5 FOCUS AND THE INTERPRETATION OF GENERIC SENTENCES

Manfred Krifka

5.1. THE FOCUS SENSITIVITY OF GENERIC SENTENCES

In Chapter 1 (section 1.2.3), we have argued for a dyadic operator **GEN** for the semantic representation of generic (or characteristic) sentences, following Carlson (1989). In that framework we could represent the different readings of generic sentences as given in (1) and (2).

(1) Mary smokes after dinner.
a. **GEN**[x,s;] (x = **Mary** & **after.dinner**(s) & **in**(x,s); **smoke**(x,s))
b. **GEN**[x,s;] (x = **Mary** & **smoke**(x,s); **after.dinner**(s))

(1a) represents the reading which says that in after-dinner situations which contain Mary, she usually smokes. (1b) represents the reading which says that when Mary smokes, it is usually in after-dinner situations.

(2) Planes disappear in the Bermuda Triangle.
a. **GEN**[x;] (**planes**(x); ∃s[**in**(s, **the.Bermuda.Triangle**) & **disappear**(x,s)])
b. **GEN**[s;] (**in**(s, **the.Bermuda.Triangle**); ∃x[**planes**(x) & **disappear**(x,s)])
c. **GEN**[x,s;] (**planes**(x) & **in**(x,s) & **in**(s, **the.Bermuda.Triangle**); **disappear**(x,s))

(2a) represents the reading which says that it is generally true for planes that they disappear in the Bermuda Triangle, or more precisely, that there exist situations in the Bermuda Triangle in which they disappear. (2b) says that it is generally true for situations in the Bermuda Triangle that there are planes which disappear in these situations. And (2c) says that it is generally true that if planes are in the Bermuda Triangle, they disappear. The different readings, then, are the result of a different partitioning of the semantic material into the restrictor and the matrix of the **GEN**-operator (see Diesing 1992 for this notion of semantic partition).

In chapter 1 we also have shown that intonational features, in particular stress placement, play a role in distinguishing between these different parti-

tions. The readings of (1) and (2) are associated with the following accentual patterns:

(1′) a. Mary SMOKES after dinner.
b. Mary smokes after DINNER.

(2′) a. Planes disappear in the BERMUDA Triangle.
b. PLANES disappear in the Bermuda Triangle.
c. Planes DISAPPEAR in the Bermuda Triangle.

It appears that accented constituents, in general, are part of the matrix. However, we will see that this statement has to be modified.

Sentence accent marks that a constituent is in focus. For example, it serves to differentiate between the readings that show up with focus-sensitive operators like *only:*

(3) a. John only introduced BILL to Sue.
b. John only introduced Bill to SUE.
c. John only introduced BILL to SUE.
d. John only INTRODUCED Bill to Sue.

(3a) can be paraphrased as: The only person that John introduced to Sue was Bill. (3b) has two readings. (i) The only person that John introduced Bill to was Sue, and (ii) The only thing John did was introducing Bill to Sue. (3c) can be rendered as: The only two persons such that John introduced one to the other are Bill and Sue. And (3d) means: The only thing John did to Bill and Sue is that he introduced him to her.

Several theories have been developed to account for the sensitivity of the interpretations of sentences like (3) to the placement of the sentence accent; suffice it to mention Jackendoff (1972), von Stechow (1982, 1989), Jacobs (1983, 1991), and Rooth (1985). In addition, several researchers as early as Lawler (1973a), and more recently Schubert and Pelletier (1987), have noticed that the interpretation of generic sentences is influenced by sentence accent. But up to now, no systematic theory of focus in generic sentences has been offered (with the exception of Rooth, this volume). The present chapter is an attempt to do precisely that. It will relate the influence of focus in generic sentences to the influence of focus in adverbial quantifications in general, as first described in Rooth 1985. In contrast to Rooth (1985) and Rooth (this volume) it works with so-called *structured meanings* as the basic semantic representation format.

The organization of this chapter is as follows: In section 5.2 I introduce *structured meanings*. Section 5.3 presents a framework of dynamic interpretation for the representation of anaphoric bindings that are crucial for generic sentences. In section 5.4, structured meanings and dynamic interpretation will be combined, and I will show that this allows for a treatment of quantificational adverbials. In section 5.5 I will come back to our initial examples and give an explicit analysis of them in the framework developed.

5.2. THE STRUCTURED MEANING REPRESENTATION OF FOCUS

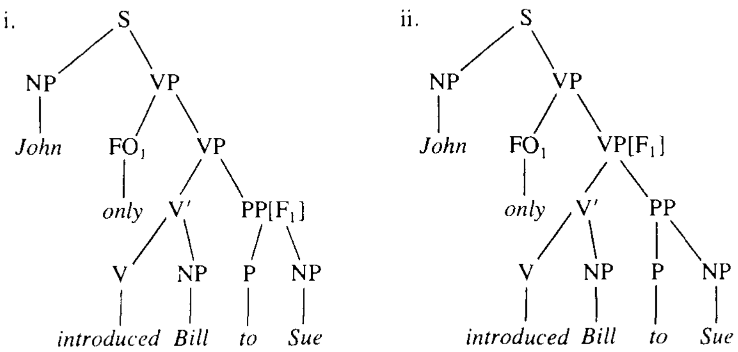
The basic function of focus is to give prominence to meaning-bearing elements in an expression. The highlighted constituents are called *focus*, the complement notion is *background*. Certain operators, like *only*, make use of this partitioning of expressions into focus and background.

We can investigate the focus-background structuring in two respects: We may be interested in the syntactic, morphological and phonological correlates of it, that is, in the marking of focus. Or we may look at how the information inherent in the focus-background structuring is put into use, that is, we may be interested in the semantics and pragmatics of focus. I will be mainly concerned with the latter in this chapter. I will follow the theory of Jacobs (1983, 1991), which has its roots in Jackendoff (1972).

According to Jacobs, focus cannot be interpreted independently (e.g., as the part of an utterance that is "new"), but only in relation to a *focus operator (FO)* that is associated with that focus. Technically, constituents in focus bear a feature [F], and this feature is coindexed with its focus operator (where the index may be suppressed). Let us give a representation of the two readings of (3b).

(3) b′.

i. ii.



The feature $[F_1]$ is spelled out by sentence accent, following rules that are sensitive to syntactic structure (see, e.g., Selkirk 1984, von Stechow & Uhmann 1986, Jacobs 1991, Féry 1991, Uhmann 1991 for some details of these rules in English and German). In (3′b.i, ii), it happens to be the case that the F-feature is realized in the same way, with the stress on *SUE*.

On the meaning side, focus induces a partition of the semantic representation into a background B and a focus F, which is commonly represented by the pair ⟨B,F⟩, where B can be applied to F, and the application B(F) yields the standard interpretation. Focus operators apply to such focus-background structures. In the example at hand, we would get the following semantic representations for readings (i) and (ii) (to keep things simple, I assume that *only* is a sentence operator instead of a VP operator):

(3) b″. i. **only**(⟨λx.**introduced**(**j**,x,**b**),**s**⟩)
ii. **only**(⟨λP.P(**j**), λx.**introduced**(x,**s**,**b**)⟩)

Let us assume that *only* has the following interpretation:

(4) **only**(⟨B,F⟩) :⇔ B(F) & ∀X[X∈ALT(F) & B(X) → X = F],
where X is a variable of the type of F and ALT(F) is the set of alternatives to F.

Here, **only** is interpreted with respect to a set of alternatives ALT(F) to the interpretation of the focus constituent F. This set of alternatives is typically provided by the context. The meaning of **only**(⟨B,F⟩) can be paraphrased as 'B applies to F, and B applies to no alternative to F'. (A more adequate analysis would analyze the first part as presupposition and the second part as assertion; cf. Horn 1969.) For our examples this will yield the following interpretations:

(3) b.‴ **introduced**(**j**,**s**,**b**) &
i. ∀x[x∈ALT(**s**) & **introduced**(**j**,x,**b**) → x = **s**]
ii. ∀P[P∈ALT(λx.**introduced**(x,**s**,**b**)) & P(**j**) →
P = λx.**introduced**(x,**s**,**b**)]

The Structured Meaning representation of focus has been elaborated to capture various additional phenomena. Jacobs (1984) shows that we can treat so-called *free focus*, that is, focus that is not associated with an overt focusing operator, as being associated instead with the illocutionary operator of the sentence, for example an assertion operator. In such cases, focus typically has an influence on the felicity conditions of the sentence. For example, (5b.i) is a felicitous answer to (5a.i), but not to (5a.ii), whereas (5b.ii) is a felicitous answer to (5a.ii), but not to (5a.i).

(5) a. i. To whom did John introduce Bill?
ii. What did John do?
b. i. ASSERT_1 [John introduced Bill to $[\text{SUE}]_{F_1}$]
ii. ASSERT_1 [John [introduced Bill to $\text{SUE}]_{F_1}$]

Also, the Structured Meaning framework can capture complex foci such as shown in (6a) (by list representations, where '·' is the list connector) and multiple foci such as shown in (6b) (by recursive focus-background structures).

(6) a. John only_1 introduced BILL_{F_1} to SUE_{F_1}.
$\mathbf{only}(\langle \lambda x{\cdot}y.\mathbf{introduced}(\mathbf{j},y,x),\ \mathbf{s}{\cdot}\mathbf{b}\rangle)$
b. Even_1 JOHN_{F_1} drank only_2 WATER_{F_2}
$\mathbf{even}(\langle \lambda x.\mathbf{only}(\langle \lambda P.\mathbf{drank}(x,P),\ \mathbf{water}\rangle),\ \mathbf{j}\rangle)$

In cases with multiple focus, it is only the focus associated with the highest operator that is clearly marked by sentence accent (in (6b), this is *JOHN*), whereas other foci are marked less prominently (cf. Jacobs 1991). This point is especially important when we consider the fact that the highest operator is the illocutionary operator of a sentence, which will typically obliterate the accentual marking of other foci. For example, we can obtain the reading (3b′.i) with stress on *John* in a context like the following one:

(7) Speaker A: Jim only introduced Bill to SUE.
Speaker B: No, JOHN only introduced Bill to Sue.
ASSERT_1 $[\text{JOHN}]_{F_1}$ only_2 introduced Bill to $[\text{Sue}]_{F_2}$

In Krifka 1991a I have developed a theory in which focus-background structures are analyzed in a compositional way. In this framework the focus on a constituent with the semantic representation A introduces a focus-background structure with an "empty" background, $\langle \lambda X.X, A\rangle$, where X is of the type of A. This focus-background structure is projected through semantic compositions. For example, if the original semantic composition rule called for the application of a semantic representation B to A, then the application of B to $\langle \lambda X.X, A\rangle$ will yield $\langle \lambda X.B(X), A\rangle$, and if the original rule called for an application of A to B, then the application of $\langle \lambda X.X, A\rangle$ to B will yield $\langle \lambda X.X(B), A\rangle$. Finally, focus-sensitive operators are applied to such background-focus structures.

Let me give a simple illustrative example. I will assume here that the semantic representation of noun phrases maps verbal predicates with n arguments to verbal predicates with n − 1 elements. Let us use the notation '$\vec{v}$' for (possibly empty) vectors of terms, and let us use Q as a variable for predicates with arbitrary arity. Then a name like *John* will be interpreted as a generalized

quantifier $\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{j})$. For example, the application of this meaning to a transitive verb like **love** will result in $\lambda\vec{v}.\mathbf{love}(\vec{v},\mathbf{j})$, which can be reduced to $\lambda x.\mathbf{love}(x,\mathbf{j})$, for $\vec{v}$ must be a single variable since **love** is two-place. The application of $\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})$ to that predicate gives us $\lambda\vec{v}[\lambda x.\mathbf{love}(x,\mathbf{j})(\vec{v},\mathbf{m})]$, where $\vec{v}$ turns out to be empty, such that we arrive at $\lambda x.\mathbf{love}(x,\mathbf{j})(\mathbf{m})$, that is, $\mathbf{love}(\mathbf{m},\mathbf{j})$. In the following, I illustrate the syntactic derivation and the corresponding semantic interpretation in tandem. Semantic combination typically is by functional application.

(8) John only met $[\text{MARY}]_F$
Mary, $\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})$
$[\text{Mary}]_F$, $\langle \lambda T.T,\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle$
met, **met**
met $[\text{MARY}]_F$, $\langle \lambda T.T,\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle(\mathbf{met})$, $= \langle \lambda T.T(\mathbf{met}),\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle$
John, $\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{j})$
John met $[\text{MARY}]_F$, $\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{j})\ (\langle \lambda T.T(\mathbf{met}),\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle)$
$= \langle \lambda T[\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{j})\ (T(\mathbf{met}))],\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle$
$= \langle \lambda T\lambda\vec{v}.T(\mathbf{met})\ (\vec{v},\mathbf{j}),\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle$
only, $\lambda\langle B,F\rangle.\mathbf{only}(\langle B,F\rangle)$
John only met $[\text{MARY}]_F$,
$\mathbf{only}(\langle \lambda T\lambda\vec{v}.T(\mathbf{met})\ (\vec{v},\mathbf{j}),\ \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})\rangle)$
$= \lambda T[\lambda\vec{v}.T(\mathbf{met})\ (\vec{v},\mathbf{j})]\ (\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m}))\ \&$
$\forall T[T\in \mathrm{ALT}(\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m}))\ \&\ \lambda\vec{v}.T(\mathbf{met})\ (\vec{v},\mathbf{j}) \rightarrow T = \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})]$
$= \mathbf{met}(\mathbf{j},\mathbf{m})\ \&\ \forall T[T\in \mathrm{ALT}(\lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m}))\ \&\ T(\mathbf{met})(\mathbf{j}) \rightarrow$
$T = \lambda Q\lambda\vec{v}.Q(\vec{v},\mathbf{m})]$

Here I have treated names as quantifiers, and consequently focus alternatives to names as sets of quantifiers. We can assume a plausible restriction for alternatives of quantifiers generated by an individual, such as names, namely, that the alternatives are quantifiers that are generated by an individual as well. Then we can reduce the last representation to one that takes the alternatives of individuals instead, and we arrive at:

$$\mathbf{met}(\mathbf{j},\mathbf{m})\ \&\ \forall x[x\in \mathrm{ALT}(\mathbf{m})\ \&\ \mathbf{met}(\mathbf{j},x)) \rightarrow x = \mathbf{m}]$$

Other types of operators that have been identified as focus sensitive include adverbial quantifiers. Rooth (1985) discusses examples like the following:

(9) a. [In St. Petersburg] OFFICERS$_{F_1}$ always$_1$ escorted ballerinas.
b. [In St. Petersburg] officers always$_1$ escorted BALLERINAS$_{F_1}$.

We have the following prominent readings: (9a) means that whenever ballerinas were escorted, it was by officers, whereas (9b) means that whenever officers escorted someone, they were ballerinas.

Rooth (1985) develops an analysis for these readings within the framework of Alternative Semantics. It can be imitated in the Structured Meaning representation. Let us concentrate on a somewhat simpler example of Rooth's to explain how it works:

(10) Mary always$_1$ took JOHN$_{F_1}$ to the movies.

This means: Whenever Mary took someone to the movies, she took John along. I will leave open whether she has to take ONLY John in order to make (10) come out as true; see Krifka 1992b for discussion and a treatment that covers both the exhaustive and the non-exhaustive interpretation. Here I will only treat the weaker, non-exhaustive reading. Also, bear in mind that a sentence like *Mary always took JOHN to the movies* can be interpreted in ways where focus on *John* does not influence quantification, for example, when *JOHN* is the focus of assertion, as in an answer to the question *Whom did MARY always take to the movies?*

Following Rooth (1985) I will concentrate in this section on sentences that contain quantifications over situations. Let us assume that episodic sentences are true of situations. Then the meaning of a sentence like (11a) can be given as the set of situations in which Mary took John to the movies, shown in (11b), which can be applied to a specific situation the speaker has in mind, or alternatively be existentially bound.

(11) a. Mary took John to the movies.
b. {s|**took.to.the.movies(m,j**,s)}

With focus on *John*, and interpreting *John* as a simple term, we get the following representation:

(12) a. Mary took [JOHN]$_F$ to the movies.
b. ⟨λx.{s|**took.to.the.movies(m**,x,s)}, **j**⟩

A focus-sensitive quantifier like *always* can then be spelled out as follows:

(13) **always**(⟨B,F⟩) :⇔ **EVERY**({s|∃X[X∈ALT(F) & s∈B(X)]}) ({s|s∈B(F)}),

Here, **EVERY** is the universal quantifier in generalized quantifier format: **EVERY**(X)(Y) :⇔ X⊆Y. For our example, this will give us the following:

(12′) a. **EVERY**({s|∃x[x∈ALT(**j**) & **took.to.the.movies(m**,x,s)]})
({s|**took.to.the.movies(m,j**,s)})

That is, in every situation in which Mary took some alternative to John to the movies, she took John to the movies. This captures the non-exhaustive reading of our example. The context may provide a set of alternatives, as in the following little text:

(14) Mary liked John and Bill a lot. One day, she would make a day trip to the countryside with John, and on the next day, she would go to a concert with Bill. However, she always took JOHN to the movies.

The last sentence, in the given context, means: Whenever Mary took John or Bill to the movies, she took John to the movies.

If the context does not provide any restriction of alternatives, we can assume that the alternatives are the set of all suitable entities of the type of the expression in focus. For example, the alternatives of **j** will be the set of all individuals (or of all persons, given a sortal restriction to humans). Then the meaning of our example is reduced to the following, which amounts to: Whenever Mary took someone to the movies, she took John to the movies.

(15) EVERY({s|∃x.**took(m**,x,s)}) ({s|**took(m,j**,s)})

A problem with this analysis is that it works only with episodic sentences and cannot capture bindings other than those related to the situation variable. Thus, examples like the following cannot be treated in the framework developed so far:

(16) a. A girl that sees a cat (always) STROKES it.
b. A three-colored cat is always INFERTILE.

In the most straightforward representation for (16a), the variables for the girl and the cat cannot be bound. Using our current way of interpretation we get something like this:

(16) a′. EVERY({s|∃x,y[**girl**(x) & **cat**(y) & **see**(x,y,s)]})({s|**stroke**(x,y,s)})

In (16b), we would like to quantify over cats, but the representation format given so far only allows us to quantify over situations.

Obviously, what we need is something like a quantification over cases, in the sense of Lewis (1975). A combination of focus representations with frameworks like Discourse Representation Theory (Kamp 1981), File Change Semantics (Heim 1982, 1983b), or another dynamic semantic representation (e.g., Rooth 1987, Groenendijk & Stokhof 1991) can offer a suitable setting.

5.3. A FRAMEWORK FOR DYNAMIC INTERPRETATION

The dynamic framework I will employ is related to Rooth 1987, the main differences being that I will work with partial assignment functions (cf. Heim 1983b) and that I will assume indices for possible worlds to capture modal quantifications and, in general, the increase of propositional information (cf. Stalnaker 1978, Heim 1982).

For a countable infinite set of *discourse referents* (or *indices;* henceforth DR) I will use natural numbers 1, 2, 3, etc. Let us call the domain of entities D, and let G be the set of *assignment functions,* that is, the set of partial functions from DR to D; thus $G = \bigcup\{G' | \exists X[X \subseteq DR \ \& \ G' = D^X]\}$. If g is an assignment function and d is an index in its domain, then I will write 'g_d' instead of 'g(d)'; for example, I will write 'g_3' instead of 'g(3)'. Two assignment functions g, k are said to be *compatible,* $g \approx k$, iff they are identical for their shared domain: $g \approx k$ iff $\forall d[d \in DOM(g) \ \& \ d \in DOM(k) \rightarrow g_d = k_d]$. The *augmentation* of g with k, g+k, is defined as $g \cup k$ if $DOM(g) \cap DOM(k) = \emptyset$, and undefined otherwise.

I will use the following notations for *variants* of assignment functions; contrary to usual conventions, they will denote sets of assignment functions. First, g[d] should be the set of assignment functions that is like g, with the added property that they map the index d to some entity in D; that is, $g[d] = \{k | \exists x[x \in D \ \& \ k = g + \{\langle d,x \rangle\}]\}$. Second, g[d/a] is the set of assignment functions that is like g, with the additional property that they map the index d to the entity a; that is, $g[d/a] = \{k | k = g + \{\langle d,a \rangle\}\}$. Note that this will be a singleton set. Be aware that these notations are defined only if $d \notin DOM(g)$. The two notations can be combined; for example, g[1/a,2,3/b] stands for $\{k | \exists x[x \in D \ \& \ k = g + \{\langle 1,a \rangle, \langle 2,x \rangle, \langle 3,b \rangle\}]\}$.

In general, the interpretation of natural language expressions will be with respect to an *input assignment,* an *output assignment,* and a *possible world.* NPs are related to discourse referents. Their syntactic indices are interpreted as semantic indices. Indefinite NPs bear indices that are new with respect to the input assignment, definite NPs bear old indices, and quantificational NPs bear new indices that are "active" only within the scope of quantification. The situation variable of episodic verbs will in addition be related to an index.

The individuals in the domain D are sorted. I assume here a minimal distinction between normal individuals (for which I use variables x,y,...), situations (with variables s,s',...), and worlds (with variables w,w',...). For situations I assume a relation **then**; 's-**then**-s'' means that the situation s is temporally succeeded by the situation s' and that s and s' form a larger, spatiotemporally coherent situation. Worlds determine the meanings of constants, which have a world argument, written as a subscript.

As above, I will use $\vec{v}$ as a meta-variable over vectors of individual terms of length ≥0. Tupels are written without commas and brackets when no confusion can arise. For example, instead of '$\langle g,k,w,y,k_2,s \rangle$' I will write '$gkwyk_2s$'. I use Q,Q', etc. as variables for entities of type $\{gkw\vec{v} \mid \ldots\}$; T,T', etc. as variables for entities of type $\lambda Q.\{gkw\vec{v} \mid \ldots\}$; and X for variables of any type. For assignments, I will use variables g,h,k,j,f. Semantic combinations are typically produced by functional application.

Let us start by giving some examples of syntactic derivations and corresponding semantic representations. I will not provide the respective syntactic and corresponding semantic rules, but it should be straightforward to infer them from the examples given.

The first example illustrates the treatment of indefinite NPs and episodic verbs. Indices of NPs are introduced by determiners, the functional heads of NPs. For indefinite NPs, the indices of indefinite determiners are new. The situation variable of an episodic verb is bound by an operator that introduces a new index for that situation; this operator may be associated with the syntactic position of INFL as the functional head of a sentence, and hence I will attach the corresponding syntactic index to the finite verb. Temporal and local adverbials specify the situation argument of a predicate. Tense will be kept implicit throughout. I will use capital letters in brackets, like '[A]', as abbreviations.

(17) A_1 plane $started_2$ on August 15, 1991.

plane, $\{ggwx | \mathbf{plane}_w(x)\}$

a_1, $\lambda Q' \lambda Q.\{gkw\vec{v} | \exists h \exists j[ghwh_1 \in Q' \ \& \ j \in h[1] \ \& \ jkwh_1\vec{v} \in Q]\}$

a_1 plane,
$\lambda Q.\{gkw\vec{v} | \exists h[h \in g[1] \ \& \ \mathbf{plane}_w(h_1) \ \& \ hkwh_1\vec{v} \in Q]\}$

start, $\{ggwxs | \mathbf{started}_w(x,s)\}$

a$_1$ plane start,
$\{gkws|k\in g[1]\ \&\ \mathbf{plane}_w(k_1)\ \&\ \mathbf{started}_w(k_1,s)\}$

on August 15, 1991,
$\lambda Q.\{gkw\vec{v}s|gkws\vec{v}s\in Q\ \&\ \mathbf{on(8\text{-}15\text{-}91},s)\}$

a$_1$ plane start on August 15, 1991,
$\{gkws|k\in g[1]\ \&\ \mathbf{plane}_w(k_1)\ \&\ \mathbf{started}_w(k_1,s)\ \&\ \mathbf{on(8\text{-}15\text{-}91},s)\}$,

INFL$_2$, $\lambda Q.\{gkw\vec{v}|\exists h[h\in g[2]\ \&\ hkw\vec{v}h_2\in Q]\}$

a$_1$ plane started$_2$ on August 15, 1991,
$\{gkw|k\in g[1,2]\ \&\ \mathbf{plane}_w(k_1)\ \&\ \mathbf{started}_w(k_1,k_2)\ \&\ \mathbf{on(8\text{-}15\text{-}91},k_2)\}(=[A])$

This analysis shows that episodic predicates are analyzed as having a situation argument, following Davidson (1967). The situation argument can be modified by temporal or locative adverbials. It is bound by an operator which can be related to the INFL node and hence is called 'INFL' here. In the example above, the INFL-operator has scope over the subject, representing a thetic sentence. It might also be applied to a VP. The INFL-operator also introduces an index attached to the finite verb.

The following example shows the treatment of transitive sentences, of definite NPs, and of temporal coherence. NPs with definite articles and definite pronouns presuppose that their index is already in the domain of the input assignment. The bare plural term *goods* is treated like an indefinite NP and introduces its own index. Temporal coherence is established by a device that allows to relate the situation index of an INFL-operator to some situation index introduced previously. The two situation indices are either identified, as in the case of an atelic predicate, or the situation index of the second predicate is located after the situation index of the first predicate (see Hinrichs 1981, Partee 1984 on temporal anaphora in narrative discourses). Technically this is solved by assuming that the INFL-operator can relate its index to an antecedent situation index. Thus the INFL-operator can have two indices, an anaphoric index and a new index. In the example below representing a categorical sentence, I assume that the INFL-operator is applied before the subject NP:

(18) The$_1$ plane carried$_{2,3}$ goods$_4$.
carry, $\{ggwyxs|\mathbf{carried}_w(y,x,s)\}$

goods$_4$, $\lambda Q.\{gkw\vec{v}|\exists h[h\in g[4]\ \&\ \mathbf{goods}_w(h_4)\ \&\ hkwh_4\vec{v}\in Q]\}$

carry goods$_4$,
$=\{gkwsx|k\in g[4]\ \&\ \mathbf{goods}_w(k_4\ \&\ \mathbf{carried}_w(x,k_4,s)\}$

INFL$_{2,3}$, $\lambda Q.\{gkw\vec{v}|\exists h[h\in g[3]\ \&\ h_2 = h_3\ \&\ hkw\vec{v}h_3\in Q]\}$

carried$_{2,3}$ goods$_4$,
$\{gkwx|k\in g[3,4]\ \&\ \mathbf{goods}_w(k_4)\ \&\ k_2 = k_3\ \&\ \mathbf{carried}_w(x,k_4,k_3)\}$

the$_1$ plane, $\lambda Q.\{gkw\vec{v}|\mathbf{plane}_w(g_1)\ \&\ gkwg_1\vec{v}\in Q\}$

the$_1$ plane carried$_{2,3}$ goods$_4$, $\{gkw|k\in g[3,4]\ \&\ \mathbf{plane}_w(k_1)\ \&\ k_2 = k_3\ \&$
$\mathbf{goods}_w(k_4)\ \&\ \mathbf{carried}_w(k_1,k_4,k_3)\}$ $(= [B])$

We can combine the first sentence with the second by dynamic conjunction, for which I use the semicolon:

(19) A$_1$ plane started$_2$ on August 15, 1991. [A]

The$_1$ plane carried$_{2,3}$ goods$_4$. [B]

A$_1$ plane started$_2$ on August 15, 1991. The$_1$ plane carried$_{2,3}$ goods$_4$. [A];[B]
$= \{gwk|\exists h[ghw\in[A]\ \&\ hkw\in[B]]\}$
$= \{gkw|k\in g[1,2,3,4]\ \&\ \mathbf{plane}_w(k_1)\ \&\ \mathbf{started}_w(k_1,k_2)\ \&\ \mathbf{goods}_w(k_4)\ \&$
$\mathbf{on(8\text{-}15\text{-}91},k_2)\ \&\ k_2 = k_3\ \&\ \mathbf{carried}_w(k_2,k_4,k_3)\}$

Let us look at another small text in which the second situation follows the first one:

(20) A$_1$ girl saw$_2$ a$_3$ cat,
$\{gkw|k\in g[1,2,3]\ \&\ \mathbf{child}_w(k_1)\ \&\ \mathbf{cat}_w(k_3)\ \&\ \mathbf{saw}_w(k_1,k_3,k_2)\}$

She$_1$ stroked$_{2,4}$ it$_2$, $\{gkw|k\in g[4]\ \&\ k_2\text{-}\mathbf{then}\text{-}k_4\ \&\ \mathbf{stroked}_w(k_1,k_3,k_4)\}$

A$_1$ girl saw$_2$ a$_3$ cat. She$_1$ stroked$_{2,4}$ it$_2$, $\{gkw|k\in g[1,2,3,4]\ \&$
$\mathbf{child}_w(k_1)\ \&\ \mathbf{cat}_w(k_3)\ \&\ \mathbf{saw}_w(k_1,k_3,k_2)\ \&\ k_2\text{-}\mathbf{then}\text{-}k_4\ \&$
$\mathbf{stroked}_w(k_1,k_3,k_4)\}$

A stative predicate, like *be infertile*, does not introduce any situation argument. That is, the INFL-operator cannot be applied (or alternatively, we assume that it can be applied vacuously). We get analyses like the following:

(21) is infertile, $\{ggwx|\mathbf{infertile}_w(x)\}$

the$_3$ cat, $\lambda Q.\{gkw\vec{v}|\mathbf{cat}_w(g_3)\ \&\ gkwg_3\vec{v}\in Q\}$

the$_3$ cat is infertile, $\{ggw|\mathbf{cat}_w(g_3)\ \&\ \mathbf{infertile}_w(g_3)\}$

To complete our overview of the dynamic framework, it might be interesting to have a look at the treatment of quantified NPs. Quantified NPs do not introduce any anaphoric possibilities beyond their scope, that is, their input assignment and output assignment are the same: they are "tests" in the terminology of Groenendijk and Stokhof (1991). For example, the meaning of the determiner *most*$_d$ can be given as follows:

(22) *most*$_d$:
$$\lambda P\lambda Q.\{ggw\vec{v}|\mathbf{MOST}(\{x|\exists h,k[h\in g[d/x] \ \&\ hkwx\in P\})$$
$$(\{x|\exists h,k,j[h\in g[d/x] \ \&\ hjwx\in P \ \&\ jkwx\vec{v}\in Q]\})\}$$

where **MOST** represents the usual generalized quantifier: $\mathrm{MOST}(X)(Y) \Leftrightarrow \mathrm{card}(X\cap Y) > \frac{1}{2}\mathrm{card}(X)$. In the following example, we use a noun with a relative clause that introduces a situation argument:

(23) a. planes that started$_2$ on August 15, 1991,
$\{gkwx|k\in g[2] \ \&\ \mathbf{plane}_w(x) \ \&\ \mathbf{started}_w(x,k_2) \ \&\ \mathbf{8\text{-}15\text{-}91}(k_2)\}$

b. carried$_{2,3}$ goods$_4$,
$\{gkwx|k\in g[3,4] \ \&\ \mathbf{goods}_w(k_4) \ \&\ k_2 = k_3 \ \&\ \mathbf{carried}_w(x,k_4,k_3)\}$

c. Most$_1$ planes that started$_2$ on August 15, 1991, carried$_{2,3}$ goods$_4$,
$\{ggw|$
$\mathbf{MOST}(\{x|k\in g[1/x,2] \ \&\ \mathbf{plane}_w(k_1) \ \&\ \mathbf{started}_w(k_1,k_2) \ \&\ \mathbf{8\text{-}15\text{-}91}(k_2)\}$
$(\{x|k\in g[1/x,2,3,4] \ \&\ \mathbf{plane}_w(k_1) \ \&\ \mathbf{started}_w(k_1,k_2) \ \&$
$\mathbf{8\text{-}15\text{-}91}(k_2) \ \&\ \mathbf{goods}_w(k_4) \ \&\ k_2 = k_3 \ \&\ \mathbf{carried}_w(x,k_4,k_3)\})\}$

That is, most x that are planes and that started on August 15, 1991, are planes that started on August 15, 1991, and carried goods.

Until now we have constructed the dynamic meaning of expressions. The truth condition for a discourse is given by existential closure over the assignments and the world arguments with respect to the "actual" world: A text A is true with respect to the world w iff there are assignments g,k such that $gkw\in A$. And A is true with respect to an input assignment g and a world w iff there is an assignment k such that $gkw\in A$.

5.4. STRUCTURED MEANINGS AND DYNAMIC INTERPRETATION

In this section, the Structured Meaning representation will be combined with the dynamic framework. Technically this is fairly easy—we have structured meanings ⟨B,F⟩, where B and F are now dynamic meanings. However, dynamic interpretation adds some complexity to the notion of alternatives: since focus meaning (and in fact, every meaning) is dynamic, the meanings in alternative sets will be dynamic as well. The task now is to decide what to do with the dynamic component of alternatives.

First of all, we should make sure that the added complexity is not only forced upon us as a technical consequence, but that we actually need it to describe the linguistic data correctly. Look at the following example:

(24) John only introduced every$_1$ woman to [her$_{1,2}$ partner]$_F$

Here, the reference of *her partner,* in the bound reading indicated, essentially depends on the choice of woman, which is captured by the dynamic component. But as the focus meaning itself is necessarily dynamic, the alternatives, which are of the same type, must be dynamic as well.

Furthermore, in constructing alternatives we must refer to the context in which the focus constituent enters the semantic composition. For the following example, imagine a dinner table situation in which every woman has a partner at her left and a partner at her right:

(25) Speaker A: Did John introduce every lady to her partner at left and her partner at right?
Speaker B: John only introduced every$_1$ woman to [her$_{1,2}$ partner at LEFT]$_F$

Here, the set of alternatives will depend on the choice of woman again—for each woman x, it will contain x's partner at left and x's partner at right. I will capture this by relating alternative sets to input assignments; for example, the alternative set of F, given input assignment g, is $\mathrm{ALT}_g(F)$.

Another complication arises because two expressions may refer to the same entity but still have different meanings when their anaphoric possibilities differ. To see this, look again at example (8), *John only met [MARY$_1$]$_F$*. Assume that *Mary$_1$* and *the$_1$ woman with a$_2$ hat* refer to the same person at the given input assignment; nevertheless, their meaning will differ, as the second NP introduces the index 2 for the hat. Assume also that the context does not restrict the alternatives. Then both $\mathbf{the_1.woman.with.a_2.hat}\in\mathrm{ALT}(\mathbf{MARY_1})$ and **John** ($\mathbf{the_1.woman.with.a_2.hat(met)}$) hold, but $\mathbf{the_1.woman.with.a_2.hat}$ does not equal $\mathbf{Mary_1}$, in the dynamic interpretation. Hence we should require that every pair of two alternatives in an alternative assignment refer to different entities, given the specified input assignment:

(26) a. For all dynamic meanings X,Y, where $X \neq Y$, and assignments g, if $Y\in\mathrm{ALT}_g(X)$, then X and Y have the same type.

b. If X is of a type $\{gkw\vec{v}| \ldots\}$, and $Y\in\mathrm{ALT}_g(X)$, then for all $k,w,\vec{v},k',\vec{v}'$:
if $gkw\vec{v}\in X$ and $gk'w\vec{v}'\in Y$, then $\vec{v} \neq \vec{v}'$.

c. If X is of a type $\lambda X_1 \ldots X_n.\{gkw\vec{v} | \ldots \}$, and $Y \in ALT_g(X)$,
then for all $k, \vec{v}, k', \vec{v}', X_1, \ldots, X_n$:
if $gkw\vec{v} \in X(X_1) \ldots (X_n)$ and $gk'w\vec{v}' \in Y(X_1) \ldots (X_n)$, then $\vec{v} \neq \vec{v}'$.

This restriction excludes that both **$\mathbf{Mary}_1$** and **$\mathbf{the_1.woman.with.a_2.hat}$** are in $ALT_g(F)$ if these meanings refer to the same object, given input g.

Now we are well equipped to give meaning rules for focus-sensitive quantification. Let us start with the nonmodal adverbial quantifier *most of the time*—a fairly typical representative—which will be rendered by 'MOSTLY'. The meaning rule looks as follows; here, B and F are used as variables of arbitrary types representing background and focus, and I assume that we also have variables of structured types, like $\langle B,F \rangle$.

(27) $\mathbf{MOSTLY}(\langle B,F \rangle) =$
$\{ggw | \mathbf{MOST}(\{h | \exists f[f = g+h \ \& \ gfw \in B(\{ggw\vec{v} | \exists Q \exists j[Q \in ALT_g(F) \ \& \ gjw\vec{v} \in Q]\})]\})$
$(\{h | \exists j[j \approx g+h \ \& \ gjw \in B(F)]\})\}$
if F is of a type $\{gkw\vec{v} | \ldots \}$

MOSTLY expresses a quantification over augmentations h of the input assignment g. In the first argument, h is restricted to the cases in which the input g and the output f (where $f = g+h$) satisfy the background applied to some alternative of F. The set of alternatives is again taken with respect to that input assignment at which the focus constituent is interpreted. We prevent the alternatives from introducing their own binding possibilities by binding the assignment j existentially—in a sense, we are skipping over the indices introduced within the focus. In the second argument, we require that $g+h$ satisfies the background applied to the focus directly. Actually, we have to introduce an assignment j that is compatible with $g+h$, as the focus might introduce its own binding possibilities that are not captured by h.

Let us see how things work out by looking at an example in which we implicitly quantify over entities and situations:

(28) Most of the time, a_1 girl that $sees_2$ a_3 cat $[STROKES_{2,4}]_F$ it_3.
stroke, $\{ggwyxs | \mathbf{stroke}_w(x,y,s)\}$ (= [C])
|
$[STROKE]_F$, $\langle \lambda Q.Q, [C] \rangle$
|
it_3, $\lambda Q.\{ggw\vec{v} | ggwg_3\vec{v} \in Q\}$ (= [D])
↓
$[STROKE]_F$ it_3, $\langle \lambda Q.[D](Q), [C] \rangle$
|
$INFL_{1,4}$, $\lambda Q.\{gkw\vec{v} | \exists h[h \in g[4] \ \& \ h_2\text{-}\mathbf{then}\text{-}h_4 \ \& \ hkw\vec{v}h_2 \in Q]\}$
↓

$[STROKES_{2,4}]_F$ it_3,
$\langle \lambda Q.\{gkwx | \exists h[h \in g[4] \ \& \ h_2\text{-}\mathbf{then}\text{-}h_4 \ \& \ hkwxh_4 \in [D](Q)]\}, [C] \rangle$
|
a_1 girl that $sees_2$ a_3 cat, $\lambda Q.\{gkw\vec{v} | \exists h[h = g[1,2,3] \ \& \ \mathbf{girl}_w(h_1) \ \& \ \mathbf{cat}_w(h_3) \ \& \ \mathbf{see}_w(h_1,h_3,h_2) \ \& \ hkwh_1\vec{v} \in Q]\}$ (= [E])
↓
a_1 girl that $sees_2$ a_3 cat $[STROKES_{2,4}]_F$ it_3,
$\langle \lambda Q.[E](\{gkwx | \exists h[h \in g[4] \ \& \ h_2\text{-}\mathbf{then}\text{-}h_4 \ \& \ hkwxh_4 \in [D](Q)]\}), [C] \rangle$
|
most of the time, $\lambda \langle B,F \rangle.MOSTLY(\langle B,F \rangle)$
↓
most of the time, a_1 girl that $sees_2$ a_3 cat $[STROKES_{2,4}]_F$ it_3,
$\mathbf{MOSTLY}(\langle \lambda Q.[E](\{gkwx | \exists h[h \in g[4] \ \& \ h_2\text{-}\mathbf{then}\text{-}h_4 \ \& \ hkwxh_4 \in [D](Q)]\}), [C] \rangle)$
$= \{ggw | \mathbf{MOST}(\{h | \exists f[f = g+h \ \& \ gfw \in [E](\{gkwx | \exists h[h \in g[4] \ \& \ h_2\text{-}\mathbf{then}\text{-}h_4$
$\& \ hkwxh_4 \in [D]\{ggw\vec{v} | \exists Q \exists j[Q \in ALT_g([C])$
$\& \ gjw\vec{v} \in Q]\})]\})]\})$
$(\{h | \exists j[j \approx g+h \ \& \ gjw \in [E](\{gkwx | \exists h[h \in g[4] \ \& \ h_2\text{-}\mathbf{then}\text{-}h_4 \ \&$
$hkwxh_4 \in [D]([C])]\})]\})\}$
The first argument of MOST reduces to:
$\{h | \exists f[f = g+h \ \& \ f \in g[1,2,3,4] \ \& \ \mathbf{girl}_w(f_1) \ \& \ \mathbf{cat}_w(f_3) \ \& \ \mathbf{see}_w(f_1,f_3,f_2) \ \& \ f_2\text{-}\mathbf{then}\text{-}f_4 \ \& \ \exists q \exists j[Q \in ALT_f([C]) \ \& \ fjwf_3f_1f_4 \in Q]]\}$
The second argument of MOST reduces to:
$\{h | \exists j[j \approx g+h \ \& \ j \in g[1,2,3,4] \ \& \ \mathbf{girl}_w(j_1) \ \& \ \mathbf{cat}_w(j_3) \ \& \ \mathbf{see}_w(j_1,j_3,j_2) \ \& \ j_2\text{-}\mathbf{then}\text{-}j_4 \ \& \ \mathbf{stroke}_w(j_1,j_3,j_4)]\}$

Hence we get an interpretation that accepts input assignments g (without changing them) and worlds w such that
– most augmentations h of g where $f = g+h$ and f_1 is a girl, f_3 is a cat, f_1 sees f_3 in situation f_2, and f_4 is a situation after f_2 such that f_1 does some alternative to stroking f_3 in f_4 (where the alternatives are determined with respect to the input assignment f)
– are such that f_1 is a child, f_3 is a cat, f_1 sees f_3 in f_2, and f_1 strokes f_3 in f_4.

Note that we refer in both cases to the same child, cat, seeing situation, and situation after the seeing situation, by virtue of the relation '≈'. In a paraphrase closer to English: 'For most x,s,y,s′ such that x is a child that sees a cat y in s and s′ follows s, x strokes y in s′'.

Until now, we have investigated cases where a verbal predicate, that is, an expression of a type $\{gkw\vec{v} | \ldots \}$, was in focus. How should we extend the rule for MOSTLY to focus constituents of other types? Let us have a look at quantifiers, which are of type $\lambda Q.\{gkw\vec{v} | \ldots Q \ldots \}$, where Q stands for the verbal predicate to which the term is applied. As in (27), we have to introduce in the restrictor some existentially bound assignment j that allows us to skip over the indices introduced by the item in focus. But in this case we must make sure that we do not skip over the indices introduced by the verbal predicate which Q stands for—that is, we have to exempt those indices that are introduced within Q. A meaning rule for *most of the time* which does that is the following (where the relevant part is $\exists\vec{v}'[gkw\vec{v}'\epsilon Q]$):

(29) $\mathbf{MOSTLY}(\langle B,F\rangle) =$
$\{ggw|MOST(\{h|\exists f[f = g+h \;\&\; gfw\epsilon B(\lambda Q.\{gkw\vec{v}|\exists\vec{v}'[gkw\vec{v}'\epsilon Q] \;\&$
$\exists T\exists j[j\approx f \;\&\; T\epsilon ALT_g(F) \;\&\; gjw\vec{v}\epsilon T(Q)]\})]\})$
$(\{h|\exists j[j\approx g+h \;\&\; gjw\epsilon B(F)]\})\}$
if F is of a type $\lambda Q.\{gkw\vec{v}\,|\,\ldots\,\}$

Let us have a look at the treatment of an example. Imagine that little Mary has several dolls and teddy bears which she likes to take to bed with herself. Her parents can observe:

(30) Most of the time, Mary takes [a TEDDY bear]$_F$ to bed.
a_3 teddy bear,
$\lambda Q.\{gkw\vec{v}|\exists h[h\epsilon g[3] \;\&\; \mathbf{teddy}_w(h_3) \;\&\; hkw\vec{v}\epsilon Q]\}$ (= [F])

[a_3 TEDDY bear], $\langle\lambda T.T,\ [F]\rangle$

take to bed, $\{ggwyxs|\mathbf{take}_w(x,y,s)\}$ (= [G])

take [a_3 TEDDY bear] to bed, $\langle\lambda T.T([G]),[F]\rangle$

$INFL_2$, $\lambda Q.\{gkw\vec{v}|\exists h[h\epsilon g[2] \;\&\; hkw\vec{v}h_2\epsilon Q]\}$

takes$_2$ [a_3 TEDDY bear] to bed,
$\langle\lambda T.\{gkw\vec{v}|\exists h[h\epsilon g[2] \;\&\; hkw\vec{v}h_2\epsilon(T([G]))]\},[F]\rangle$

Mary$_1$, $\lambda Q.\{gkw\vec{v}|g_1 = \mathbf{m}_w \;\&\; gkwg_1\vec{v}\epsilon Q]\}$ (= [H])

Mary$_1$ takes$_2$ [a_3 TEDDY bear] to bed,
$\langle\lambda T.[H](\{gkw\vec{v}|\exists h[h\epsilon g[2] \;\&\; hkw\vec{v}h_2\epsilon(T([G]))]\}),[F]\rangle$

most of the time, $\lambda\langle B,F\rangle.MOSTLY(\langle B,F\rangle)$

most of the time, Mary$_1$ takes$_2$ [a_3 TEDDY bear] to bed,
$MOSTLY(\langle\lambda T.[H](\{gkw\vec{v}|\exists h[h\epsilon g[2] \;\&\; hkw\vec{v}h_2\epsilon(T([G]))]\}),[F]\rangle)$,

$= \{ggw|MOST(\{h|\exists f[f = g+h \;\&\; gfw\epsilon[H](\{gkw\vec{v}|\exists h[h\epsilon g[2] \;\&\; hkw\vec{v}h_2\epsilon$
$(\{gkwxs|\exists y'x's'[gkwy'x's'\epsilon[G]] \;\&\; \exists T\exists j[j\approx f \;\&$
$T\epsilon ALT_g([F]) \;\&\; gjwxs\epsilon T([G])]\})]\})]\})$
$(\{h|\exists j[j\approx g+h \;\&\; gjw\epsilon[H](\{gkw\vec{v}|\exists h[h\epsilon g[2] \;\&$
$hkw\vec{v}h_2\epsilon[F]([G])]\})]\})\}$

The first argument of MOST reduces to:
$\{h|\exists f[f = g+h \;\&\; g_1 = m_w \;\&\; f\epsilon g[2] \;\&\; \exists yxs[\mathbf{take}_w(x,y,s)] \;\&$
$\exists T\exists j[j\approx f \;\&\; T\epsilon ALT_g([F]) \;\&\; fjwg_1k_2\epsilon T([G])]]]\}$
The second argument of MOST reduces to:
$\{h|\exists j[j\approx g+h \;\&\; g_1 = m_w \;\&\; j\epsilon g[2,3] \;\&\; \mathbf{teddy}_w(j_3) \;\&\; \mathbf{take}_w(j_1,j_3,j_2)]\}$

This accepts input assignments g (without changing them) and worlds w such that
– most augmentations h of g with DOM(h) = {2} and f = g+h where f_1 is Mary, f_2 is a situation where f_1 takes something to bed, and f_1 takes some alternative to a teddy bear to bed
– are such that they can be extended to j, where j_1 (= f_1) is Mary, j_3 is a teddy bear, and j_1 takes j_3 to bed in situation j_2 (= f_2).

This gives us the right analysis, at least for the non-exhaustive reading. We effectively quantify only over situations in which Mary takes something to bed with her. Krifka (1992b) discusses the meaning rules for the exhaustive readings.

In the final section we will take a closer look at generic sentences and at the role of the alternative sets.

5.5. GENERIC SENTENCES

In chapter 1 we have discussed different ways to render the semantics of the generic quantifier, **GEN.** Here I will adopt a modal treatment—a quantification over possible worlds—inspired by Lewis (1973) and Kratzer (1981).

GEN is dependent on a modal background N (e.g., a deontic or epistemic background) and a possible world, here, the actual world a. We assume a partial order relation '$\leq_{N,a}$' between cases, where '$u \leq_{N,a} v$' means: u is at least as normal (close to the ideal) as v, with respect to N and a. Then we can state the following:

(31) $\mathbf{GEN}_{N,a}(A)(B)$ iff
$\forall u[u\epsilon A \rightarrow \exists v[v \leq_{N,a} u \;\&\; \forall v'[v' \leq_{N,a} v \;\&\; v'\epsilon A \rightarrow v'\epsilon B]]]$

That is, for any case u that satisfies the restrictor A, there is a case v that is at least as close to the ideal as u, such that all cases v' that are at least as close to v and that satisfy the restrictor A also satisfy the matrix B. That is, for the "most normal" cases v', it holds that satisfaction of the antecedent entails satisfaction of the consequent.

The adverbial quantifier that incorporates **GEN** will be called '$\mathbf{GENER}_N$', where N refers to some modal background; its definition is similar to that of **MOSTLY** above:

(32) $\mathbf{GENER}_N(\langle B,F\rangle) =$

a. $\{ggw|\mathbf{GEN}_{N,w}(\{h|\exists f[f = g+h \ \& \ gfw \in B(\{ggw\vec{v}|\exists Q\exists j[Q \in ALT_g(F) \ \& \ gjw\vec{v} \in Q]\})\})$
$(\{h|\exists j[j \approx g+h \ \& \ gjw \in B(F)]\})\}$
if F is of a type $\{gkw\vec{v}| \ldots \}$.

b. $\{ggw|\mathbf{GEN}_{N,w}(\{h|\exists f[f = g+h \ \& \ gfw \in B(\lambda Q.\{gkw\vec{v}|\exists\vec{v}[gkw\vec{v} \in Q] \ \& \ \exists T\exists j[j \approx f \ \& \ T \in ALT_g(F) \ \& \ gjw\vec{v} \in T(Q)]\})]\})$
$(\{h|\exists j[j \approx g+h \ \& \ gjw \in B(F)]\})\}$
if F is of a type $\lambda Q.\{gkw\vec{v}| \ldots \}$

Let us now look at the treatment of our initial examples. I start with the derivations of the two readings of (1), *Mary smokes after dinner*. I assume that a phrase like *after dinner* introduces a dinner situation and links the situation argument of the verb to that situation; more specifically, the situation argument should follow that situation.

(33) $[\text{SMOKE}]_F$, $\langle \lambda Q.Q, \{ggwxs|\mathbf{smoke}_w(x,s)\}\rangle$, $= \langle \lambda Q.Q,[I]\rangle$

after dinner$_3$,
$\lambda Q.\{gkw\vec{v}s|\exists h[h \in g[3] \ \& \ h_3\text{-}\mathbf{then}\text{-}s \ \& \ \mathbf{dinner}_w(h_3) \ \& \ hkw\vec{v}s \in Q]\}$ $(= [K])$

$[\text{SMOKE}]_F$ after dinner$_3$, $\langle \lambda Q.[K](Q),[I]\rangle$

INFL$_2$, $\lambda Q.\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in Q]\}$

$[\text{SMOKES}_2]_F$ after dinner$_3$, $\langle \lambda Q.\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in [K](Q)]\},[I]\rangle$

Mary$_1$, $\lambda Q.\{gkw\vec{v}|g_1 = \mathbf{m}_w \ \& \ gkwg_1\vec{v} \in Q\}$ $(= [L])$

Mary$_1$ $[\text{SMOKES}_2]_F$ after$_2$ dinner$_3$,
$\langle \lambda Q.[L](\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in [K](Q)]\}),[I]\rangle$

$\emptyset$, $\lambda\langle B,F\rangle.\mathbf{GENER}_N(\langle B,F\rangle)$

Mary$_1$ $[\text{SMOKES}_2]_F$ after$_2$ dinner$_3$,
$\{ggw|\mathbf{GEN}_{N,w}(\{h|\exists f[f = g+h \ \& \ gfw \in [L](\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}g_2 \in [K](\{ggw\vec{v}|$

$\exists Q\exists j[Q \in ALT_g([I]) \ \& \ gjw\vec{v} \in Q]\})]\})]\})$
$(\{h|\exists j[j \approx g+h \ \& \ gjw \in [L](\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}g_2 \in [K]([I])]\})]\})\}$

The first argument of $\mathbf{GEN}_{N,w}$ reduces to:
$\{h|\exists f[f = g+h \ \& \ g_1 = \mathbf{m}_w \ \& \ f \in g[2,3] \ \& \ f_3\text{-}\mathbf{then}\text{-}f_2 \ \& \ \mathbf{dinner}_w(f_3) \ \& \ \exists Q\exists j[Q \in ALT_f([I]) \ \& \ fjwf_1f_2 \in Q]]\}$

The second argument of $\mathbf{GEN}_{N,w}$ reduces to:
$\{h|\exists j[j \approx g+h \ \& \ g_1 = \mathbf{m}_w \ \& \ j \in [2,3] \ \& \ j_3\text{-}\mathbf{then}\text{-}j_2 \ \& \ \mathbf{dinner}_w(j_3) \ \& \ \mathbf{smoke}_w(j_1,j_2)]\}$

This accepts input assignments g (without changing them) and worlds w such that g_1 is Mary and
– augmentations h of g with f = g+h and DOM(h) = {2,3} such that f_3 is a dinner situation followed by a situation f_2 in which f_1 (= g_1) does some alternative Q to smoking
– can typically be extended to j such that j_2 (= f_2) is a situation following the dinner situation j_3 (= f_2), and j_1 (= f_1) smokes in j_2.

The other reading of (1) can be derived as follows:

(34) smoke$_2$, $\{ggwxs|\mathbf{smoke}_w(x,s)\}$ $(= [I])$

after dinner$_3$, [K]

[after DINNER$_3$]$_F$, $\langle \lambda T.T,[K]\rangle$

smoke [after DINNER$_3$]$_F$, $\langle \lambda T.T([I]),[K]\rangle$

INFL$_2$, $\lambda Q.\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in Q]\}$

smokes$_2$ [after DINNER$_3$]$_F$, $\langle \lambda T.\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in T([I])]\},[K]\rangle$

Mary$_1$, $\lambda Q.\{gkw\vec{v}|\exists h[h \in g[1] \ \& \ hkwh_1\vec{v} \in Q]\}$ $(= [L])$

Mary$_1$ *smokes*$_2$ [*after DINNER*$_3$]$_F$,
$\langle \lambda T.[L](\{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in T([I])]\}),[K]\rangle$

$\emptyset$, $\lambda\langle B,F\rangle.\text{GENER}_N(\langle B,F\rangle)$

Mary$_1$ *smokes*$_2$ [*after DINNER*$_3$]$_F$,
$\{ggw|\mathbf{GEN}_{N,w}(\{h|\exists f[f = g+h \ \& \ gfw \in \{gkw\vec{v}|\exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in \{gkw\vec{v}| \exists\vec{v}[gkw\vec{v} \in [L]] \ \& \ \exists T\exists j[j \approx f \ \& \ T \in ALT_g([I]) \ \& \ gjw\vec{v} \in T([L])]\}]\}]\})$
$(\{h|\exists j[j \approx g+h \ \& \ gjw \in \{gkw\vec{v}|\exists s[gkw\vec{v}s \in [I]([L])]\}]\})\}$

The first argument of $\mathbf{GEN}_{N,w}$ reduces to:
$\{h|\exists f[f = g+h \ \&\ f \in g[2] \ \&\ g_1 = \mathbf{m}_w \ \&\ \mathbf{smoke}_w(f_1,f_2) \ \&$
$\quad \exists T \exists j[j \approx f \ \&\ T \in ALT_f([I]) \ \&\ gjwf_2 \in T([L])]\}$
The second argument of $\mathbf{GEN}_{N,w}$ reduces to the same expression as in (33).

This accepts input assignments g (without changing them) and worlds w such that g_1 is Mary and

– an augmentation h of g such that DOM(h) = {2} and $f = g+h$, where f_1 ($= g_1$) smokes in f_2, and there is some alternative T to the temporal determination "after dinner" such that f_1 smokes in f_2, and f_2 is related to T

– typically can be extended to an assignment j such that there is a dinner situation j_3, and j_2 ($= f_2$) follows j_3.

In both cases we get the intuitively correct readings. In the first case, we quantify over after-dinner situations and say that Mary smokes in these situations; in the second case, we quantify over situations in which Mary smokes and say that they are after-dinner situations.

One potential problem with this analysis arises from the fact that we should count only those dinner situations that involve Mary. This is not expressed directly in the representations given. In our informal formalizations in (1a,b), we had to represent the fact that Mary had to be "in" the dinner situation by a relation **in** whose presence was not licensed by any linguistic element.

Where can we locate the implicit requirement that the dinner situations should include Mary? The proper place for that is within the set of alternatives and the relation between situations **then.** In the analysis of the first reading, (33), we require that the alternatives to [I] are with respect to the assignment f, where f contains reference to a dinner situation f_3 followed by a situation f_2 in which the alternatives are located. Now, it is a reasonable requirement that all the alternatives Q to [I] (i.e., smoking, with respect to f) such that f_1 (= Mary) has the property Q in f_2 must be located after f_3. Furthermore, when two situations stand in the relation **then,** we should be allowed to draw the inference that the participants in the situation are the same. In our example, if f_3 is a dinner situation, f_2 is a smoking situation with Mary as the agent, and f_2 is related to f_3 by **then,** we can infer that f_3 contains Mary as a participant as well.

In the second reading, (34), the condition that Mary be part of the dinner situation need only be expressed in the matrix. It follows, under the assumption mentioned above, that the **then**-relation between situations invites the inference that the situations have the same participants.

Generic sentences that lack a situation variable can be treated as well. Let us derive the following example:

(35) A_1 three-colored cat [is INFERTILE]$_F$

is infertile, $\{ggwx|\mathbf{infertile}_w(x)\}$ (= [M])

[is INFERTILE]$_F$, $\langle\lambda Q.Q,[M]\rangle$

a_1 three-colored cat, $\lambda Q.\{gkw\vec{v}|\exists h[h = g[1] \ \&\ \mathbf{cat}_w(h_1) \ \&\ \mathbf{3\text{-}colored}_w(h_1) \ \&\ hkwh_1\vec{v} \in Q]\}$ (= [N])

a_1 three-colored cat [is INFERTILE]$_F$, $\langle\lambda Q.[N](Q),[M]\rangle$

$\emptyset$, $\lambda\langle B,F\rangle.\mathbf{GENER}_N(\langle B,F\rangle)$

a_1 three-colored cat [is INFERTILE]$_F$

$\{ggw|\mathbf{GEN}_{N,w}(\{h|\exists f[f = g+h \ \&\ gfw \in [N](\{ggw\vec{v}|\exists Q \exists j[Q \in ALT_g([M]) \ \&\ gjw\vec{v} \in Q]\})]\})$
$\quad (\{h|\exists j[j \approx g+h \ \&\ gjw \in [N]([M])]\})\}$
$= \{ggw|\mathbf{GEN}_{N,w}(\{h|\exists f[f = g+h \ \&\ f \in g[1] \ \&\ \mathbf{cat}_w(f_1) \ \&\ \mathbf{3\text{-}colored}_w(f_1) \ \&$
$\quad \exists Q \exists j[Q \in ALT_f([M]) \ \&\ gjwf_1 \in Q]]\})$
$\quad (\{h|\exists j[j \approx g+h \ \&\ j \in g[1] \ \&\ \mathbf{cat}_w(j_1) \ \&\ \mathbf{3\text{-}colored}_w(j_1) \ \&\ \mathbf{infertile}_w(j_1)]\})\}$

This accepts those inputs g (without changing them) and worlds w such that in general, augmentations h of g such that h_1 is a three-colored cat that has some alternative property to being infertile are such that h_1 is a three-colored cat that is infertile. Effectively we do quantify over individuals in this case.

In chapter 1 we mentioned that a sentence like *Simba is infertile* cannot be interpreted as a characteristic sentence, because there is no variable to quantify over—the subject does not provide for it, since it is a name, and neither does the predicate, since it is stative. In our reconstruction, these sentences would have degenerate representations, as the augmentations h have an empty domain. This is illustrated by the following derivation, where h has as its domain the empty set:

(36) Simba$_1$ is infertile.

$\{ggw|GEN_{N,w}(\{h|\exists f[f = g+h \ \&\ f = g \ \&\ g_1 = \mathbf{s}_w \ \&\ \exists Q \exists j[Q \in ALT_f([M]) \ \&\ gjwf_1 \in Q]]\})$
$\quad (\{h|\exists j[j \approx g+h \ \&\ j = g \ \&\ g_1 = \mathbf{s}_w \ \&\ \mathbf{infertile}_w(j_1)]\})\}$

Finally, let us go over the treatment of the readings of example (2), *Planes* *disappear in the Bermuda Triangle*. The three readings are related to the following focus assignments:

(37) a. Planes_1 $[\text{disappear}_2$ in the_3 BERMUDA $\text{Triangle}]_F$.
b. $[\text{PLANES}_1$ $\text{disappear}_2]_F$ in the_3 Bermuda Triangle.
c. Planes_1 $[\text{DISAPPEAR}_2]_F$ in the_3 Bermuda Triangle.

We assume the following meanings:

(38) a. Planes_1:
$\lambda Q.\{gkw\vec{v} \mid \exists h[h \in g[1] \ \& \ \mathbf{planes}_w(h_1) \ \& \ hkwh_1\vec{v} \in Q]\}$ (= [P])
b. disappear: $\{ggwxs \mid \text{disappear}_w(x,s)\}$ (= [D])
c. in the_3 Bermuda Triangle:
$\lambda Q.\{gkw\vec{v}s \mid g_3 = \text{BT}_w \ \& \ \text{in}_w(s,g_3) \ \& \ gkw\vec{v}s \in Q\}$ (= [B])

Now, the first of the three readings can be derived as follows:

(37) a′. disappear in the_3 Bermuda Triangle, [B]([D])

INFL_2, $\lambda Q.\{gkw\vec{v} \mid \exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in Q]\}$

disappear_2 in the_3 Bermuda Triangle,
$\{gkwx \mid \exists h[h \in g[2] \ \& \ hkwxh_2 \in [B]([D])]\}$ (= [DB])

$[\text{disappear}_2$ in the_3 BERMUDA $\text{Triangle}]_F$, $\langle \lambda Q.Q, [DB] \rangle$

planes_1, [P]

planes_1 $[\text{disappear}_2$ in the_3 BERMUDA $\text{Triangle}]_F$, $\langle \lambda Q.[P](Q), [DB] \rangle$

$\emptyset$, $\lambda \langle B,F \rangle.\text{GENER}_N(\langle B,F \rangle)$

planes_1 $[\text{disappear}_2$ in the_3 BERMUDA $\text{Triangle}]_F$,
$\{ggw \mid$
$\text{GEN}_{N,w}([\{h \mid \exists f[f = g+h \ \& \ gfw \in [P](\{ggw\vec{v} \mid \exists Q \exists j[Q \in \text{ALT}_g([DB]) \ \&$
$gjw\vec{v} \in Q]\})]\})$
$(\{h \mid \exists j[j \approx g+h \ \& \ gjw \in [P]([DB])]\})\}$

The first argument of $\text{GEN}_{N,w}$ reduces to:
$\{h \mid \exists f[f = g+h \ \& \ f \in g[1] \ \& \ \mathbf{planes}_w(f_1) \ \& \ \exists Q \exists j[Q \in \text{ALT}_f([DB]) \ \&$
$fjwf_1 \in Q]]\}$
The second argument of $\text{GEN}_{N,w}$ reduces to:
$\{h \mid \exists j[j \approx g+h \ \& \ j \in g[1,2] \ \& \ j_3 = \mathbf{BT}_w \ \& \ \mathbf{in}_w(j_2,j_3) \ \& \ \mathbf{disappear}_w(j_1,j_2)]\}$

This derivation accepts input assignments g and worlds w for which it is the case that

– an augmentation h of g with DOM(h) = {1} and f = g+h such that f_1 are planes and f_1 has some alternative property Q to disappearing in the Bermuda Triangle
– typically can be extended to j such that j_2 is a situation in the Bermuda Triangle in which j_1 (= f_1) disappears.

This represents the intended reading correctly: Disappearing in the Bermuda Triangle is the typical fate of planes.
Next, let us drive the reading corresponding to (37b):

(37) b′. Planes_1 disappear, [P]([D]) (= [PD])

$[\text{PLANES}_1$ disappear], $\langle \lambda Q.Q, [PD] \rangle$

in the_3 Bermuda Triangle, [B]

$[\text{PLANES}_1$ $\text{disappear}]_F$ in the_3 Bermuda Triangle, $\langle \lambda Q.[B](Q), [PD] \rangle$

INFL_2, $\lambda Q.\{gkw\vec{v} \mid \exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in Q]\}$

$[\text{PLANES}_1$ $\text{disappear}]_F$ in the_3 Bermuda Triangle,
$\langle \lambda Q.\{gkw\vec{v} \mid \exists h[h \in g[2] \ \& \ hkw\vec{v}h_2 \in [B](Q)]\}, [PD] \rangle$

$\emptyset$, $\lambda \langle B,F \rangle.\text{GENER}_N(\langle B,F \rangle)$

$[\text{PLANES}_1$ $\text{disappear}_2]_F$ in the_3 Bermuda Triangle,
$\{ggw \mid \text{GEN}_{N,w}(\{h \mid \exists f[f = g+h \ \& \ \exists h[h \in g[2] \ \& \ hfwh_2 \in [B](\{ggws \mid \exists Q \exists j$
$[Q \in \text{ALT}_g([PD]) \ \& \ gjws \in Q]\})]]\})$
$(\{h \mid \exists j[j \approx g+h \ \& \ \exists h[h \in g[2] \ \& \ hjwh_2 \in [B]([PD])]]\})\}$

Here the first argument of $\text{GEN}_{N,w}$ reduces to:
$\{h \mid \exists f[f = g+h \ \& \ f \in g[2] \ \& \ f_3 = \mathbf{BT}_w \ \& \ \mathbf{in}_w(f_3,f_2) \ \& \ \exists Q \exists j[Q \in \text{ALT}_f([PD])$
$\& \ gjwf_2 \in Q]]\}$
The second argument reduces to the same as in (37a′).

This accepts input assignments g and worlds w such that
– an augmentation h of g where DOM(h) = {2}, f = g+h, and f_2 is a situation in the Bermuda Triangle such that some alternative Q to the disappearing of planes happens in f_2
– can typically be extended to j such that j_2 (= f_2) is a situation in which there are planes f_1 that disappear in f_2.
That is: It is characteristic for situations in the Bermuda Triangle that planes disappear there.

Finally, we have arrived at perhaps the most plausible reading, the one corresponding to (37c):

(37) c′. $[\mathrm{DISAPPEAR}]_F$, $\langle \lambda Q.Q, [D] \rangle$

in the_3 Bermuda Triangle, $[B]$

$[\mathrm{DISAPPEAR}]_F$ in the_3 Bermuda Triangle, $\langle \lambda Q.[B](Q), [D] \rangle$

INFL_2, $\lambda Q.\{gkw\vec{v} \mid \exists h[h \in g[2]\ \&\ hkw\vec{v}h_2 \in Q]\}$

$[\mathrm{DISAPPEAR}]_F$ in the_3 Bermuda Triangle,
$\langle \lambda Q.\{gkw\vec{v} \mid \exists h[h \in g[2]\ \&\ hkw\vec{v}h_2 \in [B](Q)\}, [D] \rangle$

planes_1, $[P]$

planes_1 $[\mathrm{DISAPPEAR}_2]_F$ in the_3 Bermuda Triangle,
$\langle \lambda Q.[P](\{gkw\vec{v} \mid \exists h[h \in g[2]\ \&\ hkw\vec{v}h_2 \in [B](Q)\}), [D] \rangle$

$\lambda \langle T,Q \rangle.\mathrm{GENER}_{N,w}(\langle T,G \rangle)$

planes_1 $[\mathrm{DISAPPEAR}_2]_F$ in the_3 Bermuda Triangle,
$\{ggw \mid \mathrm{GEN}_{N,w}(\{h \mid \exists f[f = g+h\ \&\ gfw \in [P](\{gkwx \mid \exists h[h_2 g[2]\ \&$
$hkwxg_2 \in [B](\{ggwxs \mid \exists Q \exists j[Q \in \mathrm{ALT}_g([D])\ \&\ gjwxs \in Q]\})]\})\})$
$(\{h \mid \exists j[j \approx g+h\ \&\ gjw \in [P](\{gkw\vec{v} \mid \exists s[gkw\vec{v}s \in [B]([D])]\})]\})\}$

The first argument of $\mathrm{GEN}_{N,w}$ reduces to:
$\{h \mid \exists f[f = g+h\ \&\ f \in g[2,3]\ \&\ \mathbf{planes}_w(f_1)\ \&\ f_3 = \mathbf{BT}_w\ \&\ \mathbf{in}_w(f_3,f_2)\ \&$
$\exists Q \exists j[Q \in \mathrm{ALT}_f([D])\ \&\ fjwf_1f_2 \in Q]\}$

The second argument reduces to the same as in (37a′).

This accepts input assignments g and worlds w such that
– an augmentation h of g with $\mathrm{DOM}(h) = \{1,2\}$ and $f = g+h$, where f_1 are planes and f_2 is a situation in the Bermuda Triangle, and where f_1 does some alternative to disappearing in f_2,
– typically is such that f_1, in fact, disappears in f_2.

Again, we have imposed certain conditions on the three interpretations (37a′,b′,c′): In (37a′), we have quantified over planes f_1 that have some property Q that is an alternative to disappearing in the Bermuda Triangle. Q need not be related to the Bermuda Triangle here at all, but may refer to the ways in which a plane can get lost. We say that an f_1 that has this property—that is, an f_1 that gets lost—typically has the property of disappearing in a situation

j_2, where j_2 is in the Bermuda Triangle; consequently, f_1 must be in the Bermuda Triangle too at the moment it disappears.

In (37b′), we quantify over situations in the Bermuda Triangle that have some property which is an alternative to containing disappearing planes. Again, the alternatives might be restricted appropriately, in this case perhaps to the situation type of catastrophic events. Then (37b′) could even be true if most situations in the Bermuda Triangle turned out to be rather unspectacular.

In (37c′), we quantify over planes and situations in the Bermuda Triangle that satisfy some alternative Q to the planes disappearing in the situations. One plausible requirement is that all planes and situations that satisfy Q are such that the planes participate in the situations, and the situations, moreover, are located in the Bermuda Triangle. Consequently, we only quantify over planes that are in the Bermuda Triangle.

These considerations show that it is a promising enterprise to formulate the implicit restrictions we often find in generic sentences in terms of suitable alternatives. I think that the set of alternatives is crucial for the interface between the semantics and the pragmatics of generic sentences.

We should expect that simple generic sentences without explicit restrictor, like *Mary smokes,* can be captured by assuming suitable alternatives as well. For this example, we would get the following semantic representation:

(39) Mary_1 $[\text{smokes}_2]_F$.
$\{ggw \mid \mathrm{GEN}_{N,w}(\{h \mid \exists f[f = g+h\ \&\ g_1 = \mathbf{m}_w\ \&\ f \in g[2]\ \&$
$\exists Q \exists j[Q \in \mathrm{ALT}_g(\{ggwxs \mid \mathbf{smoke}_w(x,s)\})\ \&\ fjwf_1f_2 \in Q]\})$
$(\{h \mid \exists j[j \approx g+h\ \&\ g_1 = \mathbf{m}_w\ \&\ j \in g[2]\ \&\ \mathbf{smoke}_w(j_1,j_2)]\})$

Here we quantify over situations f_2 in which Mary ($= f_1$) does some alternative to smoking, and we say that, in fact, she smokes in these situations. Many situations may not count as alternatives to smoking situations—for example, all situations that exclude smoking to begin with, like being asleep, but also other situations, such as those in which Mary has just finished a cigarette. So it seems that proper restrictions of the alternatives can lead us to a proper interpretation of generic sentences even in these cases.

5.6 OPEN ISSUES

I have developed in this chapter a framework for the meanings of generic sentences that captures the influence of focus. I have shown that a combination of the Structured Meaning representation of focus with a dynamic interpretation allows us to formulate an adequate description.

There are several issues that require further elaboration. On the top of the list is a closer investigation into the notion 'alternatives', since it is here that the semantics and the pragmatics of generic sentences, and quantificational sentences in general, meet. In particular, there are two aspects that require further investigation: First, how does the context or the situation of utterance influence the set of alternatives? Secondly, what are the general principles behind the construction of alternatives? For example, I have suggested that the alternatives to a situation predicate like *Planes disappear* are predicates that describe other catastrophic situations. So it seems that one important principle in constructing sets of alternatives is that we generalize from a relatively specific type of situations, objects, or cases to a more general type, perhaps using a universal ontological hierarchy.

In this chapter, I did not cover generic sentences that contain generic, or kind-referring, NPs, such as *The cat meows.* (See chapter 1 for a discussion of how generic NPs relate to generic sentences, and how generic sentences with generic NPs can be treated. Also, I did not go into the role of the plural in sentences like (2). Chapter 1 contains some discussion of the treatment of plurality and distributivity within a lattice-theoretic semantic representation.

A final point is the question of how predictive focus is in determining the semantic partition that is necessary for the generic operator and for adverbial quantifiers in general. Schubert and Pelletier (1987), in their discussion of "reference ensembles" (i.e., the restrictor of the quantification), give a number of examples where they do not refer to the role of focus, but where focus seems to play a role. For instance, their example *Cats usually land on their feet* can easily be explained in terms of background-focus structure: The main accent probably is on *feet;* hence we have *Cats usually land [on their FEET]$_F$* as a plausible analysis, which would generate the reading 'Usually, when cats land on something (one of their body parts), then they land on their feet'. However, there certainly are other examples where focus doesn't seem to play a role. For example, sentence (30),—*Most of the time, Mary takes [a TEDDY bear]$_F$ to bed*—might also be interpreted with respect to situations in which Mary goes to bed. Here, Schubert and Pelletier's suggestion that presuppositions may furnish the reference ensembles seems to be on the right track. Thus, taking a stuffed animal to bed implies going to bed. It remains to be clarified whether the role of focus-background structure can be subsumed under a general theory of the role of presupposition in quantification.

6 INDEFINITES, ADVERBS OF QUANTIFICATION, AND FOCUS SEMANTICS

Mats Rooth

6.1. INTRODUCTION

A sentence with an indefinite description in subject position may be intuitively equivalent to one where the material from the indefinite subject has been moved to an initial *when*-clause:

(1) a. A green-eyed dog is usually intelligent.
b. When a dog is green-eyed, it is usually intelligent.

Suppose we adopt the view that adverbs of quantification such as *always* and *usually* are semantically two-place operators, and assume that one way of specifying their arguments is this: an initial *when-* or *if*-clause contributes the restrictor (or first argument) and the corresponding main clause, minus the adverb, contributes the scope (or second argument). Then we can use intuited equivalences with initial *when*-clause examples to make observations about how the arguments are filled in other cases. According to this test, in the variety of generic sentence illustrated in (1), semantic material coming from an indefinite description (in this case, *a green-eyed dog*) fills the restrictor of a quantificational adverb. Such readings of indefinite descriptions are not limited to subject position (see, for instance, Carlson 1989). In (2a), the indefinite description contributing the restriction is in object position.

(2) a. Knowing who to interview usually cracks a case like this.
b. When a case is like this, knowing who to interview usually cracks it.

Indeed, the position of the indefinite description seems quite unrestricted. In (3a) it is inside a relative clause modifier of the subject. (3b) is a near-*when*-clause paraphrase indicating that the indefinite description is supplying the restrictor (first argument) of the quantification.

(3) a. At least one person an AIDS victim works with is usually misinformed about the disease.
b. When someone has AIDS, at least one person he or she works with is usually misinformed about the disease.