantiated either as an adjective (A) or as a predicate missing one argument (VP). The relative pronoun does not

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[2] Alternatively, N-modifiers can be described as functions from sets of individuals to sets of individuals, i.e. of type <<*e,t*>,<*e,t*>>. This semantic is equivalent to the one given in (17) and (18):

(17*) $\|\alpha\ \beta\|_O = \|\alpha\|_O(\|\beta\|_O) = \{d|\ d = f(e)\ f\ \in \|\alpha\|_O\ e\ \in \|\beta\|_O\}$

(18*) $\|\alpha\ \beta\|_A = \{X(Y)|\ X\ \in \|\alpha\|_A, Y\ \in \|\beta\|_A\} = \{P\ |\ P=R(S)\ R\ \in \|\alpha\|_A\ S\ \in \|\beta\|_A\}$

receive a semantic interpretation; it merely indicates which argument of the relative clause predicate is related to the head noun. The alternative interpretation generated by the modified N in (21) consists in combinations of properties expressed by the alternatives to the head noun and the alternative generated by the VP. It is a set of sets of individuals, as illustrated in (21a):

(19) $\|\text{N who RC}\|_O = \{d|\ d \quad \|N\|_O \cap \|RC\|_O\}$

(20) $\|\text{N who RC}\|_A = \{P|\ P = a \cap b\ a \quad \|N\|_A\ b \quad \|RC\|_A\}$

(21) $\|\text{woman who introduced MARY}_F \text{ to John}\|_A$
$= \{P|\ P = a \cap b\ a \quad \|\text{woman}\|_A\ b \quad \|\text{introduced MARY}_F \text{ to John}\|_A\}$
$= \{P|\ P = a \cap b\ a \quad \{\textbf{woman'}\}\ b \quad \{\textbf{introd'}(z)(\textbf{j})|\ z \quad \text{ALT}(\textbf{m})\}\}$
$= \{P|\ P = \lambda x\ [\textbf{woman'}(x) \,\&\, \textbf{introd'}(z)(\textbf{j})(x)]\ z \quad \text{ALT}(\textbf{m})\}\}$

(21a) e.g. {{**Mary'**, **Sue'**}, {**Sue'**, **Ana'**, **Dora'**}, {**Mary'**, **Karla'**}, ...}

4. Determiners

At the international faculty party, some students, several German, Italian and American professors, but only one Dutch professor appeared. In this context, sentence (3), repeated as (22), can be felicitously uttered. The domain of quantification includes all professors at the party. Although the ordinary meaning (22a) can be described with the iota operator indicating some uniqueness conditions, this semantics cannot be transferred to the alternative meaning, since it would counter intuitively restrict the domain of quantification to only those professors that are unique with respect to their nationality, as indicated in (22b). The alternative function of the definite article is rather to collect all individuals from all alternatives to the property expressed in the modified noun as indicated in (22c), and more general in (23).

(22) Sam only introduced the DUTCH$_F$ professor to John

(22a) $\|\text{the DUTCH}_F \text{ professor}\|_O = \iota x\ [\textbf{Dutch'}(x) \,\&\, \textbf{prof'}(x)]$

(22b) $\|\text{the DUTCH}_F \text{ professor}\|_A = \{d|\ d = \iota x\ [Rx \,\&\, \textbf{prof'}(x)] \text{ for all } R \quad \|\text{DUTCH}_F\|_A\}$
$= \{\iota x\ [\textbf{Dutch'}(x) \,\&\, \textbf{prof'}(x)], \iota x\ [\textbf{Germ'}(x) \,\&\, \textbf{prof'}(x)], \iota x\ [\textbf{Ital'}(x) \,\&\, \textbf{prof'}(x)]...\}$

(22c) $\|\text{the DUTCH}_F \text{ professor}\|_A = \{d|\ d \quad R \text{ for all } R \quad \|\text{DUTCH}_F \text{ professor}\|_A\}$
$= \{d|\ d \quad R \text{ for all } R \quad \{\lambda x\ [\textbf{Dutch'}(x) \,\&\, \textbf{prof'}(x)], \lambda x\ [\textbf{Germ'}(x) \,\&\, \textbf{prof'}(x)],$
$\lambda x\ [\textbf{Ital'}(x) \,\&\, \textbf{prof'}(x)], ...\}$

(23) $\|\text{the N}\|_A = \{d|\ d \quad R \text{ for all } R \quad \|N\|_A\}$

Example (4), repeated as (24), served as the key argument for Krifka (1996) to introduce his "hybrid" approach to focus, combining elements of movement theories and Alternative Semantics. However, the example can be solved by using only Alternative Semantics extended in the above demonstrated way. The alternative meaning of the complex N was already computed in (21); it is a

set of sets of individuals. The alternative function of the article is to transform this into a set of individuals as illustrated in (24a). This combines with the matrix sentence yielding the meaning of the whole sentence in (24b):

(24) Sam only talked to the woman who introduced MARY$_F$ to John

(24a) ||the woman who introduced MARY$_F$ to John||$_A$
= {d| d R for all R ||woman who introduced MARY$_F$ to John||$_A$}
= {d| [**woman'**(d) & **introd'**(z)(**j**)(d)] z ALT(**m**)}
= {d| z [**woman'**(d) & **introd'**(z)(**j**)(d)]}

(24b) ||Sam only talked to the woman who introduced MARY$_F$ to John||$_O$ =
[**talk'**(ιx [**woman**(x) & **introd'**(**m**)(**j**)(x)](**s**) &
P {**talk'**(y) | y {d| z [**woman'**(d) & **introd'**(z)(**j**)(d)]}} P(**s**)
→ P = **talk'**(ιx [**woman**(x) & **introd'**(**m**)(**j**)(x))]

5. Determiners and the Architecture of Alternative Semantics

Let us assume that the ordinary meaning (25) of the definite article is a function of type <<*e*,*t*>,*e*>, i.e. a function that assigns one element to a set. If we furthermore assume, following the general principle (8c), that the alternative meaning of an unfocused expression is the singleton set of its ordinary meaning, as in (26), then we must postulate a very unnatural alternative meaning for the complex noun *N* in (27). The alternative meaning of the complex noun must include singleton sets of all possible alternative individuals in order to allow the determiner to collect all alternative individuals. In such a case the determiner would assign to each singleton its element and fail to assign an element to any other set. We have already seen in (22b) that this application is highly artificial.

(25) $||\text{the}||_o = f_{<<e,t>,e>}$

(26) $||\text{the}||_A = \{f_{<<e,t>,e>}\}$

(27) $||\text{the N}||_A = \{X(Y)|\ X \in \{f_{<<e,t>,e>}\},\ Y \in ||N||_A\}$
$= \{d|\ d = f_{<<e,t>,e>}(Y) \text{ for all } Y \in ||N||_A\}$

Alternatively, I propose a more direct analysis of complex NPs in Alternative Semantics. The definite article is assigned an alternative function of type <<*e*,*t*>,*t*>,<*e*,*t*>>, as in (28), which was derived from the discussion in the last section. The alternative meaning of the functional application of the article to a complex noun consists in the direct application of the alternative function to the alternative meaning of the N in (29), rather than the complex application in (27).

At a more abstract level, one could merge the ordinary and the alternative function into one: The meaning of the article could be described, as in (30), by a function *f* that takes a set of type <τ,*t*>, and yields one of its elements of type τ. In this view, the article stands for a polymorph choice function or a general "type shifter". In the ordinary interpretation, the definite article takes a singleton

and yields its unique element, whereas in the alternative interpretation it takes a set of sets and yields the largest set in that set (assuming some maximality condition).

(28) $\|\text{the}\|_A = f_{<<e,t>,t>,<e,t>>}$

(29) $\|\text{the N}\|_A = f_{<<e,t>,t>,<e,t>>}(\|N\|_A) = s_{<e,t>}$

(30) $\|\text{the}\| = f_{<<\tau,t>,\tau>}$

The final question is why does the alternative meaning of the article differ from the alternative meanings of other expressions and why does it not follow the general principles of Alternative Semantics described in (8) and (11). There are two suggestion: First, these principles were designed for content words, which contribute to the focus-background structure, but not for function words like the article, which do not contribute to this structure. Second, the article cannot be focused itself - perhaps it is "invisible" for the recursive definition of the alternative meaning. Both suggestion motivate investigation into other functions words. In fact, the indefinite article behaves quite similar to the definite one. The alternative meaning of indefinite complex NPs are identical with the one for definite one. The domain of quantification for *only* in (31) is the same as in (22). This can only be explained if we assume the same alternative function for definite and indefinite articles.

(31) Sam only introduced a DUTCH_F professor to John

6. Conclusion

Alternative Semantics can be extended to analyze focus in complex noun phrases. However, the alternative meaning of the article cannot be derived in the same way as the alternative meaning of content words. This indicates that the main rules (8) and (11) of Alternative Semantics cannot be applied to determiners. Finally, it was noted that the definite and indefinite article have the same alternative meaning. This might reflect common aspects of their ordinary meaning.

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