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1 GENERICITY: AN INTRODUCTION

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1.0. Introduction and Acknowledgments

The purpose of this introduction is to present an overview of top and issues within the area of generics, and where possible draw conclusi about the current state of the area as agreed upon among the authors. This proven a formidable task, given the large number of semantic issues that study of generics directly interacts with, and the number of open questi that remain. This chapter is based on drafts written by Manfred Krifka consultation with the other authors, starting from a paper written earlier Krifka, partially in collaboration with Claudia Gerstner-Link. Krifka's fi draft was subsequently reworked, in some places extensively, by Francis Je Pelletier and then Gregory Carlson. In attempting to create a synthesis of views, we found that many of the ideas expressed were not unanimously agr upon, and the sum total of ideas expressed in this introduction is probably endorsed by a single one of us.

While all authors listed bear some measure of responsibility for the cla and views expressed, special credit should go to Manfred Krifka for the er mous amount of research and writing that made this introduction possible, special responsibility (or blame) for the shape of the overall outcome to volume editors, Gregory Carlson and Francis Jeffry Pelletier. We also w to thank many colleagues who shared with us their ideas on genericity, those who took the time to discuss earlier versions of this Introduction: Emm Bach, Henry Churchyard, Ileana Comorovski, Hana Filip, Claudia Gerst Link, Randy Goebel, Jim Higginbotham, Janet Hitzeman, David Israel, I Karimi, Boomee Kim, Angelika Kratzer, John Lawler, Bernie Linsky, McCawley, Sally McConell-Ginet, Michael Morreau, Barbara Partee, I Sag, Len Schubert, Andrew Schwartz, Scott Soames, Bob Stalnaker, I Thomason, Frank Veltman, Karina Wilkinson, Katsuhiko Yabushita, and dro Zucchi. Manfred Krifka wants to thank especially Claudia Gerstner-L with whom he developed some central ideas that are presented in this intro tory chapter. We also wish to thank the two anonymous University of Chi Press referees for their many productive comments.

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1.1. WHAT IS GENERICITY?

1.1.1. The Two Basic Varieties of Genericity

In the history both of philosophy of language and of linguistics, there have been two quite distinct phenomena that have been referred to or classified as 'genericity'. The first is *reference to a kind*—a genus—as exemplified in (1). The underlined noun phrases (NPs) in (1) do not denote or designate some particular potato or group of potatoes, but rather the kind Potato (*Solanum tuberosum*) itself. In this usage a generic NP is an NP that does not refer to an "ordinary" individual or object, but instead refers to a kind.

(1) a. The potato was first cultivated in South America.
b. Potatoes were introduced into Ireland by the end of the 17th century.
c. The Irish economy became dependent upon the potato.

We will call NPs like *potatoes* or *the potato* in these sentences *kind-referring NPs*, or sometimes *generic NPs*, as opposed to *object-referring NPs*, and call the predications in sentences involving such NPs *kind predications*, in opposition to *object predications*.[1]

The second phenomenon commonly associated with genericity are propositions which do not express specific episodes or isolated facts, but instead report a kind of *general property*, that is, report a regularity which summarizes groups of particular episodes or facts. Examples can be found in the natural readings of the sentences in (2). Here (2a) does not report a particular episode but a habit—some kind of generalization over events; and (2b) does not state something about a specific potato but about potatoes in general—a generalization based on properties of individual potatoes. This second notion of genericity is clearly a feature of the whole sentence (or clause), rather than of any one N in it; it is the whole generic sentence that expresses regularities which transce particular facts.

(2) a. John smokes a cigar after dinner.
b. A potato contains vitamin C, amino acids, protein and thiamine.

We will call sentences like these *characterizing sentences*, or sometimes si ply *generic sentences*, as they express generalizations. They are opposed *particular sentences*, which express statements about particular events, prop ties of particular objects, and the like.[2] We will classify the respective predi tions as *characterizing predications* (as in (2)) and *particular predications* in (1)), respectively. Other common terms for characterizing sentences fo in the literature are '(g)nomic', 'dispositional', 'general', or 'habitual'. M of our knowledge of the world, and many of our beliefs about the world, couched in terms of characterizing sentences. Such sentences, we take it, either true or false—they are *not* "indeterminate" or "figurative" or "m phorical" or "sloppy talk". After all, we certainly would want to count classic *Snow is white* as literally having a truth value!

Both phenomena—kind-referring NPs and characterizing sentences—occur combined in a single sentence, as the following examples show:

(3) a. Potatoes are served whole or mashed as a cooked vegetable.
b. The potato is highly digestible.

Certainly the subjects of these sentences can be analyzed as kind-refe NPs, and the sentences themselves express regularities which hold fo specimens of this kind. The two phenomena co-occur in the same sent quite often.

Few studies concentrate explicitly on only one type of genericity. Non less, Langford (1949), Sellars (1963), Bacon (1973a,b, 1974), Platteau (1 Heyer (1987), Gerstner-Link (1988), Kleiber (1990), and Ojeda (1991) be cited as concerning themselves mainly with reference to kinds, wh Chafe (1970), Lawler (1973a), Dahl (1975), Nunberg and Pan (1975), B Roberts (1976, 1977), Biggs (1978), Farkas and Sugioka (1983), C (1985), Strigin (1985), Declerck (1986), and Schubert and Pelletier (1989) are concerned primarily with characterizing sentences. Smith (197

1. 'Object' is a semantic notion here describing the ontological status of what is being referred to and does not have anything to do with 'object' as a syntactic notion. However, regarding this latter sense of 'object', note that generic NPs can occur as objects of verbs, of prepositions, etc.—as in (1c). For the most part our discussion will revolve around kind-referring NPs in subject position. But we intend our results to apply directly to other syntactic positions as well.

2. They are also opposed to explicitly quantified general sentences such as (i):
(i) Each potato in this room was grown in Alberta.
But the exact opposition involved here is a topic for later in this chapter; see section 1.1.

Carlson (1977a,b, 1982) essentially treat both aspects, trying to analyze one in terms of the other. The two types were contrasted by Gerstner and Krifka (1983);[3] Wilkinson (1988), Wilmet (1988), and Declerck (1991) make similar distinctions.

It is quite obvious that reference to kinds and characterizing sentences have something in common: with kinds we abstract away from particular objects, whereas with characterizing sentences we abstract away from particular events and facts. Furthermore, it seems natural that one way to express a general law about the specimens of a kind is to state it for the kind itself. Nonetheless, it is important to keep these two types of generic phenomena apart, since it turns out that there are linguistic differences between them. So even if in the end we decide (for example) that the best semantic analysis will analyze one in terms of the other, we will still wish to maintain them as separate linguistic phenomena. Also, it will be important to distinguish generic sentences, be they characterizing sentences or sentences containing kind-referring NPs, from nongeneric ones. In section 1.1.3 we will present some linguistic tests to do so.

We want to mention right at the outset that although characterizing sentences sometimes have the flavor of universally quantified sentences, these two categories must be kept apart. One reason is that characterizing sentences, in general, allow for exceptions, whereas universally quantified sentences make a claim for every object of a certain sort. For example, if from time to time, John does not smoke after dinner, sentence (2a) can still be true. And if an occasional potato lacks vitamin C, (2b) can still be true. In both situations, the corresponding universally quantified sentences would be false:

(4) a. Always after dinner/After each dinner, John smokes a cigar.
b. Every potato contains vitamin C, amino acids, protein and thiamine.

Characterizing sentences allow for exceptions (and as the attentive reader will have recognized, this is a characterizing sentence as well: there might be—and in fact are—characterizing sentences that hold without exceptions). The issue of how to handle possible exceptions in a precise semantic framework is an extremely interesting one, not only for linguistics but also in logic, cognitive science, and artificial intelligence. We will discuss problems related to this issue in section 1.2.4 of this introductory chapter, and in some of the later chapters in this volume, most notably those by Carlson and by Asher and Morreau (chapters 4 and 7).

3. These authors used the terms 'D-generic' and 'I-generic' for kind-referring NPs and characterizing sentences respectively. The idea was that reference to kinds is often manifested by definite NPs, whereas characterizing sentences often have an indefinite (or bare plural) NP in them. But not only are these not universal properties of the two types; the terms also incorrectly suggest that both types are somehow on a par in that they are manifested by NPs. (It is the terminology that is confused, not the authors.) Also, earlier, "underground" versions of this introductory chapter used 'characteristic sentence' where we now prefer 'characterizing sentence', both for purposes of euphony and for some ineffable and subtle distinction in "feeling" between the two.

1.1.2. Subtypes of the Basic Varieties of Genericity

If we look at the linguistic realization of kind-referring NPs and characterizing sentences, we find that they seldom are encoded in an unambiguous way. Not only are there many linguistically distinct ways to state a particular generic sentence, but also it often happens that a given sentence can have both a particular and a characterizing reading.

Let us first consider kind-referring NPs. In English, many definite singular count nouns, bare plural count nouns, and bare mass nouns can be considered as kind-referring.[4]

(5) a. The lion is a predatory cat.
b. Lions are predatory cats.
c. Gold is a precious metal.

Furthermore, count nouns, and mass nouns like *metal* in a "secondary" count noun reading, can denote subspecies in a taxonomic hierarchy. In this *taxonomic* reading, they clearly have to be analyzed as kind-denoting, even when they appear as indefinite singular NPs.

(6) a. The World Wildlife Organization decided to protect a (certain) large cat, namely the Siberian tiger.
b. One metal, namely copper, went strongly up on the market yesterday.

Of course, the NPs we have considered so far *need* not be analyzed as referring to kinds. Definite singular NPs, bare plural NPs, bare singular NPs, and indefinite singular NPs all can, intuitively, refer to objects as well, as in the following examples:

(7) a. The lion / Lions escaped yesterday from the Hellabrunn zoo.
b. Gold was stolen in yesterday's bank robbery.
c. A cat was sitting on the mat when John arrived at home.

4. We say "can be considered" here because we do not wish to prejudge the final semantic analysis to be given. Certainly at first blush, and on a pretheoretic level, the cited sentences use the underlined NPs to refer to kinds.

One linguistic problem is to identify the clues which help us distinguish between a generic and a nongeneric reading of such NPs—if there is such a distinction, a matter taken up in section 1.4.6 below.

Are there any NPs which can *only* be interpreted as kind-referring? An example is the English NP (not the common noun) *man:*

(8) Man has lived in Africa for more than 2 million years.

There are other unequivocal cases, like *this kind of tiger* and *each species of fish.* But beyond such idiosyncratic examples as *man* and these systematic NPs with special lexical content, no NPs appear to demand unequivocal reference to kinds, at least not at first sight. In section 1.4 we will extend similar consideration to gerunds, infinitive constructions, and deverbal nominalizations as additional possible cases of kind-referring expressions.

Let us now turn to characterizing sentences. Like kind-referring NPs, they often are not clearly marked. Sentences with verbal predicates[5] in the simple present tense, the past tense or the future can (in English) have either a characterizing or a particular interpretation (this even holds for *smokes* with the so-called 'reportive present'):

(9) John smokes/smoked/will smoke a pipe.

Sometimes characterizing sentences are said to express 'timeless truths' (e.g., Lyons 1977, 194). We think that this claim is false, as it is perfectly possible to claim that a characterizing property held in the past or will hold in the future, without any implication for the present. However, there *is* a correlation with aspectual distinctions: progressive and perfect sentences show at least a strong tendency toward a particular, noncharacterizing interpretation:[6]

(10) John is smoking/has smoked a pipe.

5. Once again we use the phrase "verbal predicate" as a pre-analytic, theory-neutral term to pick out what one naively would call the verb phrase. It may be that the correct semantic theory will analyze this verbal predicate in terms of some other predicate which (for example) holds of temporal stages of the verbal subject, and so the verbal predicate may not be the "real" predicate. But here, when we use such terms as "verbal predicate," we wish to focus on the pretheoretical structure of the sentence.

6. Schubert and Pelletier (1987) cite various apparent counterexamples to this "tendency":

(i) Oil is becoming scarce.

(ii) The wolves are becoming bigger as we travel northwards.

It seems that to maintain our claim we need to make caveats about group readings, and about kind-referring NPs; or perhaps say that (i) and (ii) *are* particular statements—about the kind.

There are various constructions which enforce a characterizing readin First, there are adverbs like *usually, typically, always, often, sometime rarely, never,* etc., that lead to lawlike characterizing sentences:

(11a) John usually/always/often/rarely/never smokes a pipe.

This effect can override the previously-noted tendency for progressives to ha noncharacterizing interpretations:

(11b) John is usually/always/often smoking a pipe.

Second, in the (English) past tense there is an auxiliary construction that mar a characterizing reading; similar constructions are found in many other la guages:

(12) John used to smoke a pipe.

Third, agentive nouns typically have a characterizing meaning, and sentenc which have agentive nouns as predicates consequently are characterizing:

(13) John is a pipe smoker.

Similarly, the derivation of deverbal adjectives using *-able* yields characte ing predicates and sentences:

(14) This book is readable.

Furthermore, verbal predicates in the middle voice typically have a characte ing interpretation:

(15) This shirt washes easily.

Finally, there are some rather idiosyncratic ways to describe characteriz generalizations, by using special lexical items:

(16) a. John has an inclination to smoke a pipe.
b. Mary has the habit of carrying an umbrella with her even when the s is shining.
c. Sue has the disposition / is disposed to get the flu in winter.
d. Bill frequents that pub over there.
e. Milk tends to sour during thunderstorms.
f. Your typical Australian drinks too much beer.

In some languages there are specialized morphological forms for verbs in characterizing sentences. An example is the verbal prefix *hu-* in Swahili (see Dahl 1985, 1988a, and chapter 12, this volume, for further examples):

(17) Wanawake hu-fanya kazi ya kuchokoa pwesa.
women HABIT-do work of catching squid
'The women (generally) do the work of catching squid.'

But normally, these markers are only a sufficient, and not a necessary, condition for the characterizing reading. For example, the same meaning could be expressed in Swahili by using a present tense:

(18) Wanawake wa-na-fanya kazi ya kuchokoa pwesa.
'The women catch squid' *or* 'The women are catching squid.'

In concluding these observations about characterizing sentences, we want to emphasize that characterizing sentences put no limitations on what kinds of NPs may occur in them. For example, we can find proper names, definite singular NPs, indefinite singular NPs, quantified NPs, bare plural NPs, and bare singular NPs in characterizing sentences.

(19) a. John / My brother drinks whiskey.
b. A professor drinks whiskey.
c. Every professor drinks whiskey.
d. Professors drink whiskey.
e. Milk is healthy.

Sometimes the subject NP apparently refers to a kind, as in (19e); sometimes it apparently refers to an individual, as in (19a), and the sentence attributes a characterizing property to this individual; sometimes it is quantified but its values apparently are ordinary individuals, as in (19c), and the sentence attributes a characterizing property to each instance of the quantified NP; and sometimes it is just unclear what the subject NP denotes, as in (19b) and (19d).

Because of the wide variability of NPs in characterizing sentences, it seems implausible that this type of genericity can be traced back to any particular type of NP. Instead, this type of genericity should be analyzed as being a *sui generis* type of sentence.

1.1.3. Genericity vs. Nongenericity: Some Diagnostic Tests

As neither generic (kind-referring) NPs nor generic (characterizing) sentences are typically marked in a clear and unambiguous way, it seems appropriate to list some fairly simple diagnostic tests and typical properties to distinguish them from nongeneric NPs and nongeneric sentences. In this section, we will give five tests of this kind. This series of tests is by no means exhaustive, and of course any test must be applied judiciously, being indicative and not criterial.

The first test. This test distinguishes characterizing sentences from particular sentences as follows: Combine the sentence in question with an adverb like *usually* or *typically*. If the resulting sentence exhibits at most a slight change of meaning, then the original sentence is characterizing. With particular sentences, the change in meaning obtained by applying these adverbs is quite drastic.[7] To be somewhat more precise, if the original sentence is characterizing, then adverbs like *usually* explicitly convey the information that there may be exceptions to the rule which the sentence expresses, and that there actually are instantiations of the rule. If the original sentence is particular, these adverbs change the meaning from a report of a specific event or a particular fact to a general rule. Some examples:

(20) a. A lion has a bushy tail.[8]
b. A lion usually has a bushy tail.
(21) a. A lion stood in front of my tent.
b. A lion usually stood in front of my tent.

In (20), the insertion of *usually* brings about only a minor change in meaning; there is a sense in which (20b) might be called somewhat weaker than (20a) since it points explicitly to the fact that there might be exceptions to the rule. In the case of (21), however, the change is from the report of a specific event to a claim about a regularity of events, which is a much more thorough change of meaning.

Consider another example, though:

(22) a. Mary handled the mail from Antarctica.
b. Mary usually handled the mail from Antarctica.

In this case, (22a) has two readings; it can either mean that Mary was in charge of the mail of Antarctica in general (even if there never was some real mail from Antarctica), or that she handled some particular batch of mail of Antarctica. If we have the former reading in mind, the adverb *usually* in (22

7. Naturally enough this test is only applicable if the sentence does not already have a *usually* or *typically* in it. And again, naturally enough, the notion of "slight change of meaning;" "drastic change of meaning" is pretty fuzzy. But the examples are clear, we hope.

8. Throughout, we follow a well-known dictionary which describes lions' tails as bushy regardless of whether in fact they are or are not bushy.

generates just slight changes in meaning (it implies that there might have been exceptions to the rule, and consequently also that there was indeed some mail from Antarctica). But if we have the second reading of (22a) in mind, we see that the addition of *usually* in (22b) generates quite a drastic meaning change, despite our contention that even on this latter reading (22a) is still a (dispositional) characterizing sentence.

The second test. This test determines which types of NPs can be used as kind-referring terms. There are some predicates with argument places that can be filled only with kind-referring NPs. Examples are the subject argument of *die out* or *be extinct* and the object argument of *invent* or *exterminate*. The reason is, of course, that only kinds (not objects) can die out or be invented. With some other predicates, such as *be a mammal, be domesticated,* and *be protected by law*, the kind-referring interpretation of the subject is not the only one; indeed, a proper name referring to a particular animal can also be used as subject with these. Yet when a general term is used as subject NP, the kind-referring interpretation of the NP has at least priority over the object-referring interpretation. We call predicates which favor a kind-referring interpretation of an argument *kind predicates;* and we observe, for example, that definite singular NPs such as in (23a), bare blural NPs such as in (23b), and bare singular NPs such as in (23c) pass this test, whereas indefinite NPs such as in (23d) fail, except in the taxonomic reading in (23e) (see also Smith 1975):

(23) a. The lion will become extinct soon.
b. Lions will become extinct soon.
c. Bronze is a metal / was invented as early as 3000 B.C.
d.* A lion will become extinct soon. (nontaxonomic reading)
e. A (certain) lion (namely the Berber lion) will become extinct soon. (taxonomic reading)

This result is quite important, as definite NPs like *the lion,* bare plural NPs like *lions,* and indefinite singular NPs like *a lion* have often been considered the three main types of 'generic noun phrases' (e.g., in the English grammar of Quirk et al. 1985, 265; Dahl 1975; Lyons 1977; Carlson 1977b). But obviously, given the unacceptability of (23d), indefinite singular NPs have to be treated differently, a point that will be substantiated with other tests below. Therefore, we will not consider indefinite NPs as kind-referring (except in their taxonomic reading). Bare plural NPs, on the other hand, can denote a kind, although sometimes they are analyzed as the plural counterpart of indefinite NPs (see Burton-Roberts 1976 and van Langendonck 1980a,b for discussion; see also Kratzer, this volume).

The third test. This test helps to distinguish object-referring NPs from kind-referring NPs. It is based on the fact that it is not possible to form kind-referring NPs with just any nominal constituent. This was pointed out by Vendler (1967), Nunberg and Pan (1975), Carlson (1977b), and Dahl (1985) for singular NPs with definite article in English. Basically, the noun or complex nominal constituent must be semantically connected with a "well-established kind" to which the noun phrase then can refer.[9] A contrast like the following (from Carlson 1977b, who attributes it to Barbara Partee) is quite striking; it can be traced back to the fact that there exists a well-established kind for Coke bottles but there is no well-established kind for green bottles:

(24) a. The Coke bottle has a narrow neck.
b. ??The green bottle has a narrow neck.

The test can be used to show that certain NPs which can be kind-referring according to our second test, namely bare plurals and bare singular NPs, might have an object-referring reading as well, even in characterizing sentences. The following examples show that bare plural NPs like *green bottles* and bare singular NPs like *gold which is hammered flat* (which do not refer to well established kinds) pattern with indefinite singular NPs like *a green bottle* rather than with definite NPs like *the green bottle.*

(25) a. A green bottle (usually) has a narrow neck.
b. Green bottles (usually) have narrow necks.
c. Gold which is hammered flat (usually) is opaque.

Simple bare nouns, like *bottles* or *gold,* may possibly be object-referring even in characterizing sentences. This becomes apparent when we consider noncharacterizing sentences like *Bottles were standing all over the kitchen, Gold was found all over the place.* In principle, therefore, bare nouns may well have two interpretations: they can be kind-referring, as shown in the previous test, and they may also be object-referring, as shown by the facts cited here (see sections 1.3 and 1.4 for further discussion of this double re

9. We will not attempt to offer any sort of analysis of the notion 'well-established kind'. The distinction is real enough and is quite striking in its effect on example sentences, but we have well-formed thoughts as to what the contrast owes its origins.

and its controversial aspects). The issue raised by this third test is whether it tests for reference to a kind or whether it tests only for reference to a "well-established" kind, whatever that may turn out to be in the end.

The fourth test. This test helps to distinguish characterizing sentences from particular sentences. Characterizing sentences express regularities and do not report particular events. A roughly corresponding linguistic distinction is the one between stative and nonstative (or dynamic) sentences. Accordingly, characterizing sentences are typically stative, and, most often, particular sentences are nonstative. If the language under consideration has a linguistic form which excludes stative predicates, as the progressive in English does (e.g., **John is weighing 175 pounds*), this form will typically exclude characterizing interpretations as well. Thus it is very difficult to transform a characterizing sentence into the progressive without its losing its generic character. For example, the sentences in (26) clearly have a characterizing reading, which the sentences in (27) lack.

(26) a. The Italian drinks wine with his dinner.
b. An Italian drinks wine with his dinner.
c. Italians drink wine with their dinner.
d. Luigi drinks wine with his dinner.

(27) a. The Italian is drinking wine with his dinner.
b. An Italian is drinking wine with his dinner.
c. Italians are drinking wine with their dinner.
d. Luigi is drinking wine with his dinner.

These facts confirm our observation that there are noncharacterizing sentences with kind-referring NPs, since kind-referring NPs can easily occur with nonstative predicates. Furthermore, they show that indefinite nontaxonomic NPs cannot be kind-referring: when combined with a nonstative predicate, they get either a non-kind-referring interpretation or a taxonomic interpretation. Here are some examples in which *reach Australia in 1770* is used as a clearly nonstative predicate:

(28) a. The rat was (just) reaching Australia in 1770. (kind-referring reading OK)
b. Rats were (just) reaching Australia in 1770. (kind-referring reading OK)
c. Rice was being introduced into East Africa several centuries ago. (kind-referring reading OK)
d. A rat was reaching Australia in 1770. (only non-kind-referring or, perhaps, taxonomic reading)

The fifth test. This last test helps us distinguish characterizing from particul sentences. As noted already by Goodman (1955) and later by Lawler (1973 Dahl (1975), Burton-Roberts (1977), and subsequent researchers, characteri ing sentences do not express accidental properties; rather, they state propertie that are in some way "essential". To put it in Dahl's (1975) terminology they are not only "descriptive" generalizations but "normative" ones. Wit this observation, we can further confirm our claim that indefinite singular NI in their nontaxonomic reading cannot be kind-referring since they are tied t characterizing sentences. For example, note the following contrast betwee sentences expressing an accidental property and sentences expressing an essei tial or at least "central" property (the examples are Lawler's):[10]

(29) a'. The madrigal is popular.
a''. The madrigal is polyphonic.
b'. Madrigals are popular.
b''. Madrigals are polyphonic.
c'. ??A madrigal is popular.
c''. A madrigal is polyphonic.

We assume that being popular is an accidental property of madrigals, where being polyphonic is essential to them. Consequently, (29c'), which can on be read as a characterizing sentence, is bad, whereas (29c'') is good. (course, different properties are essential (in the present sense) to different typ of objects. Being popular may not be essential to madrigals but it is to footb heroes. Thus, as Nunberg and Pan (1975) say, *A football hero is popular* acceptable. It's acceptable because the property of being popular is essent or central to football heroes.

Previous observations made in the literature (Lawler 1973, Heyer 19 Laca 1990) suggest another test for distinguishing between kind-referring a object-referring NPs. In upward-entailing contexts (roughly, non-negative c texts), indefinite object-referring NPs show the usual monotonicity effec they can be replaced by "less informative" NPs without making the senter false, as (30a). This is not possible with generic NPs, as shown in (30b).

(30) a. Berber lions escaped from the zoo ⇒ Lions escaped from the zoo
b. Berber lions are extinct ⇏ Lions are extinct

10. Once again (as with "well-established kind") we are not in a position to provide analysis of what an "essential" vs. an "accidental" property consists in, as it is used by test. Again, the distinction is real and manifests itself in striking results, but the underlying rea is not clear.

However, this test only works when the kind-referring NP is not also in a characterizing sentence. This is so because characterizing sentences have (what we will soon call) a "restrictor" position; and in this position neither kind- nor object-referring NPs show monotonicity phenomena. For instance:

(30) c. Berber lions are well adapted to cold weather $\not\Rightarrow$ Lions are well adapted to cold weather
d. A Berber lion is well adapted to cold weather $\not\Rightarrow$ A lion is well adapted to cold weather

In (30c), replacing *Berber lions* by *lions* does not block truth preservation just because the subject NPs are kind-referring, but rather because of the specific properties of characterizing sentences. (30d) shows that we obtain the same effect with singular indefinite NPs that are not kind-referring.

1.1.4. A Cross-Classification of Generic Phenomena

In this section, we will develop some more terminology for the classification of generic phenomena. The aim of this classification is a modest one: we wish to put these phenomena into some systematic framework to serve as a reference system for later use. Since some of the phenomena are independent of each other, we expect cross-classification.[11]

We have already introduced a nominal distinction (i.e., a distinction within the NP system), namely the distinction between *kind-referring* and *object-referring* NPs, and a clausal (sentence-level) distinction, namely the distinction between *characterizing sentences* and *particular sentences*. Both the nominal and the clausal distinction can be further refined.

We start with the nominal distinction. We have seen that indefinite singular NPs cannot be simply considered as kind-referring or 'generic' in and of themselves (in contrast to some earlier analyses). The reason is that they get an apparent 'generic' interpretation only when occurring in a characterizing sentence (if we exclude the taxonomic interpretation). The locus of genericity is not in the indefinite singular NP, but rather in the sentence itself; and therefore this type of genericity is outside the nominal system. But there *is* a distinction within singular NPs that is of interest in the present context: the distinction between NPs referring to a particular entity (e.g., definite NPs and indefinite NPs like *a lion* in *A lion stood in front of my tent*) and NPs which do not refer to a particular entity (e.g., *A lion* in *A lion has a bushy tail*). Let us call NPs which refer to a particular individual *specific* and NPs which do not refer to a specific individual *nonspecific*. Although this might be reminiscent of the formal distinction discussed by, e.g., Baker (1973) and Fodor and Sag (1982), and further explored by Enç (1991), we view it as a pretheoretic notion at this point.[12]

We want to emphasize that the specific/nonspecific distinction is independent of the kind reference/object reference distinction. It is well known that with ordinary object-level predications we can use an indefinite NP to be either specific or nonspecific; similarly with predications to kinds. For when we are "talking about" kinds, we can do so either specifically (*the lion* or *a cat (namely the lion)*) or nonspecifically. In the latter case we use an indefinite NP, of course, but we consider it as designating some element in this kind taxonomy—as for example in *A different cat is displayed in the zoo each month.*

Then the initial four-way cross-classification with the nominal system can be exemplified as follows:

(31) a. *A lion* (as in *A lion has a bushy tail*) is nonspecific and non-kind-referring.
b. *Simba / a lion, namely Simba* (as in *Simba stood in front of my tent*) is specific and non-kind-referring.
c. *A cat* (in the taxonomic reading, as in *A cat shows mutations when domesticated*) is kind-referring but nonspecific.
d. *The lion / A cat, namely the lion* (taxonomic reading) is kind-referring and specific.

The third of our four dimensions concerns the type of sentence itself, rather than the NP used. Thus we obtain the following cross-classification of characterizing and particular sentences with different NP types as subjects:

(32) a. *A lion has a mane.* (characterizing; nonspecific non-kind reference)
c. *Simba ate lunch.* (particular; specific non-kind reference)
d. *Simba roars when he smells food.* (characterizing; specific non-kind reference)
f. *A predatory cat (usually) is protected by law.* (characterizing; nonspecific kind reference)

11. As we shall see, the dimensions are not entirely orthogonal to (or dependent of) one another. We will find certain "gaps" in the classification, which shows some degree of interaction among the dimensions.

12. The actual specific/nonspecific distinction (if there is just one such distinction) is extremely difficult to elucidate in its details. It is for this reason that we wish to remain on a pretheoretic level. Even so, we had better point out that we take, e.g., *a lion* in *A lion must be standing in the bush over there* to be specific rather than nonspecific, even if there is no particular lion that the speaker believes to be in the bush.

"rare species are common"

g. *The lion vanished from Asia.* (particular; specific kind reference)
h. *The lion roars when it smells food.* (characterizing; specific kind reference)

We observe two gaps, both with particular sentences containing nonspecific NPs. Nonspecific NPs (in the sense in which we intend the term here) only occur with characterizing sentences. In addition, if an NP that may be nonspecific occurs with a characterizing predicate, this NP tends to be interpreted as nonspecific. We should conclude from this that nonspecific NPs are tied to characterizing sentences, or put differently, that particular predications do not allow nonspecific NPs as subjects, whether they make nonspecific reference to objects or to kinds. This affinity between characterizing sentences and nonspecificity has often been observed, for example by Dahl (1975), who remarked that the following sentences only have one interpretation each, instead of two:

(33) a. A dog is barking.
b. A dog barks.

Here (33a) is a particular sentence about a particular (specific) dog, and (33b) is a characterizing sentence which is not about a particular (specific) dog but, intuitively speaking, about dogs in general. Thus, although *a dog* may be either specific or nonspecific in and of itself, (33a) cannot be interpreted as a particular sentence about the kind *Canis familiaris* (or the class of dogs) stating that they happen to bark at the moment, and (33b) cannot be interpreted as a characterizing sentence about a particular dog, stating, say, that Rover barks. We will come back to this important correlation in section 1.2 and again in section 1.4.

Our final dimension concerns clausal distinctions. First, we have the well-known distinction between *stative* sentences and *dynamic* sentences (cf. Vendler 1967; Kenny 1963; Mourelatos 1978, who speaks of states and occurrences; Tichy 1980; Chierchia 1982a; and many others). Stative sentences express a *property* of the subject referent; dynamic sentences report an *event* in which the subject referent is involved. Examples are *Simba has a mane* and *Simba roared,* respectively. Of course, there are further subdistinctions among dynamic sentences, such as that between activities and accomplishments, but they will not concern us now. While it appears that all characterizing (generic) sentences are stative, there appear to be particular sentences which are stative as well: *Simba is in the cage* is one such example. Though stative, these are also episodic, because they do not express long-lasting properties and because they pattern with other episodics (cf., the *ser/estar* distinction in Spanish and existential entailments of bare plural subjects; see Kratzer, this volume, for many more examples of particular states found in the 'stage-level' adjectives and Carlson 1977b for further discussion). The most important point to note here is that characterizing sentences are always stative: they express a property and never report a specific event (cf. section 1.2.2).[13] So the stative/episodic distinction only applies to particular sentences and is neutralized for characterizing sentences.

A second clausal distinction, this time for characterizing sentences, is the one between "habitual" sentences and (for lack of a better term) "lexical" characterizing sentences. The verbal predicate of a habitual sentence is morphologically related to an episodic predicate that is commonly used to form episodic sentences, whereas lexical characterizing sentences lack such an episodic counterpart. For example, *John smokes* and *Italians smoke* are habitual characterizing sentences since they contain the episodic verb *smoke,* which also occurs in *John is smoking.* Habitual sentences intuitively generalize over patterns of events as a component of their meaning (e.g., in this case the generalizations is over instances of John or Italians actually engaging in smoking). On the other hand, lexical characterizing verbs do not have such morphologically related episodic predicate, and consequently there is no semantic generalization over events; rather, the generalization would appear to be over characterizing properties of individuals. This class includes many of the verbs that form stative sentences (*know, cost, weigh, love, fear,* the inalienable possession sense of *have,* etc.). For example, *Italians know French* is a characterizing sentence, generalizing about properties of individual Italians but there is no morphologically related episodic sentence and thus no generalization over events. Copular sentences such as *Lions are mammals* or *John is intelligent* likewise lack such episodic counterparts. There is no episodic predicate which is morphologically related to *know French* (this would be an episodic verb which denotes events and which provides evidence that someone knows French), so the sentence *Italians know French* is a lexical characterizing sentence. It will be a task of section 1.2.3 to develop a hypothesis about the distinction (see also Chierchia, this volume).

So among the particular sentences there is a distinction between stative and

13. It does not follow from this that characterizing sentences cannot be in the progressive form—indeed, we gave examples of this earlier. Rather, when the progressive is used in a characterizing sentence, then that progressive is in fact reporting a stative property. As we saw before, this is atypical but not unheard of.

dynamic sentences, and among the characterizing sentences there is a distinction between habitual and lexical characterizing sentences; one question left open here is whether these two distinctions are related. We can now derive a more comprehensive classification of sentence types, which can be illustrated with the following list of examples:

(34) A. HABITUAL SENTENCES
Simba (usually) roars when he smells food. (specific non-kind-referring)
A lion (usually) roars when it smells food. (nonspecific non-kind-referring)
A predatory cat (e.g., the leopard) (usually) is exterminated when it is dangerous to people. (nonspecific kind-referring)
The lion (usually) roars when it smells food. (specific kind-referring)

B. LEXICAL CHARACTERIZING SENTENCES
A lion (usually) weighs more than 200 lbs. (nonspecific non-kind-referring)
The lion weighs more than most animals. (specific kind-referring)
A predatory cat (e.g., the lion) (usually) knows its young. (nonspecific kind-referring)
Simba has a mane. (specific non-kind-referring)

C. EPISODIC DYNAMIC SENTENCES
Simba roared. (non-kind-referring)
The lion disappeared from Asia. (kind-referring)

D. EPISODIC STATIVES
Simba is in this cage. (non-kind-referring)
The lion is in the cage next to the tiger. (kind-referring)

As noted earlier, there are no nonspecific episodic predications, either of ("regular") objects or of kinds, but the rest of the paradigm is filled in. One puzzle in this is that lexical characterizing sentences with non-kind subjects do not seem to have a basis for generalization, unlike those that have kind-referring subjects. Possible counterexamples to this claim are sentences like (35):

(35) John (usually) has pink hair.

But one could argue that here the basically stative predicate *have pink hair* is "coerced" into an episodic meaning, and that only then can the quantificational adverb *usually* be applied in order to produce a habitual. See section 1.2.3 below, and also Chierchia (this volume).

In the next section, we will start by looking at the range of meanings exhibited by characterizing sentences and their linguistic expression.

1.2. CHARACTERIZING VS. PARTICULAR SENTENCES

1.2.1. Basic Properties

We have argued that the type of genericity found in characterizing sentences is tied to sentences rather than to NPs. Two main arguments were used to support this thesis.

The first argument was that characterizing sentences may contain virtually any NP, including indefinite and definite NPs of any type, and proper names (even of "ordinary" objects, which are clearly not kinds). The variety of NPs acceptable in characterizing sentences makes it implausible that this type of genericity is conditioned by the meaning of an NP.

The second argument was that in those few cases where a characterizing sentence is marked formally, the operator is clearly more tightly related to the finite verb (that is, the head of the sentence) than to some argument of the finite verb. In these cases, the marker of characterizing is either some auxiliary (as in the English *used-to* construction, or the corresponding German *pflegt-z* construction), an adverb (such as English *usually*), or an affix of the main verb (as in Swahili and many other languages). There are no clear cases where the marker is part of the NP. (A possible counterexample to this claim are NPs with the adjective *typical*, as in *A typical lion has a mane*. Note, however that this adjective occurs freely not only in characterizing sentences but with nongeneric NPs as well. For example, it occurs in episodic sentences such as *A typical house was built next to ours*, where it does not unequivocally indicate a characterizing property.)[14] The syntactic position of the markers of characterizing sentences, then, shows clearly that this type of genericity is independent of verbal predicates.

Recalling the results of section 1.1, we can summarize our findings concerning characterizing genericity as follows:

1. In characterizing sentences the property described by the verbal predicate is an "essential" property of some entity mentioned in the sentence.
2. The subject (or other NP) of a characterizing sentence may be any type of NP.
3. Characterizing predicates may be *habitual* (i.e., derived from episodic predicates) or *lexical*.

One requirement on a semantic theory of characterizing sentences is that it specify the semantic relationship between instances or objects of a kind and a characterizing sentence about that kind. For example, how is the truth of

14. See also the discussion of 'average property interpretations' in section 1.3.4.

lion has a bushy tail related to particular lions? Or, how is the truth of *John smokes a cigar after dinner* related to actual smoking events? As mentioned earlier, characterizing sentences differ from universally quantified sentences in that they allow for exceptions. This is the real puzzle of characterizing sentences; we do not claim to have solved it, but in the following sections we will present some linguistic facts which a solution must address, and some linguistic clues which may facilitate a solution.

1.2.2. Theories with a Monadic Generic Operator

In the first semantic theories of characterizing sentences, genericity was traced to a verb phrase operator taking as its argument an ordinary verbal predicate and yielding a characterizing predicate. We will, for present purposes, call this a "monadic" analysis, in contrast to the "dyadic" analyses to be presented below. For example, Lawler (1972), Dahl (1975), and Carlson (1977a,b) postulate generalization operators which change a particular predicate to a characterizing one. If **Gn** is such operator, we have formalizations such as the following:[15]

(36)	a.	John is smoking.	**smoke(John)**
	b.	John smokes.	**Gn(smoke)(John)**
(37)	a.	Italians are smoking.	$\exists x$[**italians**(x) & **smoke**(x)][16]
	b.	Italians smoke.	**Gn(smoke)(Italians)**

In (36) and (37), **smoke** is a particular predicate (true of individuals at a time, or—depending on the semantic theory adopted—true of temporal stages of individuals), and **Gn(smoke)** is the derived characterizing predicate. In (37) it is assumed that **italians** is a predicate applying to Italians and that **Italians** refers to the kind, Italians (*Homo sapiens italicus*). Of course, we should have a theory of how the predicate **italians** and the kind **Italians** are related. There are several ways such a theory can be constructed (see section 1.3.2). The most interesting and influential theory was developed by Carlson (1977a,b, 1982).[17] According to Carlson's theory, we must distinguish between three types of basic entities: ordinary *objects* and *kinds* (which jointly form the category of *individuals*) and *stages* (which are temporal slices of an individual—that is, individuals-at-a-certain-time-interval). Carlson postulates a "realization" relation **R** which holds between stages and their associated individuals. For example **R(s,Simba)** expresses that **s** is a stage of the object **Simba** and **R(s,Lion)** expresses that **s** is a stage of the kind **Lion.** Arguably, we should assume that if **R(s,Simba),** and Simba is a lion, then also **R(s,Lion)** every Simba-stage will be a lion-stage.[18] In addition, Carlson also uses **R** for the relation between objects and the kinds they belong to, giving **R(Simba,Lion)**.

Carlson introduced two kinds of verbal predicates: *individual-level* and *stage-level* predicates. Individual-level predicates are predicated of individuals (kinds or objects); they are stative predicates such ask *know French* and *have red hair* (for objects) or *be extinct* (for kinds). Stage-level predicates are non-stative (or episodic) predicates such as *is speaking French* or *are smoking*. They also appear as predicates of individuals; Carlson described such uses as an existential quantification over stages plus the predicate on stages. For example, a sentence such as *John is smoking* can be paraphrased as: There is a stage of John which is engaged in smoking. A sentence such as *John knows French,* on the other hand, cannot be reduced in this way to a proposition concerning a stage of John.

With this understanding of the "types" of the basic predicates (that is, the ontological level of their arguments), we see that the representations (36a) and (37a) were not quite correct—since the predicate *smoke* only applies directly to stages, we must redefine what it is for John to be smoking as some stages of John smoking. By contrast, stative predicates like *know French* already apply directly to objects, so we have the following:

(38)	a.	John knows French.	**know.French(John)**
	b.	John is smoking	$\exists y^s$ [**R**(y^s,**John**) & **smoke**(y^s)]
	c.	Italians are smoking.	$\exists y^s$ [**R**(y^s,**Italians**) **smoke**(y^s)]

If we wished, we could introduce a special operator **Ep** on episodic sentences which maps basic stage-level predicates onto their derived individual-level forms. **Ep** would be defined as $\lambda P \lambda x \exists y^s$[**R**(x,y) & P(y)], where y is a variable over stages and x is a variable over individuals. (38b,c) would then be represented as follows:

(38) b.′ **Ep(smoke)(John)**
(38) c.′ **Ep(smoke)(Italians)**

15. Here and below, tense is not captured in the formalism. We use boldface for semantic representations, except for variables, logical connectives, and operators.

16. Plurality is discussed below. We believe that sentences such as (37a) are true if but one individual satisfies the predicate; however, the use of the plural form conversationally implies that the use of the singular would be less accurate.

17. See section 1.4.6 for a more detailed discussion of Carlson's theory.

18. At least if Lion is a "natural kind" of the sort such that any object which manifests Lion does so throughout its existence. So if Simba ever manifests Lion then Simba does so throughout his existence—and hence any *stage* of Simba does so also. But artifactual kinds such as table not so obviously obey this restriction.

After replacement of **Ep** by its definition, these expressions become (38b,c). (38b) (and 38b′)) states that a stage of the object **John** is engaged in smoking; (38c) (and (38c′)) states that a stage of the kind **Italians** is engaged in smoking. In the latter case, we must assume that the stages y, which consist of the stages of several Italians, also stand in the **R**-relation to the kind **Italians,** and that the predicate **smoke** handles this in an adequate way by distributing the property **smoke** to stages of single Italians (see Hinrichs 1985 for such refinements).

Among individual-level predicates, we can make a further distinction between *object-level* and *kind-level* predicates; and we can view the **Gn**-operator as a function which raises the predicate level by mapping stage-level predicates to object-level predicates and object-level predicates to kind-level predicates. For example:

(39) a. John smokes. **Gn(smoke)(John)**
b. Italians smoke. **Gn(smoke)(Italians)**
c. Italians know French. **Gn(know.French)(Italians)**

The correct formulation of **Gn** is a central and difficult problem (as shown by Carlson 1977b) which we will not attempt to solve here. In any case, the truth of **Gn**(α)(β), where α is a verbal predicate and β a term denoting an individual, must be spelled out in terms of the realizations of β and the predicate α. For example, we could require the following:

TENTATIVE GN-RULE: Whenever **Gn**(α)(β) holds, there are several times t and realizations y of β, **R**(y,β), such that α(y) holds at t.

In (39a), for example, this would mean that there are several times t and stages y^s such that [**R**(y^s,**John**) & **smoke**(y)] holds at t. In the case of (39b), this means that there are times t and stages y^s such that [**R**(y,**Italians**) & **smoke**(y)] holds at t. Sentence (39c) is analyzed as: There are several times t and objects y^o such that [**R**(y,**Italians**) & **know.French**(y)] holds. This formalism allows us to give a second rendering of *Italians smoke* as **Gn(Gn(smoke))(Italians),** which will be true according to our tentative **Gn**-rule if there are several times t and objects y^o such that [**R**(y^o,**Italians**) & **Gn(smoke)**(y^o)], which in turn is true if there are several times t′ and stages x^s such that **R**(x^s,y^o) & **smoke**(x^s). In the first analysis of (39b), the generalization holds because of certain stages of Italians who are engaged in smoking. In this second analysis, the generalization holds because of individual Italians who are smokers.

We conclude this section with some remarks on the individual-level/stage-level distinction (see also Kratzer, this volume). Carlson (1977b), making use of observations by Milsark (1974), noted that stage-level predicates allow for *there*-constructions.

(40) a. There are students smoking in the classroom.
b.* There are students knowing French.

Stump (1985) observed that absolute constructions as in the following examples can be paraphrased by conditional clauses only if they are based on stage-level predicates:

(41) a. Smoking a cigarette, John can enjoy the trip.
= If he smokes a cigarette, John can enjoy the trip.
b. Knowing French, John can enjoy the trip.
≠ If he knows French, John can enjoy the trip.

The stage/individual distinction seems to cut across many established categor distinctions. For example, verbal predicates may be either individual-level c stage-level, as we have seen. Predicative adjectives are also found in bot categories: *available* is a case of a stage-level predicate, and *intelligent* a cas of an individual-level predicate.

(42) a. There are firefighters available.
b. *There are firefighters intelligent.

Locative prepositional phrases in predicative positions can occur in both classe as well; witness the two readings of *Books are on the shelf.* Predicative nom nals were considered to be individual-level by Carlson; however, Weir (198(remarked that they also may be stage-level, as shown by a sentence like *Ra clouds were a welcome sight* in its "particular" reading.

We will return to Carlson's theory and its motivations and consequences section 1.4. In the next subsection, we will present an alternative, "dyadic description of the nature of generic sentences which makes use of the insigh of discourse-based semantics (Heim 1982, Kamp 1981) and, at least in certa respects, improves on the monadic predicate-operator analysis.

1.2.3. Theories with a Dyadic Generic Operator, Plurality Phenomena, and Specificity

Carlson (1989) points out that a treatment of characterizing sentenc based on a monadic predicate operator such as **Gn** leads to several difficultie There are many sentences with more than one characterizing reading, such as

19. The example is from Milsark 1974, the second due to Barbara Partee (reported in Carl 1989), and the third from Schubert & Pelletier 1987.

(43) a. Typhoons arise in this part of the Pacific.
1. Typhoons in general have a common origin in this part of the Pacific.
2. There arise typhoons in this part of the Pacific.
b. A computer computes the daily weather forecast.
1. Computers in general have the task of computing the daily weather forecast.
2. The daily weather forecast is computed by a computer.
c. A cat runs across my lawn every day.
1. Cats in general run across my lawn every day.
2. Every day, a cat runs across my lawn.

In these examples, the 2-readings are the natural interpretations, whereas the 1-readings are less favored and seem pragmatically odd. The examples in (44) below also contrast in terms of which reading is the most salient, exhibiting an ambiguity with the modal *must* that is strongly reminiscent of the ambiguities above:[20]

(44) a. Dogs must be carried. (Sign in front of an escalator)
1. A dog must be carried in order to use the escalator.
2. Any dogs on the escalator are to be carried.
b. Shirts must be worn. (Sign at a restaurant entrance)
1. If you want to enter this restaurant, you must wear a shirt.
2. The only thing you can do with a shirt is to wear it.

The monadic analysis of the **Gn**-operator yields only the nonpreferred, 1-readings of the examples in (43).[21] (43a) would be analyzed as **Gn(arise.in.that.part.of.the.Pacific)(Typhoons)**, for example, which means, according to our tentative **Gn**-rule, that there are times t and stages y^s such that [**R**(y^s, **Typhoons**) & **arise.in.that.part.of.the.Pacific**(y^s)]. This is paraphrased as 'It is in some way typical for typhoons that they arise in that part of the Pacific', which is the 1-reading rather than the desired 2-reading.

The fact that some sentences have these multiple readings suggests that the monadic operator analysis of characterizing sentences is on the wrong track. Carlson (1989) proposes to replace it with what he calls a "relational" analysis, which is based on the assumption that characterizing sentences use a specific relation to relate two semantic constituents to each other, and that the different readings can be obtained by varying which of these constituents is related to the other in that way. For example, the two readings of sentence (43a) can be interpreted in the following informal manner:

20. These examples are from Halliday 1970.
21. And, with work, it could probably generate the preferred meanings of (44).

(45) 1. For typhoons it holds: They arise in this part of the Pacific.
2. For this part of the Pacific it holds: There arise typhoons.

Here the two constituents are separated by a colon. Such cases, in which the are two distinct generic readings of one sentence, can now be said to due to different partitions of the sentence into these two constituents. The observations lead us to conclude that the generic operator should be not m nadic but rather dyadic, relating these two constituents.

Similar dyadic operators have been proposed earlier for characterizing se tences which contain a conditional or a *when*-clause, as in *John smokes wh he comes home*. (See Lewis 1975, Kamp 1981, Kratzer 1981, Heim 19 Farkas & Sugioka 1983, Rooth 1985, ter Meulen 1986a, Schubert & Pellet 1987, 1989, and Declerck 1988). Heim (1982) was the first to propose a the of characterizing sentences with indefinite generic NPs using a dyadic operat

A dyadic operator may be seen as a quantificational adverb—an adverb operator that relates one set of conditions (containing one or more variabl to another set (which may share some variables with the first set). Consi the following example, due to Lewis (1975):

(46) When m and n are positive integers, the power m^n can be computed by su cessive multiplication.
∀(m,n are positive integers; m^n can be computed by successive multiplication)

Here, '∀' is a quantifier expressed in English by *always* which relates two o propositions. They will be called the *restrictor* and the *matrix*, respectively. Lewis's theory, '∀' is a so-called unselective quantifier, as it binds any f variables in its scope (here, *m* and *n*). This same tripartite analysis is a gen form applying to a variety of constructions (Partee 1991).

This representation has the advantage of capturing our observations that genericity of characterizing sentences takes sentential scope, and that it sho be treated as similar to adverbs such as *always, often, seldom,* and the li Adverbs such as *usually, typically,* and *in general* are closest in meanin the generic operator, which often is not realized phonologically.[22]

But if we want to represent characterizing sentences in general, we car simply assume that the adverbial quantifier binds every free variable. example, the 2-reading of (43a) makes no claim about typhoons in gene so the variable for *typhoons* should be bound existentially within the ma (rather than universally with a wide-scope quantifier). We therefore assu

22. See Farkas & Sugioka 1983 and Schubert & Pelletier 1989.

that the quantifier indicates which variables it binds and which variables are to be found existentially within the matrix. (See Heim 1982 for the formulation of a syntactic construction algorithm which accomplishes this, and Schubert & Pelletier 1989 sect. 7 for a series of examples to illustrate the different possibilities of binding.) So, if **Q** is a dyadic adverbial quantifier, the general form of adverbial quantification will be given as follows:

(47) $Q[x_1,\ldots,x_i;y_1,\ldots,y_j]$ (**Restrictor** $[x_1,\ldots,x_i]$; **Matrix** $[\{x_1\},\ldots,\{x_i\}, y_1,\ldots,y_j]$)

Here, $x_1,\ldots,x_i$ are the variables to be bound by **Q**, and $y_1,\ldots,y_j$ are the variables to be bound existentially with scope just in the matrix. The notation $\Phi[\ldots x_m\ldots]$ is a formula where x_m occurs free, and $\Phi[\ldots\{x_m\}\ldots]$ is a formula where x_m possibly occurs free. So (47) is equivalent to (47′):

(47′) $Q[x_1,\ldots,x_i;]$ (**Restrictor** $[x_1,\ldots,x_i]$; $\exists y_1,\ldots,y_j$ **Matrix** $[\{x_1\},\ldots,\{x_i\}, y_1,\ldots,y_j]$)

Although the preceding material is just notation, as yet without any semantic interpretation and without any direct tie to the syntax, it nonetheless gives us a convenient way of representing the various readings of our characterizing sentences. Let **GEN** be the generic quantifier underlying characterizing sentences that lack an overt quantificational adverb. Then example (43a) is represented as follows:

(43) a.′ Typhoons arise in this part of the Pacific.
1. **GEN**[x;y](x **are typhoons;** y **is this part of the Pacific** & x **arise in** y)
2. **GEN**[x;y](x **is this part of the Pacific;** y **are typhoons** & y **arise in** x)
= **GEN**[x;](x **is this part of the Pacific;** ∃y[y **are typhoons** & y **arise in** x])

In this formalization, the different readings of sentences such as those in (43) can be captured by assuming a single dyadic generic operator. This partition of the semantic material into two parts is related to linguistic phenomena. For example, the "universal" vs. "existential" interpretation of bare plurals in German (Diesing 1988, 1992) and in Dutch (de Mey 1982, where the following examples are taken from) depends on their syntactic position.

(48) a. In Duitsland worden hoge posten nod steeds door Nazi's bekleed.
'In Germany, high posts are still being filled by Nazis.'
Gen[x;y,s](x **are high posts & x in Germany;** x **are filled by** y **in** s & y **are Nazis)**

b. In Duitsland worden er nog steeds hoge posten door Nazi's bekleed.
'In Germany, there are still high posts filled by Nazis.'
Gen[s;x,y](s **in Germany;** x **are high posts & x are filled by** y **in** s & y **are Nazis)**

In (48a) the bare plural *hoge posten* has scope over the adverbial *nog steeds* 'still'; in (48b) we have an *er*-construction (similar to a *there*-construction English), and *nog steeds* has scope over *hoge posten*. We conclude therefore that the first sentence is a generalization over high posts in Germany, where the second is a generalization over situations in Germany (see section 1.2 for generalizations over situations). Diesing (1988, 1992) discusses additional syntactic reflexes of the semantic partition, for example the position of modal particles in German and topic marking in Japanese.

The partition of the semantic material into two parts is also related to stress placement, sentence intonation, and word order. These phenomena are discussed by Krifka (this volume) and Rooth (this volume). For example, the two readings of (43a) differ in the placement of the main sentence pitch agent. If we mark the main sentence accent by capitalization and the pertinent pause by a vertical line, we find the following accentuations go with the 1- and 2-interpretations:

(49) a. 1. Typhoons | arise in THIS part of the Pacific.
2. TYPHOONS arise in this part of the Pacific.

If we assume (following much recent work) that sentence accent marks the focused part of an utterance,[23] it then becomes clear that the focused part of an utterance with an operator such as **GEN** is always in the matrix and never the restrictor.

An analysis of such sentences as (43a) raises another issue that interacts with the study of genericity—the role of plurality, especially in bare plural NPs. Chomsky (1975), for example, has raised basic issues concerning generics based on plurality (see below), and de Mey (1982) has developed a concept of "dependent plurals" that interacts with the treatment of generics. A sentence like (43a) requires an interpretation for plural noun phrases and predicating things of plural noun phrases. Let us assume, for the sake of convenience here, that plural nouns, in general, represent *sum individuals*, that is, individuals which consist of other individuals. Link (1983) and others have developed formal models which structure individual domains so that

23. The exact placement of the accent is a matter of syntactic and morphological rules is of no concern for us now.

sum operation on individuals '⊕', and a concomitant 'part-of' relation '≤', can be defined (x≤y iff x⊕y=x). For example, if x is a typhoon and y is a typhoon, then x and y together. i.e., the sum individual (written x⊕y) will be in the extension of the property 'typhoons' (along with other typhoons), with each typhoon as a part. This structure has an influence on predication as well, since we will have to distinguish between different modes of predication—such as distributive and cumulative predication—once we allow sum individuals into the domain. This shows up clearly in sentences such as the following:

(50) a. The losers got a lemon.
b. The losers got lemons.

Assume that *the losers* applies to a sum individual j⊕m which consists of two elementary, or atomic, individuals, j and m. Let us use the relation '$\leq_a$' for 'be an atomic part of'; for example, j is an atomic part of j⊕m, so it is true that j $\leq_a$ j⊕m. We can now express the two interpretations of (50a): The cumulative interpretation, as shown below in (50a'.1), says that there is a lemon such that j⊕m got it. In the distributive interpretation, the predicate *got a lemon* must be distributed over the atomic individuals. Following Link (1983), we define a distributivity operator **DST** which does this:

$$\mathbf{DST}(\delta)(\alpha) \leftrightarrow \forall z[z \leq_a \alpha \rightarrow \delta(z)]$$

The distributive reading is shown in (50a'.2):

(50) a.' 1. ∃x[x **is a lemon** & j⊕m **got** x]
2. **DST**(δy∃x[x **is a lemon** & y **got** x])(j⊕m)
= ∃x[x **is a lemon** & j **got** x] & ∃x[x **is a lemon** & m **got** x]

Example (50b) also has both a cumulative and distributive interpretation, but we are only interested here in the cumulative interpretation, in which the two losers j and m each got one lemon. We can describe this interpretation as in (50b'):

(50) b.' ∃x[x **are lemons** & j⊕m **got** x]

We can describe (50b) in this manner by the rule of summativity (see Krifka 1989, 1992b), which states that, in the example at hand, if 'u got y' and 'v got z' are true, then 'u⊕v got y⊕z' is also true. We furthermore need to assume that the semantics for count nouns allows us to conclude from 'y is a lemon' and 'z is a lemon' that 'y⊕z are lemons'. It then follows from 'j got y', 'y is a lemon', 'm got z', and 'z is a lemon' that ∃x[x are lemons & j⊕r got x].

To return to the interaction of generics and the treatment of plurals, conside the examples in (51). Chomsky (1975) proposed to explain the plural *horns* i (51a) as a syntactic phenomenon:

(51) a. Unicorns have horns.
GEN[x;y](x **are unicorns;** y **are horns** & x **has** y)
b. Unicorns have a horn.
GEN[x;](x **are unicorns;** **DST**(λx∃y[y **is a horn** & x **has** y])(x))
= **GEN**[x;](x **are unicorns;** ∀z[z$\leq_a$x → ∃y[y **is a horn** & z **has** y]])

An alternative, and quite possibly better, explanation for the data would b semantic in nature. The most natural interpretation of (51a) is a cumulativ interpretation of the matrix: If x *are* unicorns, then for every atomic part z x (i.e., for every unicorn), there is a horn y which z has, and therefore the are horns w such that the unicorns x have w. (Note that the sentence wou also be true if the atomic entities had more than one of the objects in questio as in the natural interpretation of *Cows have horns*.)[24] To get the most natur interpretation of (51b), namely, that each unicorn has one horn, we mu assume that the matrix contains the distributivity operator, and that the existe tial quantifier is in the scope of that operator. The issue that is being allud to here is one of *dependency*—a unicorn has a horn, and therefore unicor have horns; but no individual unicorn has the kind, Horn. The intricaci involved with the important notion of dependency are investigated by Li (this volume).

This focus on singular and plural indefinites emphasizes their propensity f being bound by other operators, resulting in a nonspecific reading. Howeve we wish to remind the reader that indefinite NPs can also be interpreted referring to specific entities. This behavior of indefinites is explained in t theories of Kamp (1981) and Heim (1982) on the assumption that indefin NPs (including many instances of bare plurals) are, in general, predicat which introduce variables that are bound by other operators. They can bound either by some local operator (as in the cases discussed so far), or the quantifier *every* (as in (52a) below), or, especially, by existential closu (where an existential operator ranges over the whole text). If they are bou by existential closure, they refer to a specific entity, as in example (52

24. The same property is expressed by the predicate whether one or more horns are intend *Cows have horns and unicorns do too* is true, and so is *Both cows and unicorns have horns.*

where ∃ is a text-level unselective existential operator that binds the free variable x.

(52) a. Every man who has a cat likes to pet it.
∀[x,y;](x **is a man** & y **is a cat** & x **has** y; x **likes to pet** y)
b. A cat came in. It meowed.
∃ [x **is a cat** & x **came in** & x **meowed**]

The availability of these two ways of interpreting indefinite NPs—allowing indefinite NPs to be interpreted either in the context of a local operator (e.g., a quantificational adverb or a generic operator) or outside of it (by existential closure)—can perhaps be used to explain why a sentence like *A dog is barking* has only a specific interpretation of *a dog*. This suggests that we might reinterpret the specific reading of indefinite NPs as follows: An NP is interpreted specifically if its variable is bound by existential closure; it is nonspecific if its variable is bound by a local operator. The other gap mentioned earlier, where *A dog barks* has only the nonspecific interpretation of *a dog*, remains something of a mystery, though. Although we know that *A dog barks* is a characterizing sentence, and therefore by our theory must have a local quantifier that binds the variable of the NP *a dog*, making it nonspecific, still, at this stage we cannot explain why this variable *must* be bound by that operator and cannot simply be left for later binding by existential closure. We will discuss this problem further in section 1.4.6.

1.2.4. Generalizations over Situations and over Objects

In sentences like *A dog barks* or *Lions have manes*, the generic quantifier **GEN**, under the dyadic analysis described here, quantifies over individuals (dogs, lions, etc.). But there are characterizing sentences in which the generic quantifier quantifies not over individuals, but over what might be called situations or occasions or cases, a notion introduced by Lawler (1972) and further refined by Schubert and Pelletier (1989).[25] Consider, for example, (53a):

(53) a. Mary smokes when she comes home.
b. **GEN**[s,x;](x = **Mary** & x **comes home** in s; x **smokes** in s)

This says that, in general, if there is a situation of Mary coming home, she will smoke in that situation. Letting s be a variable for situations, we represent this interpretation as in (53b). (One might note that reference to situations here plays a role similar to reference to stages in Carlson's original theory.) Where does the situation argument s come from? Kratzer (chapter 2, this volume) argues that episodic verbs have, in addition to their usual syntactic argument, an argument for the location where the event described by the verb occurs. This argument can be bound by quantificational adverbs.

Although it is natural to assume generalizations over situations in condition characterizing sentences such as (53), simple sentences such as (54) are more difficult, since it is unclear what should count as the restrictor in these cases.

(54) Mary smokes.

One way to handle these examples is to assume that even in these cases there *is* a restrictor, but that this restrictor must be derived pragmatically. Spears (1974), Newton (1979), Conrad (1982), Kleiber (1985), Krifka (1987), and Schubert and Pelletier (1989) have all made suggestions along these lines. For the example at hand, the restrictor could be situations which contain Mary and which are somehow "normal" situations with respect to smoking. With this idea in mind, we would get the following semantic interpretation:

(54′) **GEN**[s,x;](x = **Mary** & s **is a normal situation with respect to smoking** & s **contains** x; x **smokes** in s)

However, this interpretation forces us to make reference to "normalcy conditions," in addition to relying on unspecified pragmatic factors, both in the interpretation of the operator **GEN** and in the interpretation of the antecedent. That is, our analysis says: 'In a normal smoking situation, Mary normally smokes.' We thereby have two separate places that appeal to "normalcy." As an alternative, we could consider interpreting **GEN** in such a way that, in and of itself, it takes into account only those situations that are relevant for the generalization at hand, which in our case are only those situations that are normal for Mary's smoking. This interpretation is further investigated in section 1.2.5.

We now turn to an issue raised at the end of section 1.1, namely the source of the peculiarity for an example like (55a), as opposed to (55b–e):

(55) a. ??Minette is infertile when she is tricolored.
b. A cat is infertile when it is tricolored.
c. The cat is infertile when it is tricolored.
d. Minette is hungry when she meows.
e. A cat is hungry when it meows.

That is, why do characterizing sentences with a specific subject, as in (55a), need a habitual predicate—in contrast with other characterizing sentences which have a nonspecific subject? Intuitively, the source of the difficulty c

25. Other authors who make similar assumptions for the treatment of genericity and quantificational adverbs are Lawler (1973a), Spears (1974), Newton (1979), Stump (1981, 1985), Conrad (1982), Partee (1984), Kleiber (1985), Krifka (1987), and Schubert and Pelletier (1987).

from the implication on the part of (55a) that a given cat, Minette, must undergo a fundamental change in her fur color from time to time, being tricolored sometimes, but not at others. Let us try to be a bit more precise.

The first question is: What is a habitual sentence? In section 1.1.4 above, we defined habitual sentences as characterizing sentences whose predicates are derived from an episodic verbal predicate. This can now be refined by saying that habitual sentences express generalizations over situations that are specified by the corresponding episodic verbal predicate. That is, habitual sentences can be defined as follows:

(56) A sentence is *habitual* if and only if its semantic representation is of the form
GEN[...s...;...](**Restrictor**[...s...]; **Matrix**[...s...])
where s is a situation variable.

Let us take a closer look at the notion of generalization over entities of a certain type, e.g., over objects or over situations. Roughly, a generalization expresses that if an entity satisfies certain conditions (or has certain properties) A, then it also satisfies certain conditions (or has certain other properties) B to a certain degree; the degree is specified by the quantifier. For example, (53) expresses the fact that if s is a situation of Mary coming home, then usually, s is also a situation of Mary smoking. In our formal representation it is therefore essential that a variable of the type generalized over occurs free in the restrictor and in the matrix, and is bound by the quantificational operator. Furthermore, the variable must not be *explicitly* tied to *exactly* one entity by the restrictor, as such a case would not result in a "generalization."[26] Our formal account is shown in (57):

(57) An expression **Q**[...x...;...](**Restrictor**[...x...]; **Matrix**[...{x}...]) is a *generalization over x* iff it allows for models in which there is more than one value for x for which ∃[**Restrictor**[...x...]] is true (where ∃ binds all free variables except x).

Characterizing sentences must have at least one variable to generalize over. That is, there must be at least one variable which is not explicitly tied to some particular object. If this were not the case, they would merely state that a certain particular object (as described by the restrictor) has a certain property (as described by the matrix), and they could no longer express a "generic" fact. Note that (57) does allow for the possibility that x has only one value with respect to certain models; this is because an indefinite NP might happen to be applicable to only one entity in a certain model (see footnote 26).

With these preliminaries out of the way, we are finally able to discuss the cause of the gap noted in (55a). Consider the semantic representations of the non-kind-referring sentences in (58):

(58) a. ??Minette is infertile when she is tricolored.
i) (??)**GEN** [x;] (x = **Minette** & x **is tricolored; x is infertile**)
ii) **GEN** [x, s;] (x = **Minette** & x **is tricolored** in s; x **is infertile** in s)
b. A cat is infertile when it is tricolored.
GEN[x;](x **is a cat** & x **is tricolored; x is infertile**)
c. A cat is hungry when it meows.
GEN[x,s;](x **is a cat** & x **meows** in s; x **is hungry** in s)
d. Minette is hungry when she meows.
GEN[x,s;](x = **Minette** & x **meows** in s; x **is hungry** in s)

The representations of (58b–d) are generalizations in our sense, because there are variables bound by the **GEN**-operator that are not explicitly tied to one particular object in the restrictor. In (58b), x can have any cat as a value. In (58d), x is bound to one entity, namely Minette, but s still can vary over all situations in which Minette is meowing. In (58c), we have generalizations over x as well as over s. Conversely, in (58a.i), the most plausible representation of (58a), the only variable is tied to a specific individual, Minette. The representation is therefore not a generalization in our sense, and (58a) is therefore not a proper characterizing sentence. A similar point is made by Kratzer (chapter 2, this volume), who argues that a stative predicate does not supply a situation variable. De Swart (1991) showed that even if we have a situation variable, we get an unacceptable sentence if the variable is tied to a particular event and there is no other variable to quantify over, as in *(??)Usually, when Minette dies, Mary is unhappy*. There is, however, a possible interpretation of (58a), namely one in which the basic predicates *be tricolored* and *be infertile* are given an episodic reading, that is, are represented with a situation variable as in (58a.ii). Although these predicates are not normally interpreted as episodic—as having an open situation variable—they can be coerced into that interpretation in certain syntactic contexts.[27] Here that means that Minette

26. The notion of *explicitness* in this condition is important. As Quine (1960) remarked long ago, *is a natural satellite of the Earth* is a general term despite its being true of exactly one entity. Here we only wish to rule out *explicit* claims of being true of exactly one entity (claims like *x is identical to Mary*), not claims that are "accidentally" true of exactly one entity (like *x is a natural satellite of the Earth*).

27. Schubert and Pelletier (1989) note that such coercion often happens in *when*-clauses. For example, *People are overweight* has a non-episodic meaning, although in the context of a *when* clause it becomes episodic—*When people are overweight, they often exercise*.

changes back and forth between being tricolored and not, and between being fertile and not. This coercion is of the same type as, for example, the coercion of a count noun into a mass noun in, say, *ten kilograms of book* or *too much car*, as discussed in Pelletier & Schubert 1989. Coercions such as these typically lead to an expression which is grammatically unusual but can be saved by some special interpretation.[28]

If we analyze *when*-clauses as restrictors of quantificational structures which may bind any open variable, we get a simple explanation for the intuitive distinction between the so-called temporal and atemporal *when*-clauses. The *when*-clauses in examples (58c,d) are temporal because they quantify over a situation variable; the *when*-clause in (58b) is atemporal because it does not quantify over a situation variable. In the meaningful reading of (58a), viz., (58a.ii), the *when*-clause is temporal because of the situation variable—but it is difficult to make predicates such as *be tricolored* be understood temporally, as this reading requires.

A kind of *when*-clause construction that we have not yet considered is illustrated by (59):

(59) When the party was over, John did the dishes.

What is the relationship between the *when*-clauses we have considered so far (restrictive *when*-clauses and the *when*-clause shown in (59)? To give the correct account of (59), we will assume that such sentences do not contain an adverbial quantifier which could bind the free variables in the *when*-clause. Instead, the *when*-clause specifies a situation in which the main clause holds, and the free variables left in the sentence must then be interpreted by existential closure (i.e., by the "unselective" existential closure quantifier, ∃):

(59′) ∃s(**the party is over in** s & **John does the dishes in** s)

An interesting question is to which extent the restrictor must be specified overtly. In some cases, this may be left pretty much to the context, as in *Mary smokes* (see Roberts 1989). Another example of context dependence is (60):

(60) [Don't worry if I'm not here at 8. You know—] planes arrive late.
GEN[s;x](s **is a situation;** x **are planes in** s & x **arrive late in** s)

28. Moens and Steedman (1988) define and discuss coercion of a sentence or verb phrase from one aspectual class to another. Such coercions are common and generally perfectly acceptable, but those which are unusual can often be saved by some special interpretation, as stated in the text. Pelletier (1991) argues that the mass/count examples are so common and acceptable that they should not be called coercions at all.

The most probable reading of *Planes arrive late* is not that it is typically true for planes that they arrive late. Instead, it says that for a specific type of situation, there are planes which arrive late. Note that the type of situation (e.g., situations at an airport) is not specified overtly here. Our preference is that this is how the semantics given for the **GEN**-operator should handle cases like this one—with underspecified restrictors.

Are there any further semantic conditions for the restrictor? Declerck (1988) discusses contrasts such as (61a,b) to show that the restrictive clause must be "unbounded," which is to say (in this case) that the restrictive indefinite NP must not be numerically specified:

(61) a. Cats are beautiful when they have white fur.
b. ?Twelve cats are beautiful when they have white fur.

Our theory gives the following interpretations for (61) (note that the subject NP forms part of the restrictor; that is, the *they* of the *when*-clause has been interpreted as referring to the subject NP):[29]

(61) a.′ **GEN**[x;](x **is a cat** & x **has white fur;** x **is beautiful**)
b.′ **GEN**[x;](x **are twelve cats** & x **have white fur;** x **are beautiful**)

In (61b′), we assume that x ranges over sum individuals which consist of part (in this case, of twelve individual cats). Contrary to Declerck's analysis, w find this interpretation to be semantically correct, and only pragmatically dev ant. The problem, we claim, is that the predicates *have white fur* and *ar beautiful* must be interpreted as distributive. A condition such as *x have whi fur* is true just in case every atomic part y of x is such that *y has white fur* true (as our analysis of distributivity and plurality puts it, following Lir 1983). But then it would be mysterious why the speaker has chosen the pred cate *twelve cats* in the restrictor when he could have made the point wi *ninety-nine cats* as easily, or simply with *a cat*. Note that examples wi number-specified NPs in the restrictor become acceptable with nondistributi predicates. In these cases, the number specification is essential:

(62) a. Two canaries can be kept in the same cage if it is large enough.
b. Two magnets either attract or repel each other.
c. Two's company; three's a crowd.

Declerck (1988) developed the notion of "unboundedness" as a general pro erty of restrictive *when*-clauses and generic sentences. This concept was

29. See Schubert & Pelletier 1989 for a discussion of the difficulties encountered in carry out this sort of interpretation in a uniform and compositional manner.

tended to refer not only to numerical restrictions, but also to the temporal anchoring of sentences. We cannot follow him closely in this latter point either, since generic sentences may in fact be temporally located by adverbs, as in the sentence *In 1989, Mary played tennis*. Declerck (1986, 1988) also used "unboundedness" to explain the fact that restrictive *when*-clauses do not refer to a specific situation or group of objects; and he argued that this, rather than the presence of a generic operator, is the essence of restrictive *when*-clauses. We agree with his observation concerning the "unspecified" nature of *when*-clauses, but we claim that it is the presence of a generic operator (or of explicit quantificational adverbs) which *causes* the *when*-clause to be "unspecific."

In concluding this subsection, we want to point out that we did not postulate stages in developing the semantics of habituals (see section 1.2.1 and cf. Carlson 1977b, 1982). In a sense, reference to situations here plays a role very similar to reference to stages in Carlson's original theory. While there are theories that employ both concepts, e.g., Hinrichs 1985, most theories make use of just one such construct.

1.2.5. Habitual and Lexical Stative Predicates; The Treatment of Object NPs.

The theory of characterizing sentences developed above sheds some light on why habitual predicates are stative, and also on the relationship between episodic and stative predicates in general. Episodic sentences are those whose main predicate has a situation argument bound by existential closure; they report on a specific event or occasion. Sentences that lack such a situation argument are generally stative, the other aspectual classes being confined to the category of episodics. There are two cases of stativity: either the verbal predicate is inherently independent of situations, as is the case with lexical statives such as *be infertile* and *know French*, or else the situation variable is bound by some operator other than existential closure, such as *usually*. In either case, the statements do not report on specific situations; and it seems natural to see this independence from specific situations as the core of stativity (though the existence of episodic statives such as progressives and such predicates as *be available* may demand a reformulation of the roots of stativity). It then follows that habitual sentences, which generalize over situations, are stative.[30]

30. See Newton 1979 for a similar explanation as to why the predicates in habitual sentences have imperfective aspect in Modern Greek.

Rather than taking lexical items as unitary, atomic items, one might take a "lexical decomposition" attitude and analyze certain lexical statives as involving generalizations over situations. For example, consider the minimal pair *speak French* and *know French*. The first item, *speak French*, has an episodic reading which refers to situations and a characterizing reading which expresses a generalization over situations (*John is speaking French* and *John speaks French*, respectively). The former type of situations—where John is speaking French—can be considered evidence for the truth of the characterizing reading. Although the second item, *know French*, lacks the episodic meaning, there nonetheless are situations which count as evidence for knowing French and (in some abstract sense) *could* have been described by *knowing French*, were English just slightly different. (We are thinking of such activities as speaking French, or listening to French and reacting in an appropriate way.) But it so happens that there is no corresponding episodic predicate in the lexicon that characterizes all the situations which count as direct evidence of the "knowing French" behavior.[31] So, one difference between verbs which are lexically stative and verbs which have a stative (habitual)/non-stative (episodic) alternation is merely that the former have no episodic counterpart in the language. Ryle (1949, chap. 5) observed such lexical gaps with certain dispositional predicates, and explained them by saying that because there are so many different ways to show a given behavior (so many different ways to show "knowing French behavior," for instance), there can be no single episodic verb to denote them all. The situation can be pictured like this:

(63)

	Habituals	Lexical Statives
Characterizing Predicates	*speak French*	*know French*
Episodic Predicates	*be speaking French*	—

The similarity between the habitual *speak French* and the lexical stative *know French* will perhaps become clearer in the following analyses. The difference is that the semantic relation **speak French in** (a situation) is denoted by a predicate in the language, namely the episodic *speak French*, whereas there is no lexical item denoting the semantic relation **show knowledge of French**

31. Of course, we can coerce *knows French* into a habitual—perhaps that state of mind brought about by those special French-language-learning pills John eats after dinner sometimes. But this is to assimilate the case to that of *speaks French*.

in (a situation)—despite the fact that the states of affairs which are relevant to the two can quite easily be semantically described:

(64) a. speak French: **λxGEN[x,s;](x in s; x speaks French in s)**
b. know French: **λxGEN[x,s;](x in s; x shows knowledge of French in s)**

We will refer to stative predicates which express a generalization over situations as *dispositional;* this term applies to both habituals and lexical statives. However, habituals and dispositional lexical statives do differ in one respect: whereas the language provides a morphologically related form to denote the type of situation involved in a habitual, such a form is lacking with respect to dispositional lexical statives.

Another case of a dispositional lexical stative predicate is *like John*. If this is attributed to a person, we'd expect that this person typically shows "liking John behavior," for which English, again, lacks an episodic predicate. Dispositional lexical statives need not be based on verbs; examples based on copular sentences are *be intelligent* and *be a friend of John*. The dispositional nonverbal predicates most naturally occur with the 'active *be*' of English (Partee 1977), to form sentences like *John is being intelligent* or *Mary is being a hero*.

Not all lexical stative predicates are dispositional, however. Take as an example *be married*. In order to count as being married, one need not show any particular regular behavior. It suffices that one event, a wedding, has occurred, and that other specified events, such as a divorce or a death, have not yet occurred. This is an essential difference between nondispositionals such as *be married* and dispositionals such as *be in love*. Other nondispositional statives are *own* (related to an event of buying), *be thirty years old* (related to an event of birth), and *be a student* (related to an event of registration). Some statives are not related to an event at all, such as *be male*. (Even if the correct applicability of such a predicate depends upon certain situations (in this case, the conception event), it is implausible to assume that the details of this play any role in the semantics of natural language!)

The general property of all or at least most stative predicates, be they dispositional or not, is that they lack reference to a specific situation. A stative predicate either expresses a generalization over situations (as with habituals and dispositional lexical statives) or is tied only indirectly to situations (as with nondispositional statives, and perhaps with episodic statives as well). We should remark here that the stative/episodic distinction may not be very strict for a given lexical item; recall the coercion phenomena discussed in connection with example (58b). Also, Campbell (1989) pointed out that there are verbs that show a systematic variation between an episodic and a stative interpretation, such as *upset, amuse, satisfy, show*. With an agentive subject, he claimed, they are basically episodic, as in *John is upsetting me*, and can be habitual, as in *John upsets me;* but with a causative subject, they are, he claimed, lexically stative and not easily interpreted as episodic, as in *John's behavior upsets me*. (See Chierchia, this volume, for further remarks on this general topic.)

Let us now consider the origin of the **GEN**-operator in dispositional predicates. There are two possibilities: either the **GEN**-operator is introduced at some point in the syntactic derivation or we have a **GEN**-operator provided in the lexicon. It seems to us that we should assume the first option for habitual predicates and the second option for lexical dispositional predicates. Consider examples such as the following:

(65) a. John speaks French after dinner.
b. ??John knows French after dinner.

In (65a), the prepositional phrase *after dinner* clearly can restrict the **GEN**-quantifier; hence its structure must be transparent for the syntax, which would be a natural consequence if we assume that *after dinner* is introduced in the syntactic derivation. In (65b), however, *after dinner* cannot restrict the proposed generic quantifier, yielding something like (65b′):

(65) b.′ ??**GEN[s;](s is after-dinner and john in s; john shows knowing-French behavior in s)**

Hence, if we assume a quantificational analysis of *knowing French* at all, we must guarantee that it is syntactically opaque.

Let us have a look at the number feature of NPs in habitual sentences, a topic that follows up on the discussion of number marking in nonhabitual characterizing sentences in section 1.2.3. Consider the following examples:

(66) a. Mary smokes cigarettes / *a cigarette.
b. John sells vacuum cleaners / *a vacuum cleaner.

The situations which justify these habitual sentences are situations in which Mary smokes a cigarette or John sells a vacuum cleaner. Under the syntactic derivation analysis, the **GEN**-operator would be applied to the representation of an episodic predicate such as *smoke a cigarette*. But this will result in *Mary smokes a cigarette*, and we would be at a loss to explain why the object NPs in (66) are plural. So why do we have plural NPs?

One explanation of this phenomenon was put forward by Declerck (198

1991) and Laca (1990), namely that the absence of a number restriction is a precondition for the generic, "unbounded" interpretation in the first place. We have seen that this explanation does not work with subject NPs (see the discussion of example (62)); it does not work with object NPs either, as shown by the following examples, which clearly are characterizing sentences:

(67) a. Mary smokes (a cigarette)/(cigarettes) after dinner.
b. Mary smokes a pipe.

The two versions of (67a) have different truth conditions, claiming (respectively) that in after-dinner situations, Mary typically smokes one cigarette, or an unspecified number of cigarettes. One way to capture the difference between (66) and (67a) would be to assume that we have a quantification over simple situations with explicit restrictions in (67a), but over "sum situations" with implicit restrictions in (66). That is, we would propose the following:

(68) a. **GEN**[s;](Mary **in** s; ∃x(**cigarettes**(x) & Mary **smokes** x **in** s))
b. **GEN**[s;](Mary **in** s & **after-dinner**(s); ∃x**cigarette**(x) & Mary **smokes** x **in** s))

In (68a) the situation s is unrestricted as to its "size"—in particular, it may be a sum situation, $s = s_1 \oplus s_2 \oplus \ldots \oplus s_n$, where all the situations s_i contain Mary, and Mary smokes different cigarettes $x_1, x_2, \ldots, x_n$ in each situation. But then the object x that is smoked in the sum situation is a sum individual $x_1 \oplus x_2 \oplus \ldots \oplus x_n$, which is in the extension of the plural predicate **cigarettes**. In this way, the assumption that implicit restrictors leave open the "size" of the situations that are quantified over predicts that we will use plural predicates. However, this would hold only if we can also assume that each simple situation is related to a different object, as here with different cigarettes for different smoking situations. If, on the other hand, every simple situation could be related to one and the same simple object, we would expect a singular NP. This explains, for example, why we have the singular *a pipe* in (67b).

In (68b), the situation s is explicitly restricted to after-dinner situations. If we assume that this explicit restriction implies a restriction to simple situations, then we should expect the singular predicate *cigarette* when it is being expressed that Mary smokes one cigarette in after-dinner situations. And we should expect the plural predicate *cigarettes* when the number is being left unspecified.

There is another use of plural objects, as in *Mary hates cigars*. In cases like these, the object NP has to be interpreted as kind-referring. We will discuss such interpretations in section 1.3.2.

To close this subsection on the semantics of dispositional predicates, it is interesting to look at a problem concerning the semantics of the genericity operator. We have provisionally assumed that it is much like some sort of universal quantifier; this will be discussed in greater detail in section 1.2.6. However, Lawler (1973a) and Dahl (1975) have pointed out that there might be two different generic interpretations, one "universal" and the other "existential." In its universal generic reading (a habitual reading), sentence (69) means that beer is the (favorite) alcoholic beverage John drinks. In its existential reading (a dispositional reading), it says that John does not object to drinking beer.

(69) John drinks beer.

Lawler employed two different generic operators to represent these two readings. But although we believe that these two readings exist, and that the precise interpretation of the generic operator is dependent on the context of utterance, we nonetheless think that a proposal to have two different, unrealized generic operators would considerably weaken any predictions of a theory of characterizing sentences. Furthermore, Lawler's "two-hidden-operators" proposal is problematic in another direction. According to Lawler's theory, the overt presence of a quantificational adverb requires that there is no unrealized operator. Thus in the sentences in (70), there can be no hidden operators. Yet these sentences have more than one reading, even though they contain an overt quantificational adverb. Therefore, it cannot be simply two phonologically unrealized operators with different meanings which give these sentences their two different meanings.

(70) a. John always drinks beer.
b. John usually drinks beer.
c. John sometimes drinks beer.
d. John seldom drinks beer.

Example (70a) has (at least) two interpretations: it can mean either (i) that whenever John drinks something, it is beer, or (ii) that he drinks beer on every occasion on which it is available. The other examples behave similarly. These two interpretations are similar to the two interpretations of the original example, (69), which did not have any overt operator; indeed, especially (70b) can be considered a near-synonym of (69) in both its interpretations. Thus, whatever is causing the ambiguity in (69) also occurs in (70)—but then it cannot be hidden operators. Furthermore, note that (69) has yet another reading over and above the "existential" and "universal" readings. It can also mean that

John has the habit of drinking beer, not excluding the possibility that he has the habit of drinking other beverages as well. After all, one can habitually drink beer *and* habitually drink wine.

In our relational analysis, which we prefer, we can stay with one meaning of the generic operator, the universal one, and account for the different readings of the examples above by postulating different partitions of the underlying semantic material. Since two of the readings are indicated by different accent placements, it is plausible to suppose that in these cases we are dealing with distinct syntactic objects. The three readings of (69) are given in (71) below.

(71) a. John drinks BEER.
GEN[x,y,s;](x = **John** & x **drinks** y **in** s; y **is beer**)
b. John DRINKS beer.
GEN[x,y,s;](x = **John** & y **is beer** & y **in** s & x **in** s; x **drinks** y **in** s)
c. John drinks BEER.
GEN[x,s;y](x = **John** & x **in** s; y **is beer** & x **drinks** y **in** s)

The "universal" interpretation in (71a) can be rendered as: In appropriate situations in which John drinks something, this is normally beer. The "existential" interpretation in (71b) says that in appropriate situations where there is some beer available, John normally drinks it. The "habitual" interpretation in (71c) says that in appropriate situations which contain John, he will drink beer. In the latter interpretation, the accent is on *beer* by the usual rules of focus projection because the entire predicate, *drink beer,* is in focus and hence is interpreted as part of the matrix. Arnauld (1662) was already aware of the fact that the restrictor can contain semantic material from different parts of the sentence. He claimed that in *All men are just through the grace of Jesus Christ,* the term *just* is understood as belonging to the subject, and hence that the sentence does not say that all men are just, but that all men who are just are so through the grace of Jesus Christ. (For further reflections on these phenomena, see Krifka, this volume, and Rooth, this volume, on the topic of focus.)

The influence of focus on the interpretation of generic sentences has been discussed by Newton (1979); Rooth (1985) developed a theory to treat the focus sensitivity of explicit adverbial quantifiers (like *always*). Schubert & Pelletier (1987) discussed the ways stress might influence the selection of what they called "cases"—essentially, the restrictor of our current framework. Laca (1990) examined cases with verb focus, such as (71b), and also cases with predicative constructions, such as *John eats salmon raw,* which naturally are interpreted with the predicate (here, *raw*) in the matrix and the object NP (here, *salmon*) in the restrictor (see also Léard 1984). The data discussed by Laca also suggest that sentences whose verbs show a particularly close verb-object relation (such as *smokes cigarettes* and *worships idols*) typically have both the verbal predicate and the object NP in the matrix.

Furthermore, Laca's (1990) discussion of Spanish data suggests that NPs in the restrictor tend to be marked with a definite article:

(72) a. Los guamba-mamba comen salmón.
'The Guamba-mamba eat salmon.'
b. Los-guamba-mamba comen el salmón crudo,
'The Guamba-mamba eat salmon raw.'

(73) a. Los arquitectos construyen casas.
'Architects build houses.'
b. Los arquitectos construyen las casas y los decoradores de interiores las arruinan.
'Architects BUILD houses, and interior decorators RUIN them.'

This analysis implies that the definite article in Spanish may be used with semantically indefinite NPs; it would indicate the position of the NP in the partition of the sentence, namely that it occurs in the restrictor. As the restrictor can be related to the thematic part of a sentence, the definite article should be analyzed as a theme marker. (See section 1.3.7 for similar cases in French, and Newton 1979 for similar observations in Modern Greek.)

1.2.6. The Semantics of the Generic Operator

In section 1.2.3 above we began with a monadic interpretation of the generic operator in characterizing sentences and supplanted it with an analysis where this operator is dyadic. Here, we will examine ways in which the semantics of such operator might be specified, casting it in terms of the dyadic analysis.

A first approximation to the semantics of the **GEN**-operator might be to analyze it as a universal quantifier. For example, consider (74):

(74) A cat has a tail.
GEN[x;y](x **is a cat;** y **is a tail** & **has** y)

This sentence is given the semantics of *Every cat has a tail:*

$\forall x[x \textbf{ is a cat} \rightarrow \exists y[y \textbf{ is a tail } \& \textbf{ has } y]]$

However, it has often been observed that the analysis is both too strong and too weak (vide Ziff 1972, Lawler 1972, 1973a,b, Putnam 1975, Dahl 1975

Lyons 1977, Carlson 1977b, Schubert & Pelletier 1987). We have already mentioned that an analysis of **GEN** as a universally quantified sentence might be too strong, since a characterizing sentence often allows for exceptions while a universal quantifier does not. For example, (74) can be true even if there are some cats which have lost their tail or were born without one. The type of quantification that we find in such sentences has already been identified by Arnauld (1662, part 2 chap. 13), who noted that we cannot conclude from *Cretans are liars* that every particular Cretan is a liar. Arnauld called such sentences "morally universal" and distinguished them from "metaphysically universal" sentences, which hold without exception. This suggests that we require a weaker quantifier, such as *most* for characterizing sentences. However, Carlson (1977b) has shown that this move is futile, in part because we can find generic sentences which are considered to be true but which nevertheless cannot be satisfactorily described by any ordinary quantifier. For example, the following sentences are certainly true characterizing sentences although less than half of all birds lay eggs (only the healthy and fertilized female ones), not more than five percent of the *Anopheles* mosquitos carry malaria, and the chance of a turtle having a long life is extremely small, as most turtles are eaten by predators early in life.

(75) a. A bird lays eggs.
b. An *Anopheles* mosquito carries malaria.
c. A turtle lives a long life.

On the other hand, the analysis is too weak, since true characterizing sentences cannot capture a mere accidental generalization. For example, it might be true that every child ever born in Rainbow Lake, Alberta, was right-handed. Still, the generic sentences *Children born in Rainbow Lake are right-handed* and *A child born in Rainbow Lake is right-handed* are not true—unless there is something special about Rainbow Lake that causes right-handedness (e.g., perhaps the water in Rainbow Lake is nomically connected with right-handedness). Or imagine a zoo where the two last surviving lions in the world are kept, and by some accident both of these poor creatures lose one leg. Then the sentences *Every lion has three legs* and *The lions have three legs (each)* would be true, but the characterizing sentence. *A lion has three legs* would nonetheless still be false. Characterizing sentences express "principled" generalizations over the entities of a class, and do not capture mere "accidental" facts about them. (See also section 1.1, examples (29) and (30), about madrigals and football heros.)

Another difference from nominal quantifiers such as *every* or *each* is that the generic operator, in common with other adverbial quantifiers, cannot be contextually restricted (Dahl 1975, Croft 1986). For example, a sentence such as (76a) below need not mean that every professor in the world wears a tie, but may mean that each of the professors in a contextually restricted set, say, the set of all professors at UCLA, wears a tie. This contextual restriction can be either explicit (by stating the restriction, as in (76b)) or implicit. However, with adverbial quantifiers as in (77), implicit contextual restriction is not possible. For example, although in the right circumstances (76a) might be used with an implicit restriction so as to mean what (76b) does, one cannot use (77a) to mean (77b). A generic sentence states a lawlike regularity, and such regularity does not admit of contextual restrictions.

(76) a. Every/Each professor wears a tie.
b. At UCLA, every/each professor wears a tie.
(77) a. A professor (always/usually/often/seldom) wears a tie.
b. At UCLA, a professor (always/usually/often/seldom/∅) wears a tie.

Several methods have been proposed to capture the semantics of the generic operator in characterizing sentences. In the rest of this section, we will sketch and discuss six of these—without coming to any hard and fast, final conclusion. First, the **GEN**-operator might be spelled out as a 'relevant quantification'. Second, the notion of prototypical entities might be employed. Third, **GEN** can be seen as a statement of a stereotype. Fourth, **GEN** might be analyzed as a modal operator, to be interpreted in a possible-worlds semantics. Fifth, **GEN** might be analyzed as combining with a sentence to express a constraint in the theory of Situation Semantics. And sixth, **GEN** might be analyzed in such a way as to indicate a nonmonotonic inference rule. We will look at these approaches in turn.

1. Relevant quantification. In a pragmatic account of genericity, the generic operator might be spelled out as a quantification over *relevant entities*, as suggested by Declerck (1991). Declerck adopted a principle which says that when a statement is made of a "set," the hearer will use his or her world knowledge to restrict the statement to just those members of the "set" to which it can be applied in a suitable way. For example, consider (78):

(78) Whales give birth to live young.

$$\forall x[\mathbf{whale}(x) \ \& \ \mathbf{R}(x) \rightarrow x \ \mathbf{gives\ birth\ to\ live\ young}]$$

This statement will be a predication over female, nonsterile whales, as only they could possibly give birth to live young in the first place. In the formulation

above, this would be expressed by specifying the restriction variable **R** in a suitable way. One obvious problem with this approach is that the principle, as it stands, can easily justify all kinds of generic sentences—it is easy to find restrictions which would make *any* quantification come out true. For example, the analysis could make (79) be a true generic, since we could take **R** to be the predicate **sick** and hence to restrict the quantification to sick whales.

(79) Whales are sick.

So this approach calls for a theory of suitable restrictions, and it is unclear how or whether this can be developed.

2. *Prototypes.* The prototype approach assumes that from among the entities which are categorized as being an instance of a certain concept, we can choose those entities which are the "best" representations of that concept (Hempel & Oppenheim 1936). The fundamental idea behind this approach is that those entities which are the most typical representatives of a concept are called 'prototypes', a concept popularized in cognitive psychology especially by Rosch (1978). Platteau (1980), Nunberg and Pan (1975), and Heyer (1985, 1987, 1990) propose treatments for characterizing sentences which make use of this notion of prototypes. In these treatments, a characterizing sentence is seen as a universal quantification over the prototypical elements of a concept. For example, a sentence such as *A cat has a tail* can be paraphrased as *Every prototypical cat has a tail.* If we represent *cat* as the predicate **cat** and adopt an operator **TYP** which restricts the extension of a predicate to the entities that are "prototypical" for that predicate, then the "prototype analysis" of generics generates the following:[32]

(80) A cat has a tail.
$\forall x[\mathbf{TYP}(\mathbf{cat})(x) \rightarrow \exists y[y \textbf{ is a tail} \,\&\, x \textbf{ has } y]]$

When developing a unified treatment for all characterizing sentences, however, we must assume a very general prototypicality operator, because the contents of a restrictor can vary widely; and we must also allow such a **TYP**-operator to be applied to predicates of different adicities. Note that this operator cannot be defined in terms of sets or other extensional entities, but must be specified as an operator whose arguments are intensional expressions. For if **GEN** were defined in terms of extensional entities, then, for example, in a world in which all birds except penguins became extinct, the notions of typical bird and typical penguin would coincide. But leaving these considerations of intensionality aside, **GEN** can be defined, using **TYP,** by a universal quantifier operating on a **TYP**-modified restrictor as follows:

(81) $\mathbf{GEN}[x_1,\ldots,x_i;y_1,\ldots,y_j](\textbf{Restrictor; Matrix})$ is true if and only if
$\forall x_1,\ldots,x_i[\mathbf{TYP}(\lambda x_1\ldots x_i\textbf{Restrictor}[x_1,\ldots,x_i])(x_1,\ldots,x_i) \rightarrow$
$\exists y_1\ldots y_j\textbf{Matrix}[\{x_1\},\ldots,\{x_i\},y1,\ldots,y_j]]$

One problem with this approach is that it replaces one puzzle (that of determining the semantics of characterizing sentences) with another (that of determining the semantics of the **TYP**-operator). In addition, the approach does not give a fine-grained enough representation, as shown by the following true characterizing sentences:

(82) a. A duck has colorful feathers.
$\forall x[\mathbf{TYP}(\mathbf{duck})(x) \rightarrow x \textbf{ has colorful feathers}]$
b. A duck lays whitish eggs.
$\forall x[\mathbf{TYP}(\mathbf{duck})(x) \rightarrow x \textbf{ lays whitish eggs}]$

The problem with the representations of these sentences is that only male ducks have colorful feathers, and only female ones lay whitish eggs. As the sets of male and female ducks are disjoint, the predicate **TYP(duck)** does not apply to any object at all. And this would have the untoward logical consequence that *any* characterizing sentence of the form '*A duck Fs*' would be true (because the antecedent of the universal quantifier would always be false). Another example comes from the concept 'human being': One expects, and indeed hopes, that each one of us is atypical in at least one respect, which once again brings us to the conclusion that the class of prototypical elements is empty, and hence that we cannot make characterizing statements about them. (Or rather, that every such sentence is true.) Clearly, the notion of prototypicality must be relativized to the property being expressed in order to save this approach.

There are ways within the prototype approach to avoid this problem. They all involve denying the fundamental idea that the prototypes of a predicate include *all* the typical exemplars of a predicate; instead they "construct" a special exemplar (or group of special exemplars) for each concept. For example, we might assume a special class of objects that may have conflicting properties, as in the theory of arbitrary objects proposed by Fine (1985), in which, for example, arbitrary numbers are allowed to be even and odd a

32. This analysis is similar to Heyer's (1985, 1987, 1990) treatment, but Heyer is concerned only with kind-referring NPs in characterizing sentences, and interprets kinds as having a set of "typical specimens," which is a subset of the set of all specimens of that kind.

the same time. Another method involves the use of the notion of partial, or underspecified, objects, as developed in Landman (1986b). In this approach, a prototypical object can lack specific properties in one information state, but can acquire these properties in more detailed information states. We will not pursue these possible remedies for the prototype approach, but it seems clear that some such alterations are required before any prototype theory can be pressed into the semantic service of characterizing sentences. We will not comment upon whether the adoption of such things as arbitrary objects, or partial objects, takes away from the initial plausibility of prototypes.

3. Stereotypes. A related approach is to analyze characterizing sentences as expressing stereotypes. Consider the following contrast:

(83) a. A lion has a mane.
b. A lion is male.

Why are we ready to accept (83a) but not (83b)?[33] Note that arbitrary lions are more likely to be male than to have a mane, since only male lions but not all male lions (e.g., not male cubs) have a mane. Nonetheless, (83a) is definitely true and (83b) is definitely false. Why? One possible answer, proposed by Geurts (1985) and Declerck (1986), is to say that (83a) but not (83b) expresses a stereotype about lions in our culture: it is part of our linguistic knowledge about the kind *Leo leo* that it has a mane. The concept of a stereotype was developed by Putnam (1970, 1975) in philosophy and Rosch (e.g., 1978) in psychology (as a distinct part of her theory of prototypes—the two parts of Rosch's work are separable, and here we are concerned only with the stereotype portion). Putnam broke down the meaning of a lexical expression into several components, including its extension and some stereotypical properties. These properties are considered to be the "core facts" (about the extension of the entities) which everyone speaking the language in question must know. Their truth-functional status is undetermined, however. As Putnam says, "The fact that a feature . . . is included in the stereotype associated with a word X does not mean that it is an analytical truth that all X's have that feature, nor that most X's have that feature, nor that all normal X's have that feature, nor that some X's have that feature" (1975, 250).

If **GEN** expresses stereotypical knowledge, then all we need to do in order to understand **GEN** is to investigate the formation of stereotypes, but there is little hope that we will find principles of general logical interest. For example, one reason why having a mane is part of the stereotype of a lion is that the lion is the only cat that has a mane, making this a distinguishing property for lions. Our task would be to search out other stereotype formations in which distinguishing properties play a role. (For our views on distinguishing properties see section 1.3.4.) But again, we think it unlikely for there to be anything of general logical interest in stereotype formation. Another potential difficulty for a stereotype analysis arises if one thinks that cultural norms are the source of stereotyping properties. For instance, suppose it is the norm in some culture to assume that snakes are slimy. Even in that culture, the sentence *Snakes are slimy* is a false sentence—although believed to be true by most members of the culture—since snakes, those real-world objects, are in fact not slimy. That is, generics are construed as making claims about the world, rather than what is considered a cultural norm.

Besides, even if **GEN** does occasionally express stereotypes, that in itself is not an adequate description of **GEN,** for stereotypes are tied to single words or well-known and "fixed" concepts, whereas the restrictor of **GEN** can be made up by novel concepts as well. A sentence such as *Mary smokes when she comes home* requires a generalization over situations in which Mary comes home. This sentence can be understood and believed to be true even though the hearer probably does not have a stereotype about situations in which Mary comes home. Furthermore, even if there were such a stereotype, it surely would not be part of our linguistic knowledge (as it is with Putnam's examples of stereotypes of lemons and the like). Instead it would merely be chance knowledge we happened to have encountered or generated. If the stereotype theory were correct, **GEN** would not have a uniform interpretation after all, or, equivalently, there would have to be numerous different generic operators. In either case there would be no general theory of the semantics of **GEN**.

4. Modal interpretations. The modal approach (Dahl 1975, Nunberg & Pan 1975, Heim 1982, Delgrande 1987, 1988), which uses a possible-worlds semantics in the analysis of generic sentences, seems more promising. For one thing, it has often been remarked (e.g., by Lawler 1973a, Burton-Roberts 1977, Thrane 1980) that characterizing generic sentences resemble conditional sentences. For example, a characterizing sentence such as *A lion has a bushy tail* can be rephrased as *If something is a lion, it has a bushy tail.* (In section 1.2.4 we discussed restrictive *when*-clauses, which are similar to conditional clauses in some respects.) So the extensive literature on the modal treatment of conditionals and counterfactuals is relevant here as well (see Lewis 1973, Kratzer 1981, van Benthem 1984, Delgrande 1987, and the articles in Traugot

33. Cf. also Carlson (1977b), who observed that *Chickens lay eggs* is considered true, but *Chickens are hens* is considered false.

et al. 1986). Heim (1982) explicitly treats both conditionals and characterizing sentences as containing modal quantification. Furthermore, the philosophical literature on dispositional predicates is related to the modal approach. Dispositional predicates, like *be soluble in water*, are generally reduced to lawlike sentences (*If x is put into water, it will dissolve*), and lawlike sentences are in turn analyzed as modalized sentences. In chapter 7 of the present volume, Asher and Morreau consider the modal approach from the point of view of knowledge representation in Artificial Intelligence.

We will first give a sketch of the possible-worlds semantics of modal operators and conditionals, based on Stalnaker 1968, Lewis 1973, and especially Kratzer 1981. According to Kratzer, we must distinguish three parameters of modal operators in natural language. One parameter, the *modal relation*, distinguishes operators such as *must* from *may* and *can*, and *necessarily* from *possibly*, or, in a more formal turn of phrase, $\Box$ from $\Diamond$. Let us call the former class of operators 'necessity' and the latter class 'possibility'.

A second parameter is called the *modal base* (or *conversational background*). Consider the following sentence:

(84) John must have a car.

This sentence can be interpreted in terms of several different modal bases, yielding different interpretations:

a. *Epistemic modality:* Given the evidence we have (e.g., that John was in Tübingen at 5:00 and in Stuttgart at 5:30), it is necessary that John has a car.
b. *Deontic modality:* In order to fulfill some requirement (e.g., to be a salesperson), it is necessary that John has a car.
c. *Instrumental modality:* In order to achieve some goal (e.g., commuting between Tübingen and Stuttgart), it is necessary that John has a car.

The modal base is often left unspecified and must be provided by the context of the utterance, but it may be specified by expressions such as *in view of what we know*, or *according to the company's directives for salespeople*, or *given that there are no other reasonable means of transportation*. Formally, the modal base should specify the set of possible worlds quantified over by the modal operator. This set of possible worlds may vary from possible world to possible world. (E.g., the rules of salespeople may be different in different worlds.) We therefore must assume that the modal base is a function which maps a possible world (the one considered the actual world) onto a set of possible worlds. In this reconstruction, the modal base is simply the accessibility relation for possible worlds in modal logic.

These two parameters must be supplemented by a third. For example, although sentence (84), in the epistemic interpretation, asserts that John could not have used a helicopter or resorted to witchcraft in order to reach his destination, its analysis as an epistemic modality does not contradict the existence of such possible worlds. The idea is that these worlds are not "similar enough" to the real world to be taken into account. In order to formalize this intuition, we need a third parameter, the *ordering source*, to give us an ordering among possible worlds. For example, the epistemic interpretation of (84) will say, based on such ordering, that worlds in which John uses a helicopter and in which he resorts to witchcraft (and in which witchcraft works!) are more abnormal than worlds in which he uses a car. The ordering is dependent upon the actual world and can be specified by expressions of the types mentioned above. For example, *according to the law* will specify an ordering relation which reflects that, the more violations of the law a world contains, the more abnormal it is. (From the description of this ordering relation, it should be clear that it is taken to be reflexive.)

Given these parameters, we can define a necessity modal operator **must** (Kratzer's "human necessity") as follows:

must Φ is true in world w with respect to a modal base B_w and an ordering source $\leq_w$ ('be at least as normal as') under the following condition:
For all worlds w' in B_w there is a world w'' in B_w such that w'' $\leq_w$ w', and for every other world w''' $\leq_w$'', Φ is true in w'''.

This definition states that **must** Φ is true in w if Φ is true in those worlds of the modal base (with respect to w) which are closest to the ideal (or most normal) worlds with respect to w. (Note that since $\leq_w$ is not required to be a total order, there will typically be many "most normal" worlds). The corresponding possibility operator **may** can be defined as follows:

may Φ is true in w with respect to B_w and $\leq_w$ iff it is not the case that **must not-**Φ is true in w with respect to B_w $\leq_w$.

Conditional sentences can be treated in this framework by assuming that they contain a modal operator. This operator can be overt as in (85a,b) or covert as in (85c):

(85) a. If John is in Stuttgart now, he must/may/could have a car.
b. Maybe/Possibly, if John is in Stuttgart now, he has a car.
c. If John is in Stuttgart now, he has a car.

The method assumes that the conditional clause restricts the modal base B_w to those worlds which are compatible with the conditional clause's semantic con-

tent. For example, the modal base of (85a) is restricted to the set of possible worlds which are in B_w and for which *John is in Stuttgart now* is true. The matrix sentence then is evaluated with respect to this modified modal basis. In (85c), the covert operator is clearly a necessity operator, as (85c) does not merely express the possibility that John has a car, given that he is in Stuttgart now, but definitely something stronger.

Now let us return to characterizing sentences. A characterizing sentence such as *A lion has a bushy tail* expresses the same concept as the conditional sentence *If something is a lion, it has a bushy tail.* We can try, therefore, to extend the modal semantics for conditionals to the realm of characterizing sentences that do not have an explicit adverb of quantification. Note that in order to capture the quasi-universal force of characterizing sentences, we will want to employ a necessity operator in our representation. More specifically, we will give the following interpretation to the GEN-operator (with a slight blurring of object- and metalanguages):

(86) **GEN**$\{x_1,\ldots,x_i;y_1,\ldots,y_j\}$(**Restrictor; Matrix**) is true in w relative to a modal base B_w and an ordering source $\leq_w$ iff:
For every $x_1,\ldots,x_i$ and every $w' \in B_w$ such that **Restrictor**$[x_1,\ldots,x_i]$ is true in w', there is a world w'' in B_w such that $w'' \leq_w w'$, and for every world $w''' \leq_w w''$, $\exists y_1,\ldots,y_j$**Matrix**$[\{x_i\},\ldots,\{x_j\},y_1,\ldots,y_j]]$ is true in w'''.

This is similar to the definition for **must** given above except that it takes into account the binding of variables, as in the similar definition from Heim (1982, 179). Consider the example below (again with a slight blurring of object- and metalanguage in the interpretation):

(87) A lion has a bushy tail.
GEN[x;y](x **is a lion;** y **is a bushy tail** & x **has** y) is true in w relative to B_w and $\leq_w$ iff:
For every x and every $w' \in B_w$ such that 'x is a lion' is true in w', there is a world w'' in B_w such that $w'' \leq_w w'$, and for every world $w''' \leq_w w''$, $\exists$y[y **is a bushy tail** & x **has** y] is true in w'''.

This representation states that everything which is a lion in the worlds of the modal base is such that, in every world which is most normal according to the ordering source, it will have a bushy tail. Note that this does not presuppose the existence of lions in the real world (B_w might not include w). It also does not require that every lion has a bushy tail, not even of those lions in B_w worlds. It merely states that a world which contains a lion without a bushy tail is less normal than a world in which that lion has a bushy tail.

An obvious question at this point is whether the covert operator in conditionals is the same as the covert operator in characterizing sentences. Both clearly express some sort of necessity, but Heim (1982, 194) argues that they are not the same. In her view, a conditional sentence must be interpreted with respect to a "realistic" modal base and ordering source, which includes the actual world and hence entails universal quantification with respect to the actual world. A characterizing sentence, however, allows for exceptions; and hence its covert operator can be interpreted with respect to modal bases which are not "realistic." So, on this view, we cannot always replace the covert quantifier by an overt quantifier such as *must*, since it might evoke a different modal basis and ordering sources. Consider the following examples:

(88) a. If someone owns a dog, he pays tax on it.
b. If someone owns a dog, he must pay tax on it.

According to Heim, (88a) can only be true if everyone in the real world who owns a dog pays tax on it. Sentence (88b), on the other hand, is a lawlike statement that can be true even if many dog owners do not pay tax on their dogs. Unlike (88a), it evokes a deontic modal base and ordering source which does not include the actual world.

However, if we look at a wider range of examples, we actually find that conditionals need not be interpreted with respect to a "realistic" base. For example, the following conditional clearly has a deontic interpretation (it can be used to control the behavior of rude tourists in British manor homes).

(89) If a gentleman is in the company of a lady, he doesn't peel bananas.

So we can entertain the simpler hypothesis that the covert operator in conditional sentences and the covert operator in characterizing sentences are the same.

There are many different ways to vary the modal bases and the ordering sources. Let us see how our approach fares with a few different examples:

(90) Two and two equals four.

This sentence expresses a mathematical necessity. Here we assume that the most normal worlds are those in which our mathematical laws hold (arguably the set of all possible worlds). Consequently, in this domain we should not encounter any exceptions. This is indeed the case; for example, the characterizing sentence *Prime numbers are odd* is definitely false, even if there is only one exception (the number 2) and an infinite number of confirming cases.

(91) A spinster is an old, never-married woman.

This is a definitional sentence that expresses a linguistic necessity. The ordering source is given by the language, so that the most normal worlds are those in which English is interpreted as it is in the real world. If we take, as usual, the meanings of terms in the language as fixed, then the set of most normal worlds for such a sentence is the set of all possible worlds, and hence sentences of this type also will not have exceptions. Burton-Roberts (1977) attempts to reduce characterizing sentences in general to such definitional sentences, where the "relevant area of evaluation" is allowed to vary.

Another sort of interpretation seems required for examples like (92):

(92) This machine crushes oranges.

We interpret this sentence with respect to a modal base and ordering source, where the machine performs the action for which it was designed. As observed by Laca (1990), this is quite typical for characterizing sentences about artifacts. In particular, we do not need any corroborating past instances to judge whether (92) is true; (92) can be true even if the machine never has and never will have crushed a single orange.

Another type of problems is illustrated by (93) and (94), due to Ewald Lang.

(93) This boat floats.
(94) a. ?This boat can float.
b. This tank can float.

In (93) we express that this boat works properly insofar as it stays above water. As noted before, we can justify such a generic sentence by evaluating it with respect to all the worlds where the machine performs the action it was designed for. (94) sounds a bit strange by comparison. This can be explained by assuming that the modal *can* expresses a weaker generalization than (93): it says that the boat floats in some worlds but not necessarily in all. When we take the same set of worlds as before, then we can infer that the boat actually does not work properly. (94b) is normal again, because we can assume that not all the worlds in which this tank works properly are worlds in which it has to float, and hence the weaker modality is warranted. Now consider (95):

(95) Mary smokes cigarettes.

In contrast to (92), we would hesitate to say that (95) is true if Mary didn't smoke now and then. This can be explained as follows: the modal base and ordering source are related to worlds in which Mary shows her typical behavior. Now, with living beings, the usual evidence we have for typical behavior is their behavior in the past. Hence, the usual and expected evidence for (95) are events of Mary smoking cigarettes.

Some further examples are provided by (96)–(99):

(96) John sells vacuum cleaners.

In this case, we might have circumstantial evidence other than actual performances of the act expressed by the verbal predicate. For example, we might know that John signed a contract with a company.

(97) Bob jumps 8.90 meters.

This sentence will be considered true if Bob accomplished the feat described once. We can explain this by employing a modal base and ordering source where Bob performs as well as he can, and where no adverse conditions interfere. It might be difficult to produce these conditions, and so it might be that Bob typically jumps a shorter distance. But there must be at least some evidence that he can jump the specified distance, and this is given by the fact that he managed to do so once. Examples such as (83a), repeated here as (98), are also amenable to a modal analysis:

(98) A lion has a mane.

According to our earlier discussion, this sentence expresses a stereotype. We can incorporate this as a special case into our analysis by assuming a "stereotypical" ordering base (Kratzer 1981, Heim 1982). For such an ordering base, the closer the worlds are to the ideal, the more stereotypical properties hold in them. Again, stereotypically interpreted characterizing sentences will have exceptions in the real world. One last, rather different example:

(99) Six apples cost one dollar.

In contrast with the examples above, this sentence must be evaluated with respect to a very restricted modal base and ordering source, namely one which is restricted to the current world (and time and place). In this "collapsed" modality, the sentence does not allow for exceptions.

Since characterizing sentences as a group have a wide variety of interpretations, it is sometimes suggested (e.g., Lawler 1973a, Heyer 1987, Kleiber 1988a) that they do not form a uniform class. Thus the sort of theory we have been suggesting would simply be going beyond the evidence. But we disagree. It is indeed true that different characterizing sentences which are superficially similar in appearance may be paraphrased in quite different ways. For example, (91) can be paraphrased by *A spinster is necessarily unmarried*, and (92) by *A boy should not cry*. However, we would prefer to have this difference in paraphrase follow from the different modal bases and ordering sources we

assume, and to stand by our simpler assumption that there is only one covert genericity operator.

As stated earlier, the modal base and ordering source are often not specified overtly. As with other context-dependent sentences, we must assume that hearers construct a modal base and ordering source for the interpretation of a sentence, in order to *accommodate* it, in the terminology of Lewis (1983). For example, if the speaker uses a definite description such as *the girl* and hearers have no specific individual available as a referent of that description, they will construct a context in which this definite description makes sense. Similarly, they may accommodate suitable modal bases and ordering sources. Accommodation may also be a way to handle the problem of simple habituals which lack an overt restrictor, such as *Mary smokes*. In these sorts of cases, we might assume that the restrictor is generated by accommodation, and that hearers accommodate modal bases in which a smoker can be expected to show smoking behavior.

Although the modal approach is promising, it sometimes forces us to accept unusual modal bases and orderings. Consider the following example:

(100) A turtle is long-lived.
GEN[x;](x **is a turtle; x is long-lived**)

According to the definition of **GEN** given in (86), this is true if and only if every turtle in the modal base is long-lived in all the most normal worlds with respect to the ordering source. This sentence evokes a kind of "realistic" modality in which the laws of biology hold. However, the worlds in which no turtle ever dies a premature death are biologically highly abnormal. Normalcy conditions may contradict one another, as do in this case the conditions for single organisms and for whole ecological systems. Consider another example (again with a simplified formal representation):

(101) A pheasant lays speckled eggs.
GEN[x;](x **is a pheasant; x lays speckled eggs**)

Again, we assume that (101) is interpreted with respect to biological normality and is true if and only if every pheasant in the worlds of the modal base lays speckled eggs in every most normal world. To get this universal quantification, we must restrict our attention to worlds in which there are only pheasants, since only they may lay speckled eggs. We know, however, that only *fertilized* female pheasants may lay speckled eggs, and according to the laws of biology, there must then be some male pheasants around as well. Those won't lay eggs, though. The precise mechanism for achieving the appropriate restrictions necessary for such interpretations remains controversial.

5. Situations. It would be convenient to use, as conversational background, domains smaller than complete possible worlds or sets of such worlds. A useful domain might be one in which we look only at single turtles or only at fertilized female pheasants. Our fifth approach does exactly this by considering *situations* instead of possible worlds, modeling characterizing sentences as *constraints on situations*. Constraints of the appropriate sort have already been used in Situation Semantics to model conditional sentences (e.g., Barwise 1986). Since characterizing sentences are basically conditionals, a constraint technique would seem to be applicable to them as well; constraints have in fact been used for this purpose by ter Meulen (1986a) and Gerstner-Link (1988).

Constraints are relations between types of situations (cf. Barwise & Perry 1983). A constraint such as $\Sigma \Rightarrow \Sigma'$, where Σ and Σ' are situation types, says that Σ *involves* Σ', or that whenever Σ is realized, Σ' is realized as well; that is, whenever there is a situation σ of type Σ there is also a situation σ' of type Σ'. The situation types may contain parameters which can be *anchored* to specific entities, locations or types. (In such an approach, parameters are similar to variables, and anchors similar to variable assignments). An important rule is that whenever f is an anchor for Σ (i.e., $\Sigma(f)$ differs from Σ insofar as some parameters of Σ are anchored) and we have a constraint $\Sigma \Rightarrow \Sigma'$, we also have a constraint $\Sigma(f) \Rightarrow \Sigma'(f)$. This rule captures the dependencies between parameters, and can be used to express these dependencies in sentences with adverbial quantifiers if we analyze the variables as parameters. It is important to note that it may be the case that a constraint holds only with respect to some background B. Such a conditional constraint is given as $(\Sigma \Rightarrow \Sigma') \mid B$, read as '$\Sigma$ involves Σ', given that B', where B is a situation type as well. It is plausible to express the conditional constraint $(\Sigma \Rightarrow \Sigma') \mid B$ as an unconditional constraint, by putting the background in the antecedent—that is, as $(\Sigma \cup B) \Rightarrow \Sigma'$—following Barwise & Perry (1983). However, Barwise (1986) explicitly refrains from doing so and treats conditional constraints as three-place relations. Gerstner-Link (1988) proposes the notation '$\Sigma \Rightarrow_c \Sigma'$, where C stands for some conditions similar to the modal dimensions discussed above.

The formalism we have developed can easily be integrated into Situation Semantics, by interpreting variables as parameters and formulas as situation types. If we ignore the fact that, in Situation Semantics, the notion of truth

must be relativized to a specific situation referred to by a declarative sentence, we have the following:

> **GEN**[$x_1,\ldots,x_i;y_1,\ldots,y_j,\ldots,y_j$](**Restrictor; Matrix**) is true relative to a background B in which $x_1,\ldots, x_i$, and possibly others, occur as parameters (i.e., relative to B[...,{x_1},...{x_i},...]) iff:
> There is an anchor f for the parameters in B such that for every situation σ which is of type B(f) it holds that if **Restrictor**(f) is true, then f can be extended to f' such that **Matrix**(f') is true.

The background B can be more specific than possible worlds could possibly be. For example, in sentence (101), *A pheasant lays speckled eggs*, B can be restricted to situations containing female animals, because the sentence tells us something about the mode of giving birth and therefore only female animals should count. But our considering here only situations that contain no male pheasants does not in any way commit us to denying that there are also mating situations in which there are both male and female pheasants. More formally:

(101') A pheasant lays speckled eggs.
> **GEN**[x,s;y](x **is a pheasant in** s; x **lays** y & y **are speckled eggs in** s) is true with respect to the background 's is a situation of giving birth' iff:
> For every situation σ which is a situation of giving birth it holds that for any x which is a pheasant in σ, there is a y which are speckled eggs, and x lays y in σ.

As with the modal approach, the pertinent background is often left unspecified; and again we must assume some rule of accommodation.

6. Nonmonotonic inferences. The sixth approach for handling the semantics of characterizing sentences is actually a set of related approaches currently under development in the literature on nonmonotonic reasoning both in logic and in artificial intelligence. Although this literature does not contain an explicit discussion of generic sentences, the crucial examples that guide its development are always characterizing sentences, and so, if these theories are successful, we should expect from them an adequate semantics of characterizing sentences. The term 'nonmonotonic' indicates that these frameworks provide a formal mechanism for retracting a previous conclusion when given new evidence. Formally speaking, an inference is nonmonotonic if the set of premises Γ generates conclusion ϕ, but the premises ($\Gamma \cup \psi$) do not generate conclusion ϕ. For example, learning that the supermarket is open and knowing that it carries wine and that I have enough money to buy wine, I can conclude that I can buy wine. However, I might (later) learn in addition that city laws prohibit the selling of alcoholic beverages between midnight and 6:00 in the morning, and as it is after midnight now, I must retract my earlier conclusion. Linguistic treatments of characterizing sentences in terms of nonmonotonic theories are sketched in Strigin 1985, Carlson 1987, Kleiber 1988b, Morreau 1988, 1992b, and, in more detail, Asher and Morreau (this volume), and Veltman 1995.

The question of how to treat exceptions is at the core of the enterprise. A typical problem is that we may infer from the fact that Bruce is a bird the fact that he can fly, although there are many types of birds which are exceptions to this rule, such as kiwis, penguins, ostriches, emus, dead birds, and birds with clipped wings. We might try to include all these exceptions in our rule by saying that, if Bruce is a bird that is not a kiwi, not a penguin, not an ostrich, not an emu, is not dead, doesn't have clipped wings, etc., then he can fly. But it may not be possible to give a complete list of exceptional properties; and in any particular case, we may not know whether the entity in question has an exceptional property. Still, we typically reason that if Bruce is a bird, then he can fly, and retract this conclusion at a later time if we learn that Bruce is, in fact, an emu.

We consider here three varieties of nonmonotonic reasoning and examine the extent to which they can be used to handle generic sentences. Consider the following example, which illustrates the three approaches:

(102) A bird is feathered.
- a. If *x is a bird* is true, and if *x is feathered* can be consistently assumed, then conclude that *x is feathered* is true.
- b. If x is a bird and it is not known that x is not feathered, then conclude that x is feathered.
- c. If x is a bird, and x is not abnormal for a bird with respect to being feathered, then conclude that x is feathered.

The reasoning in (102a) is an example of a *default rule* in default logic (Reiter 1980). This is an inference rule that allows us to reach a conclusion C (here, *x is feathered*) from a sentence A (here, *x is a bird*), given that another sentence B (the so-called justification; here, *x is feathered*) is consistent with the facts assumed so far, that is, we cannot infer its negation from these or other facts.

The reasoning in (102b) is an example of *autoepistemic reasoning* (McDermott & Doyle 1980, Moore 1984). The various approaches which fall into this category differ with respect to the epistemic modality they invoke, as well as in certain technical details. In general, this type of approach can be character-

ized as reasoning in the absence of positive knowledge; it is similar to default logic in this respect. Unlike default logic, however, modalized nonmonotonic reasoning allows the default rule to be made explicit in the object language by employing the modal operator **it is not known that**.

The reasoning in (102c) represents McCarthy's theory of *circumscription*, or *minimal entailment* (McCarthy 1980, 1986). The central idea is to cover all exceptions by one predicate which indicates that these cases are abnormal, and to restrict the domain of that predicate merely to those entities which *must* be abnormal given the positive knowledge we have. This minimization of the predicate domain is called 'circumscription'. Clearly, the abnormality must be relativized to a certain property. For example, the emu Bruce is abnormal for a bird because he cannot fly, but not abnormal in the sense of having no feathers. To emphasize the fact that the abnormality predicate in Circumscription must be relativized in this manner, we assume here that this predicate is dependent upon the semantic constituents of the sentence. Note that (102c) can be used in two directions: Either we learn about a bird x which is not feathered and then conclude that x is abnormal for a bird with respect to being feathered, or, if we already know or can derive that x is abnormal for a bird with respect to being feathered (because it's molting, for example), then we refrain from deriving that x is feathered.

We won't go into the technical details of the various formats of nonmonotonic reasoning at this point, such as the treatment of conflicting rules (see Asher and Morreau, this volume, for some remarks, and Reiter 1987 for a general discussion of nonmonotonic formalisms). However, we *do* wish to point out that the default logic approach in (102a) differs from the two other approaches in that it uses a formula of the metalanguage rather than of the representation language to state how characterizing sentences are to be understood. Default rules are rules, and therefore are sound or unsound—in contrast with sentences, which are either true or false. If we analyzed characterizing sentences using default rules, these sentences would not have truth values, and their meanings could not be specified by an ordinary semantic interpretation function. If we were to accept this, we would need to find a way to handle cases with nested **GEN**-operators such as the following:

(103) A cat is healthy if it chases an object when that object is moved in front of its eyes.
GEN[x;](x **is a cat** &
GEN[y,s;](y **is an object** & y **is moved in front of** x's **eyes in** s; x **chases** y **in** s); x **is healthy**)

Default logic can't work here because in such an approach the embedded **GEN**-formula would have to be spelled out as a default rule—which is a statement in the metalanguage and cannot be conjoined with a sentence such as *x is a cat* in the object language as required for the treatment of the other **GEN**-phrase. Another manifestation of the problems associated with treating characterizing statements as metalinguistic default rules is that as such they are neither true nor false—they are not *in* the language, and therefore do not "talk about the world"; instead they "talk about" which inferences to draw. But as we claimed very early in this chapter, it is with characterizing statements that most of our knowledge about the world is represented. What shall we make of a theory that refuses to tell us the conditions under which *Snow is white* is true? Indeed, one that refuses even to admit that it *is* true?

The main reason that nonmonotonic logics appear to be useful for representing the meaning of characterizing statements is that they explicitly allow for exceptions to general rules, and thus can accommodate the fact that characterizing sentences typically allow for exceptions. Furthermore, there is a correspondence between the "modal" quality of these generic sentences and the way generalizations are captured in nonmonotonic logics: Generic sentences are "modal" in that they make claims about an open (or open-ended) class of entities. For example, the sentence *A lion has a mane* does not make a claim about the closed class of all existing lions, but rather about every ("realistically") possible lion. This excludes the possibility of simply listing the properties of the entities in question, or of formulating universal sentences and enumerating their exceptions. Default reasoning seems to be just what is called for in such a circumstance.

The nonmonotonic reasoning approach fares well in certain cases that are problematic for the modal approach. For example, the sentence *A turtle lives a long life* does not require us to construct biologically inconsistent possible worlds; it simply says that when x is a turtle and we have no information to the contrary, we can assume that x lives a long life. Despite the apparent success of the approach along this dimension, however, the original problem might reappear in the guise of the "lottery paradox" (Kyburg 1988): Given a box with a suitably large number of lottery tickets, only one of which is a winner, a rule such as "If x is a ticket, and we have no information to the contrary, then x is not a winner" is sound; however, we cannot apply that rule to *every* ticket, because we know that one of them is indeed a winner. Similarly, we know that we cannot apply the rule "If x is a turtle, x lives

long'' to every turtle; if we were to do it, the notion of biological inconsistency would make its appearance again.

Nonmonotonic reasoning can handle the problems with simple generic sentences such as (54), repeated here with a new interpretation that makes no reference to the situations which are normal with respect to smoking:

(54) a. Mary smokes.
b. **GEN**[x,s;](x = **Mary** & s **contains** x; x **smokes** in s)

At first glance, this representation appears to be too strong, since even a heavy smoker doesn't necessarily smoke in every situation. However, there seems to be a way to use the nonmonotonic reasoning paradigm in such a way that (54b) could be seen to be a reasonable representation—at least if one has considerable explicit knowledge concerning smoking. Consider (54c):

(54) c. If s is a situation which contains Mary, and if s is not an abnormal situation for Mary with respect to smoking, then Mary is smoking in s.

For example, in a given situation s, there may be many properties of s from which we can derive the conclusion that s is an unlikely situation for Mary to be smoking in. Which situations we would consider abnormal situations for Mary to be smoking in depends upon our theories concerning smoking and Mary. For example, we could assume that s is abnormal in this respect if Mary is sleeping or eating in s, or if Mary is a guest and her hosts object to smoking, or if s immediately follows a situation s′ in which Mary has smoked a cigarette. There are, of course, many other reasons why we might conclude that s is abnormal for Mary's smoking. A perhaps more striking case is provided by our earlier sentence (97), repeated here:

(97) a. Bob jumps 8.90 meters.
b. If s is a situation which contains Bob, and if s is not an abnormal situation for Bob with respect to jumping, then Bob jumps 8.90 meters in s.

Again, there could be many reasons why Bob did not jump 8.90 meters on a specific occasion: he might have been asleep or watching an opera performance, or perhaps he was not really trying, or he had a hangover, or there was some head wind. . . . Sports fans are never at a loss for arguments as to why a specific situation was abnormal for an athlete's performing his best in some particular situation s.

Our final remark on nonmonotonic reasoning is that there is nothing in current theories which corresponds to the different modal bases and ordering sources of the modal approach presented earlier. We have argued that the interpretation of characterizing sentences clearly shows a dependency on these parameters. To give an adequate semantics to characterizing sentences in a nonmonotonic reasoning framework requires a reconstruction of those parameters in this framework.

It is time to conclude our inconclusive discussion of the semantics of characterizing sentences. We have great empathy for the reader who is dissatisfied with all of the approaches outlined here. The semantics of characterizing sentences (more specifically, the semantics of the **GEN**-operator) is one of the deepest problems not only for linguistic semantics but also for disciplines such as cognitive psychology, analytic philosophy, and Artificial Intelligence. We wish we could answer all the questions raised in this section, but we console ourselves with the belief that this is a large and interesting area, connecting with deep issues of broader import, that calls for much more research.

1.3. KIND-REFERRING AND OBJECT-REFERRING NPs

1.3.1. Basic Properties

In this section we turn our attention toward the other type of genericity we identified in section 1.1, that is, toward kind-referring NPs. Our basic observations in section 1.1 about these NPs can be recapitulated as follows:

i) Nominal predicates that are tied to an established kind can safely be regarded as yielding a kind-referring NP (*the Coke bottle* vs. **the green bottle*).
ii) The verbal predicate in a sentence with a kind-referring NP need not be stative (*The panda is dying out*).
iii) There are verbal predicates (kind predicates like *be extinct, invent*) which require a kind-referring NP in some argument place.
iv) Observations (i–iii) can be most easily explained if we assume that the phenomenon under consideration is tied to the NPs in question, and not to the sentences as a whole.
v) Although observation (iii) might suggest that we deal with a phenomenon that is verb oriented, we can most easily handle these cases simply as selectional restrictions of specific verbs.

To illustrate point (v): we would say that a verb like *invent* selects for kinds in its direct object position. In this way, a nominal distinction is reflected in a concomitant verbal distinction, but would nevertheless remain a nominal distinction. This is rather like our practice of saying that although *kill* requires an animate object (in non-metaphorical uses), the feature [± animate] is still

a nominal feature. Thus (103) has the kind-selecting verb *invented* select the kind-denoting NP *the computer* as a direct object.

(103) Charles Babbage invented the computer.

We will assume throughout that what we call kind-referring NPs actually *do* refer to kinds, which are modeled as special types of individuals. This is, of course, not the only theory that can be found in the literature (see Kleiber 1990 for a recent survey and discussion). First, kind-referring NPs might be claimed not to refer at all, but to be quantificational in force (Bacon 1973a, 1974). This may work with examples like *The lion is ferocious* (which will be rendered as, perhaps, 'All lions are ferocious'), but it is unclear how sentences with kind predicates like *The lion is extinct* would be handled. A possibility is that kind-referring NPs are ambiguous between a quantifying and a nonquantifying use—an assumption that can be found already in Frege 1892 with examples like *Das Pferd ist ein Vierbeiner* 'The horse is a four-legged (animal)' and *Der Türke belagert Wien* 'The Turk is occupying Vienna'. However, this ambiguity obviously depends on the verbal predicate and certainly does not strike one as a particularly elegant solution. (See Carlson 1982 and Heyer 1987 for discussion.)

Second, kind-referring NPs might be analyzed as denoting the intension of their nominal predicate, and hence kinds would be intensions (see, inter alia, Mayer 1980 and Martin 1986). This approach accounts for some properties of kind-referring NPs quite nicely—for example, that we can distinguish between *the tyrannosaurus* and *the brontosaurus*, even though their extensions in the current world are the same, namely the empty set. However, in other respects this analysis raises questions. In a sentence like *The rat reached Australia in 1770*, we need to ensure that the truth of the sentence depends upon the arrival of concrete, non-intensional rats. This in turn suggests that we should instead think of kinds as relatively "concrete" entities. A third position that points in this direction, namely that kind-referring NPs denote the sum of the entities to which the nominal predicate applies (Kleiber 1990, Ojeda 1991), will be discussed in section 1.3.4 below.

We will start with nontaxonomic NPs and then consider taxonomic NPs and the associated taxonomic hierarchies. Finally, we will examine the range of possible meanings of sentences that contain kind-referring NPs and discuss some items that seem closely related to kinds.

1.3.2. Nontaxonomic Kind-Referring NPs

We begin by looking at the possible linguistic forms of (nontaxonomic) kind-referring NPs in English and some other languages. In English, kind-referring NPs are typically definite singular NPs like *the Panda*, bare plurals like *pandas*, bare mass terms like *gold*, or proper names like *Ailuropoda melanoleuca*:

(104) a. The panda will become extinct soon.
b. Pandas will soon become extinct.
c. Gold has the atomic number 79.
d. *Ailuropoda melanoleuca* will become extinct soon.

Why do we find these forms and not others? Our hypothesis is that kinds are (a certain type of) individual entities, and kind-referring NPs consequently should be NPs which refer to these entities. It follows from this hypothesis that the subclass of kind-referring terms we are considering in this section might be semantically analyzed as proper names (Langford 1949, Carlson 1977b, Heyer 1985). That is, when these terms (which, after all, can be used in various other ways) are in fact being used to "talk about" kinds (in the manner indicated in (104)), then in that usage they may well be functioning like proper names.

There are a number of arguments for this analysis. To begin with, there is a conceptual relationship between this notion of a kind-referring NP and the notion of a proper name: both are definite, referring expressions. Secondly, the class of kind-referring NPs actually does contain some ordinary proper names, like *Ailuropoda melanoleuca*. Maybe even the more common *man* (as an NP, not as a noun) must be analyzed as a proper name, as well as poetic names like *Bruin* or German *Meister Petz* for bears:

(105) a. *Homo sapiens* lived in Australia for at least 40,000 years.
b. Man lived in Australia for at least 40,000 years.
c. Bruin likes to take a nap after eating.
d. Meister Petz macht gern ein Schläfchen nach dem Fressen.
'Bruin likes to take a nap after eating'.

Another context in which kind-referring NPs behave like proper names is provided by the so-called *so-called* construction (this was observed by Carlson 1977b for bare plural NPs).

(106) a. The Incredible Hulk was so called because of his shape.
b. The liger is / Ligers are so called because it is / they are the offspring of a lion and a tiger.
c. *This fat man is so called because he is corpulent.

Now, why do the other kind-referring NPs (the ones which are not proper names by the usual syntactic tests) take precisely the forms they have? This can be explained by the assumption that normally, a common noun like *panda* has to perform at least two functions: first, it refers to a kind, and second, it has as its extension the set of entities which belong to this kind. To be more specific, let **R** be the *realization relation* which relates kinds to their specimens. It is similar to Carlson's realization relation (cf. Carlson 1977a,b; also, section 1.2.2 above), with the exception that we do not consider stages here. Thus a formula **R**(x,k) states that the object x belongs to the kind k. For example, it holds that **R(Xinxin, Ailuropoda melanoleuca)**, that is, Xinxin is a panda. **R** arguably should be an irreflexive relation,[34] as no entity can be a specimen of itself. The hypothesis being put forward can then be recast by saying that a common noun like *panda* has two functions: first, it is related to a kind, in this case *Ailuropoda melanoleuca*, and second, it is related to a set (or property), in this case $\lambda x[\mathbf{R}(x,\mathbf{Ailuropoda\ melanoleuca})]$—or the set of all pandas. If δ is a common noun, let us designate its kind-referring use by δ_k and its predicate use by δ_p.

According to its kind-referring function (K-function), a common noun should behave like a proper name, that is, as an NP. According to its predicative function (P-function), it should behave like a nominal predicate, that is, as an N. This ambivalence between a referring interpretation and a predicate interpretation was first investigated with mass nouns, as mass nouns in English actually occur in both functions. According to Quine (1960), a mass noun like *water* is a singular term when in subject position, as in *Water is a fluid*, and a general term when occurring after the copula, as in *This puddle is water*. Ter Meulen (1980, 1981) distinguished more generally between 'nominal' mass terms and 'predicative' mass terms. The tension between these two uses can be resolved in different ways (Parsons 1970, Pelletier 1974, Bealer 1975, Bunt 1985, Pelletier & Schubert 1989). We may either take the kind-referring use as semantically primitive and derive the predicate use from it, as δ_p equals $\lambda x[\mathbf{R}(x,\delta_k)]$; that is, δ_p equals the set of objects which realize the kind δ_k. Or we may take the predicate use as primitive and define the kind-referring use in terms of it, as δ_k equals $\iota x \forall y[\delta_p(y) \leftrightarrow \mathbf{R}(y,x)]$; that is, δ_k equals that kind of which every object in the extension of δ_p is a realization. (We leave it open as to whether every predicate has a corresponding kind individual). And of course there is also the option of taking each term to be ambiguous; on that view, both uses are primitive and should be related (when necessary) by meaning postulates. (See Bunt 1985 for this option, and see Carlson 1977b for the correspondence between kind-referring and predicative nouns generally).

34. Otherwise we might run into some (Platonic-style) Third Man Argument, or maybe a Russell-style contradiction.

It seems that common nouns in many languages are primarily predicates, that is, of category N, and that the kind-referring use, which requires the category NP, has to be marked somehow. But there are certainly counterexamples, and even distinctions within a language, between different types of nouns (count nouns vs. mass nouns, for instance).[35] Let us have a look at a sampling of a few different languages in this respect (cf. also Gerstner-Link 1988).

English. The basic syntactic difference between simple NPs (e.g., names) and common nouns is that NPs can be used directly as arguments of verbs, whereas an N normally needs a determiner to do so. But note that there are cases where a proper name has a definite article, like *The Sudan*. This should not be surprising: proper names are semantically definite and so the definite article is not out of place. Common nouns, on the other hand, come in three classes: mass nouns like *rice* can stand as an NP without determiner; the same holds for plural nouns like *pandas*, whereas singular count nouns like *panda* require a determiner. Now, if a common noun has to be used like a proper name, as in the case of the kind-referring interpretation, it must somehow be transformed into a member of the NP category. The three options at hand are these: (i) If the common noun is a mass noun, it can be used directly as an NP without any change. If it is a count noun, this option is usually not available in English (*man* is an exception, see below). The two minimal changes are (ii) to put it into the plural form, or (iii) to add a definite article as a determiner. Option (ii) certainly does not distort the meaning of the count noun—indeed, some people have even argued that the plural form is the semantically unmarked form anyway (see Krifka 1989). Neither does option (iii) distort the meaning: for as we have observed, the definite article is compatible with the meaning of proper names. (Mufwene 1986 reports on a tendency of English-based creoles not to mark generic nouns as plural.)

Chinese. In this language, any noun is syntactically also an NP—witness the NP *xíongmao* '(the panda(s)' in sentences like (107). Therefore we need no

35. Note, however, that Pelletier and Schubert (1989) argue that in English the predicative use is primary, even in the case of mass nouns.

determiner at all for kind-referring NPs. This is shown by examples like the following (the glosses ASP and CL stand for 'aspect' and 'classifier'):

(107) a. wǒ kànjiàn xíongmao le.
I see bear-cat ASP
'I saw (the/some) panda(s).'
b. Xíongmao jué zhōng le.
bear-cat vanish CL ASP
'The panda is extinct.'

French. In French there is a syntactic requirement that, with the exception of very few syntactic constructions, every noun needs a determiner in order to be an NP. Therefore we cannot have bare nouns as kind-referring NPs in the manner encountered in Chinese. Instead, kind-referring NPs have to be constructed with a definite article.

(108) a. *Pandas sont éteint.
Le panda est éteint.
Les pandas sont éteint.
'The panda is extinct.'
b. *Or prend de la valeur.
L'or prend de la valeur.
'Gold is going up in value.'

We conclude that if a language is forced to construct a kind-referring noun with a determiner, it will use the definite article. This corresponds best to the fact that these NPs are definite.

German. In this language, proper names are constructed more often with the definite article than happens in English. For example, personal names frequently occur with definite articles, as in *Der Karl ist gekommen* 'Charles has arrived'. It fits in perfectly with the proper name analysis of kind-referring NPs that we find the definite article more often with them as well. For example, mass nouns and, to a somewhat lesser extent, plural count nouns in this interpretation can employ the definite article:

(109) a. (Das) Gold steigt im Preis.
'(The) Gold is getting more expensive.'
b. (Die) Pandabären sind vom Aussterben bedroht.
'(The) Pandas are facing extinction.'

In general then, the syntax of kind-referring NPs tends to be similar to the syntax of kind-referring NPs tends to be similar to the syntax of proper names. This makes best sense if kind-referring NPs *are* proper names of kinds.

German dialects. In some German dialects (see Scheutz 1988 for Bavarian), as well as in Frisian (see Ebert 1971a), there are two sorts of definite articles. There is a long form used for anaphoric reference and a short form used to refer to entities that are part of the shared background knowledge of speaker and hearer. This short form is used with proper names as in (110a), with NPs referring to unique entities as in (110b), and with kind-referring NPs as in (110c), but is not used to refer to an entity which is introduced in the text, as in (110d). The following examples are Bavarian.

(110) a. Da/*Dea Kare is kema.
'Karl has arrived.'
b. Da/*Dea Kini is gschtoabm.
'The King has died.'
c. Da/*Dea Schnaps is daia.
'Schnaps is expensive.'
d. I hab a Bia un an Schnaps bschdait. Dea/*Da Schnaps war daia.
'I have ordered a beer and a schnaps. The schnaps was expensive.'

Indonesian. A similar situation is reported for Indonesian by Porterfield and Srivastav (1988) (who also discuss the situation in Hindi). In this language, definite NPs are normally overtly marked (by the determiner *-itu* or the suffix *-nya*). But NPs which refer to unique entities, like the president of the country, occur as bare nouns, and this holds also of kind-referring NPs.

The fact that languages which mark definite NPs whose referent is furnished by the background knowledge also mark kind-referring NPs in this way supports our hypothesis, put forward in section 1.1.3 with examples like the *Coke bottle/*the green bottle*, that kind-referring NPs refer to well-established entities in the background knowledge of speaker and hearer. If kind-referring NPs denote kinds which are not 'construed' in the text but are well-established in the background knowledge of speaker and hearer, we should conclude that they are lexical entries, even if they are syntactically complex. In case they are syntactically complex, they have to be counted as idiomatic expressions; that is, their meaning cannot be derived systematically from the meaning of their parts. As an example, consider (111a,b) below.

(111) a. The German shepherd is a faithful dog.
b. *The German fly is a lazy insect.

The clear difference in acceptability is related to the fact that *German shepherd* is an idiomatic expression specified as such in the lexicon, whereas *German fly* is not. (People who do not find (111b) so bad presumably accommodate their lexicon and conceptual universe such that it contains a hitherto unknown kind, *Musca germanica*). Kind-referring NPs share this property with proper names. Even when proper names are syntactically complex (like *John Smith*) or descriptive (like *William the Conqueror* and *Sitting Bull*), their meaning (the object to which they refer) cannot be systematically derived from the meanings of their parts.

A similar example was discussed by ter Meulen (1980), who contrasted *heavy water*, which refers to a kind (deuterium oxide), with *muddy water*, which does not. There are some borderline cases, that is, complex kind-referring NPs whose composition is still transparent; one example is *Coke bottle*. And of course, nouns of any complexity can occur in generic (characterizing) sentences, like *Lions without teeth are vegetarian;* but then they clearly do not refer to a well-established kind, but instead can be analyzed as predicates occurring in characterizing sentences in accord with our remarks in section 1.2. Just when a language will promote an NP to kind-referring status is quite difficult to specify. And it is even more difficult to contemplate the ontology this picture presupposes. (Are kinds created and destroyed by our use of language?) On the other hand, the analysis of Carlson (1977b) treats all bare plurals, regardless of complexity, as denoting kinds, and holding on to that sort of analysis requires that bare plurals and definite generics in English be differentiated in other ways. Some predicates that are apparently kind-selecting can take complex bare plurals, as in *Lions without mates at mating time are quite common*. For this and other reasons, we give a different treatment of such predicates in section 1.4.1.

Up to now, we have only considered kind-referring NPs in subject position. It is interesting to look at them when they occur in other syntactic environments, for example in object position. In section 1.2.5 we analyzed cases like *John loves dogs* by claiming that *dogs* does not refer to a kind, but is a predicate instead. However, there are fairly clear cases of kind-referring NPs in object position (Smith 1975); in the following examples they are in the direct object position.

(112) a. The Americans invented chewing gum.
b. The Italians improved German food quite a lot.
c. Shockley invented the transistor / ?transistors.
d. The Sumerians invented the pottery wheel / ?pottery wheels.
e. The French settlers in Mauritius exterminated the dodo / ?dodos.

Examples (112a,b) show that kind-referring mass mouns can occur in object position. Examples (112c–e) show that kind-referring count nouns with a definite article can occur in object position as well, whereas bare plural NPs in this position are not normally accepted by speakers (indicated by the question marks). One should note, however, that this may have something to do with the nature of the direct object position itself rather than the semantics of the predicate, since the bare plural form is much more acceptable as the subject of the passivized versions of (112) (e.g., *Dodos were exterminated by the French settlers in Mauritius* is much more acceptable than (112e) with the bare plural). To be sure, a bare plural NP in direct object position *can* be interpreted as an indefinite NP denoting elements of a class of kinds—that is, here, as subkinds of the transistor, of the pottery wheel, or of the dodo. These interpretations are cases of taxonomic readings, which we will examine in the next sections. And those who accept the plurals in (112) but who insist they are not taxonomic seem to agree that they are interpreting *invented* as *constructed*, and *exterminated* as *killed* (i.e., they are not really using kind-selecting verbs but rather object-selecting verbs). It seems, then, that the bare plurals in this position may not designate kinds for such people but rather specimens of the kind.

In (112a–e), the direct objects must be kind-referring terms. But recall that there are also sentences (such as *John loves dogs* and *Mary smokes cigarettes*) in which we claim that the direct object is to be analyzed as a predicate rather than as a kind-denoting term. In part, the difference between the two is that, for instance, while one smokes *a* cigarette, one does not invent *a* transistor.[36] But there are many verbs which are "intermediate" along such intuitive dimension:

(112) f. John hates coffee / cigarettes / the lion.
g. Dutchmen despise Belgians.
h. Rust erodes iron.

How shall we analyze these sentences? Are they kind-denoting or predicative in their object positions? Our claim is that they are kind-denoting, and are not cases of a predicate within the scope of a generic operator.[37] For one thing,

36. Except, of course, in the taxonomic sense.
37. See Kanouse 1972, Lawler 1973b, Declerck 1987, and Laca 1990.

sentences (112f–h) can be put into the passive without changing their truth conditions, unlike *Mary smokes cigarettes:*

a. John hates coffee ⇔ Coffee is hated by John
b. Dutchmen despise Belgians ⇔ Belgians are despised by Dutchmen
c. Rust erodes iron ⇔ Iron is eroded by rust
d. Mary smokes cigarettes ⇏ Cigarettes are smoked by Mary

Also, the object NPs in (112f–h) cannot be replaced by subordinate kinds *salva implicatione*, unlike the case of *Mary smokes cigarettes.*

a. John hates Columbian coffee ⇏ John hates coffee
b. Mary smokes French cigarettes ⇒ Mary smokes cigarettes

Furthermore, as Laca (1990) mentions, the NPs we would intuitively consider to be kind-referring occur with the definite article in Spanish, yielding contrasts like the following:

a. Juan detesta el café.
b. Juan fuma cigarros.

In sum, there is enough evidence to conclude that the object NPs in examples like (112f–h) refer to kinds, much in the same way as the object NPs in (112a–e) and in contrast to the object NPs in examples like *Mary smokes cigarettes*. Obviously, the truth conditions of a sentence like *John likes coffee* should ultimately be related to quantities of the kind Coffee, and this relationship will be different from the relationship between Shockley and the kind Transistor in (112c). In both cases, though, we will claim that this relationship is "intensional" (as we argued above when considering sentences like *Mary handles the mail from Antarctica* and *Kim helps her friends in emergencies*, which can be true even if there never has been mail from Antarctica or any opportunity for Kim to help friends).

There is, though, an interesting difference between the sentences in (112a–e) and those in (112f–h): plural objects are considerably better in the latter. A possible explanation of this effect might go like this: the usual interpretation of a bare plural NP is an indefinite NP, and the definite interpretation is only possible in suitable syntactic environments. There are at least two environments that are suitable:

1. The subject of so-called categorical sentences. These are sentences whose subject is in the topic position; they are contrasted with so-called thetic sentences (Kuroda 1972, Sasse 1987). (113 is an example of this contrast:[38]

(113) a. Pandas | are facing EXTINCTION. [the kind *Ailuropoda melanoleuca*]
b. PANDAS were roaming the camp. [some specimens of *Ailuropoda melanoleuca*]

2. The object position of stative verbs. These verbs favor the definite interpretation of bare plurals.

So why is the kind-referring interpretation of a bare plural NP tied in this way to its syntactic position in the sentence? One idea would be that the default interpretation of a bare plural NP is the indefinite one, and that the definite, kind-referring interpretation of a bare plural may be coerced by additional means. These means include, in English, sentence-initial position as in (113a) (which must be a sentence about the kind *Ailuropoda melanoleuca* because of (i) the selectional restrictions of the verbal predicate *face extinction* and (ii) the progressive form, which excludes a characterizing interpretation over subspecies of *Ailuropoda melanoleuca*). (In addition to being sentence initial, the bare plural NP must occur in a sentence with a certain accentual structure.) A further way to coerce the interpretation can be to have the bare plural NP in the object position of stative verbs. These two positions—the subject position of categorical sentences and the object position of stative verbs—are not particularly well-suited to introduce new discourse referents (the usual task of indefinite NPs) and so they may be free to be interpreted differently.

The obvious generalization that follows from this reasoning, then, is that bare plurals can be easily interpreted as definite (and hence kind-referring) only when they are in topic position; if they are in the subject position of a thetic sentence like (113b) or in a nonsubject position, they tend to be interpreted as indefinite (see also Gerstner-Link 1988, for German). In (112c–e) the verbs require kind-referring objects, and bare plural NPs are coerced to the definite interpretation. The assumption that the topic position enables a definite interpretation of bare plural NPs is a natural one, given the fact that topics are definite (or at least specific), whereas indefinite bare plurals are nonspecific. Thus the accentual topic marking in (113a) forces the bare plural NP *panda* into its definite (kind-referring) reading. In object position, on the other hand, there is no accentual marking for definiteness, and so we tend

38. As before, a vertical line marks a pause, and capitalization marks the main sentence accent.

toward the normal indefinite interpretation of bare NPs. Interestingly, the same subject–object asymmetry in the interpretation of some types of bare NPs holds for other languages as well, e.g., for bare plural NPs in German and for bare singular NPs in Hindi and Indonesian (cf. Porterfield & Srivastav 1988).

However, this whole discussion about whether and when an instance of a bare plural NP is interpreted as referring to a kind or as designating objects of that kind is at the moment lacking clear guiding criteria; and this theory, like the one assuming that all instances of bare plural NPs denote kinds, stands in need of considerable refinement.

1.3.3. Taxonomic Kind-Referring NPs

We now turn to what we have called taxonomic NPs. Consider a noun like *whale*. Up to now, we have identified two uses of such a noun, one as a predicate applying to the specimens of the kind *Cetacea*, the other as a name of the kind *Cetacea* itself. There is a third use, namely as a predicate applying to the *subkind* of the kind *Cetacea*, that is, the blue whale, the sperm whale, the dolphin, etc. Thus taxonomic NPs were identified by Galmiche (1985) as forms "pour référer à une sous-espèce," and by Declerck (1987a, 1991) as NPs in the "subkind interpretation." (See also Burton-Roberts 1981 and Wilmet 1988.)

In which forms do taxonomic NPs occur? The underlined expressions in the following examples give some indication for the range of possible forms.

(114) a. The dolphin is a whale.
b. The dolphin and the porpoise are whales.
c. One whale, namely the blue whale, is nearly extinct.
d. Two whales, namely the blue whale and the fin whale, were put under protection.
e. This whale, namely the blue whale, is nearly extinct.
f. The whale which was most recently put under protection is the blue whale.
g. Every whale (from the pygmy whale to the blue whale) is protected by law.

These examples show that taxonomic NPs need not be indefinite. Instead, taxonomic NPs show the whole gamut of syntactic behavior that we observe with every count noun: we find singular indefinites like *a whale*, bare plurals like *whales*, NPs with numerals like *one whale, two whales*, NPs with demonstratives like *this whale*, NPs with definite article like *the whale which was most recently put under protection*, and quantified NPs like *every whale*. The count-noun-like character of taxonomic NPs also shows up in the fact that if we put a mass noun in a count noun context, it typically gets the taxonomic reading, as in the following example (cf. Pelletier & Schubert 1989):

(115) *Two red wines* are produced in Württemberg: Lemberger and Trollinger.

There are count nouns, like *species, halogen, metal,* and *alloy*, which seem to have only a taxonomic reading:

(116) a. Chlorine is a halogen.
b. There was chlorine/?halogen in the water.

And furthermore, the taxonomic reading does not make much sense if the noun is associated with a kind which has no species, as is the case for *dodo:*

(117) ?A dodo is extinct.

But taxonomic NPs do not only occur in the form of simple count nouns. For example, we find constructions based on nouns like *type* or *kind* which resemble numerative constructions like *five glasses of wine* but which denote subkinds (for further remarks see Wilkinson, this volume):

(118) This kind of whale lives mainly in Arctic and Antarctic waters.

In a classifier language like Chinese, which has to use classifier construction to render the equivalent of count noun constructions, we find different classifiers in the object-related case than we find in the taxonomic case.

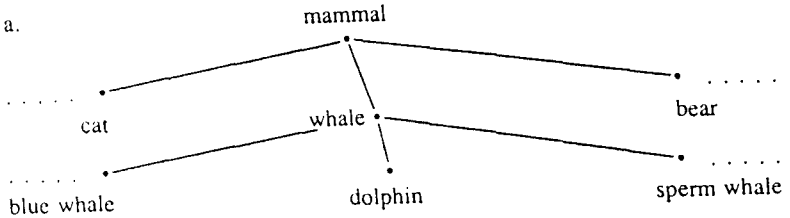
(119) a. yi zhī xíong
one CL bear
'an individual bear'
b. yi zhōng xíong
one CL bear
'a kind of bear, a bear species'

In German, there is a productive morphological process to derive taxonomic count nouns, which consists in suffixing *-art* or *-sorte*. In the following example, which represents the equivalent of (115), *-sorte* is added to the mass noun *Rotwein* 'red wine', making it a count noun referring to subkinds of red wine. (Alternatively, the noun itself could be used taxonomically, as in *zwei Rotweine* 'two red wines'.)

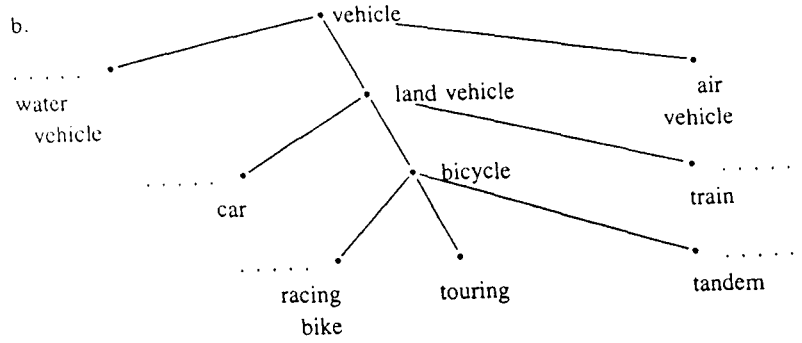
(120) Zwei Rotweinsorten werden in Württemberg angebaut: Lemberger und Trollinger.

Let us now look at the nature of the subkind relation. It is obvious that it should be analyzed in terms of *taxonomic hierarchies*. As an example, consider the following (parts of) taxonomic hierarchies:

(121) a.



b.



See Kay 1971, Berlin, Breedlove & Raven 1973, Cruse 1986, and Pelletier & Schubert 1989 for a discussion of such hierarchies in language and of their mathematical structure. Basically, they can be considered as partial orderings or lattice structures. There typically is a distinguished level of "everyday words" (Berlin et al. call them "generic," though more commonly they are referred to as "basic-level" terms). These words are frequent and noncomposite; in our example, the *cat/whale/bear* level and the *car/bicycle/train* level are basic in this sense. The words at this distinguished level are most readily used to describe an object. For example, to refer to some bicycle, a speaker is less likely to use *vehicle* or *15-speed racing bike* than to just use *bicycle* (or *bike*).

Taxonomic hierarchies also play a role in the determination of the comparison class in a characterizing sentence with positive adjectives (Bierwisch 1987). For example, the sentences *A pony is small* and *A Saint Bernard is big* are probably considered true, although Saint Bernard dogs typically are smaller than ponies. The reason is that the positive adjectives *small, big* implicitly refer to some standard given by the comparison class, and that the comparison class of *pony* and that of *Saint Bernard* are different and hence may yield different standards. The comparison class in these cases is given by the taxonomic hierarchy; it is horses for *pony* and dogs for *Saint Bernard*.

Let us call the taxonomic subkind relation **T**, with **T**(x,y) meaning that x is a subkind of y.[39] This is reminiscent of our previously mentioned realization relation **R**(x,y): x is an instance of y. There is the following relation between the two:

(122) $[\mathbf{T}(x,y) \,\&\, \mathbf{R}(z,x)] \Rightarrow \mathbf{R}(z,y)$

That is, if x is a subspecies of y and the object z belongs to x, then z also belongs to y. For example, every sperm whale is a whale. We might be tempted to conflate the subkind relation **T** and the realization relation **R**, that is, to make no distinction between kinds and individual objects. This is frequently done in the AI literature on semantic nets (see, for example, the articles in Findler 1979—a standard reference), which have only one relation, ISA, to cover both **T** and **R**. However, not only are there logical reasons to distinguish kinds and objects (as philosophers have been claiming for decades); there are also linguistic reasons to make the distinction. For example, an object could never be in the extension of a nominal predicate which is clearly marked as taxonomic, say, German *eine Walart* 'a kind of whale'. This even holds in the case where a kind happens to be realized by only one object. That is, even in extreme cases like this one, there is a type distinction between kinds and objects. This requires that **T** and **R** must be different, because as they have different domains, namely, **T** relates kinds to kinds while **R** relates objects to kinds.

The notion of a taxonomic hierarchy can be exploited to cover the well-known *type–token ambiguity* as well. For example, *this book* can either refer to a specific copy or to a title:

(123) a. This book got wet in the rain. (= copy)
b. This book sells well. (= title)

The first reading can be treated as an individual-related one, and the second as a taxonomic one. In this case, a book type (a title) can be analyzed as a subkind of the kind book.

39. **T** is asymmetric, as no kind can be a *sub*kind of itself, and it is transitive—if a kind x is a subspecies of a kind y and y is a subspecies of a kind z, then x should count as subkind of kind z as well. The relation **T** is also "intensional" in that (for example) there can be two distinct species both of which are empty. It furthermore ought to be noted that a species might have only one subkind, and yet the species and subkind are nonetheless distinct.

1.3.4. The Meanings of Sentences with Kind-Referring NPs

In this section, we will present the range of meanings we find with sentences containing a kind-referring NP and give a rough-and-ready analysis in order to elucidate each phenomenon further. The following list gives some typical examples, as well as a preliminary descriptive classification of the phenomena:

(124) a. The dodo is extinct.
(kind predicate interpretation)

b. Linguists have more than 8,000 books in print.
The German customer bought 11,000 BMWs last year.
(collective property interpretation)

c. The American family contains 2.3 children.
German teenagers watch six hours of TV daily.
(average property interpretation)

d. The potato contains vitamin C.
(characterizing property interpretation)

e. Dutchmen are good sailors.
The Dutchman is a good sailor.
(distinguishing property interpretation)

f. Be quiet—the lion is roaming about!
In Alaska, we filmed the grizzly.
(representative object interpretation)

g. Man set foot on the Moon in 1969.
(avant-garde interpretation)

h. The wolves are getting bigger as we travel north.
(internal comparison interpretation)

We will discuss these interpretations in turn and given some more examples for each of them.

A. Kind predicates can only be applied to kinds in the first place, and so it is quite clear that (124a) uses the kind-referring NP to name a kind directly and then to predicate something of it. These kind predicates have been described by several authors, e.g., Smith (1975), Heyer (1985, 1987), and Wilkinson (1988). Of our eight examples in (124), this is the only one that clearly and straightforwardly "says something" about the kind without talking about the instances of the kind.

But note that even kind predicates are related to properties of *instances* of the kind, if we engage in an analysis of the lexical meaning of such predicates (which does not affect the ability of these predicates to select for kinds). For example, in order to show that the dodo is extinct, one has to show that there have been realizations of this kind in the past, that there are no present realizations of this kind now, and, perhaps, that there will be no more in the future. This reduction of kind predicates to predicates about objects can be handled by meaning postulates for kind predicates. To give a fairly simple case, we can derive from 'x is *a* liquid' and **R**(y,x) that 'y is liquid' holds, at least under normal temperature conditions. (See Pelletier & Schubert 1989 for similar simple examples.) Often, though, the reduction of kind predicates is quite complex; consider for example 'x is extinct'. Here, something like the following must hold: x must be a (biological) kind, there did exist objects y such that **R**(y,x) in the past, but there exists no object now such that **R**(y,x) in the present. When we take into account that there are kinds which may survive over long periods in form of spores or even as frozen sperm, we must claim in addition that the genetic propagation of the kind is irreversibly disrupted. As an even more complicated example for the reduction of kind properties to object properties, consider the following (from Schubert & Pelletier 1987):

(125) The lemur evolved from the tree shrew.

We might call kind predicates like *be extinct, invent,* or *evolve from,* which cannot be reduced to morphologically related predicates of objects, *lexical kind predicates;* and we might contrast them with *derived kind predicates* (the cases in (124b–h)), since these other predicates all have parallel, morphologically related predicates which hold directly of objects. This distinction is reminiscent of the one between lexical dispositional predicates like *love* and habitual predicates like *smoke* (see section 1.2.5), as only habituals are related to situation-dependent predicates.[40]

B. If the predicate applies collectively to all existing objects belonging to a kind, the property can be projected from the objects to the kind. We call this the *collective property interpretation.* This interpretation might seem to be "at the opposite end of the scale" from the kind predicate interpretation, for here it seems clear that the property in question is something that holds of the actual

40. A special property of sentences containing kind-referring NPs in this interpretation concerns the past tense. Consider (i):
(i) The dodo was a bird.
This sentence suggests that the dodo is extinct. In general, when a necessary property is asserted of a kind in the past tense, we infer that the kind does not exist anymore. Contrary to Anderson (1973), we assume that this is a mere pragmatic effect—note that (ii) is true as well, in spite of the dodo's being extinct.
(ii) The dodo is a bird.

instances (as a group), and not of the abstract object, the kind. One might even argue, using this sort of example, that a kind should be analyzed as the sum of its realizations (cf. Sharvy 1980, Kleiber 1990, Ojeda 1991 for this 'mereological' reconstruction). The reason is that collective interpretations can often be rendered formally in mereological models. For example, the collective interpretation of *The girls ate seven apples* can be given as: The collection of the girls ate seven apples. Similarly, in (124b) we could argue that the property of having eight thousand books in print is applied to the collection of all linguists.

But one should carefully distinguish between these entities (mereological sum vs. kinds), since not every predicate which holds for the collection of the specimens of a kind holds for the kind itself, nor vice versa. For example, it may be true that the collection of all existing rabbits has a weight of more than one million tons, but generic sentences like (126) are quite strange.[41]

(126) The rabbit has a weight of more than one million tons.
Rabbits have a weight of more than one million tons.

It remains to be investigated under which conditions the collective property interpretation is available (see Condoravdi 1992).

C. It is interesting to contrast collective property interpretations with *average property interpretations*. Certainly there are no syntactic differences, as can be seen from the example sentences in (124b,c). Rather, our choice of interpretation is conditioned upon facts such as these: that it would be extremely implausible for the average German customer to have bought eleven thousand BMWs last year, and we know (from our own case?) that the average linguist could not have published eight thousand books last year (thus the sentences in (124b) must receive collective property interpretations); that no actual family can contain 2.3 children, and that it would be extremely unlikely for the total daily German-teenager-TV-watching-time to be only six hours (thus the sentences in (124c) must receive average property interpretations). The average property interpretation is sometimes marked in the NP by nominal adjectives such as *typical, average, ordinary, normal, usual*, etc. (*The average American family . . .*, *Your typical German teenager . . .*). The lack of syntactic distinction between these two types of interpretation means that there can be instances of properties for which we cannot tell which interpretation is meant. Consider sentences such as these:

41. This same argument is applied against mereological interpretations of mass terms in Pelletier & Schubert 1989.

The American family used less water this year than last year.
The small businessperson in Edmonton paid nearly $30 million in taxes but only made $43,000 in profits last year.

The former sentence is ambiguous between the collective and average property interpretations. It could be true that the average American family used less water this year than last while the collective American family used more (due to more families); conversely, it could be true that the average family used more but the collective family used less. As to the latter sentence, which is admittedly somewhat strange (but might be used to further the political interests of Edmonton businesspeople), our world together tells us that the first conjunct of the VP must be interpreted as a collective property, since certainly the average businessperson, even in wealthy Edmonton, does not pay $30 million in taxes; but our world knowledge also tells us that the second of the VP conjunctions is to be given an average property interpretation.

D. In (124d), we find our "kind-referring NP" genericity and our "characterizing" genericity combined. (The subject NP is kind-referring, and the sentence is of the characterizing type). Heyer (1985, 1987) calls these sentences "personal generic," since the kind-referring NP can be replaced by an indefinite NP without much change in meaning. Ideally the analysis of this case should be logically derived from a combination of the semantics of kind reference and of characterizing predication. We will discuss this issue in section 1.3.6 below. Here, we just label the case as the *characterizing property interpretation*, to indicate that the property expressed by the verbal predicate must be characterizing for the objects of the kind.

E. Another case in which we can project a property from an object to its kind is shown in (124e) (an example from Arnauld 1662). Some more examples of this type are the following (due to Schubert & Pelletier 1987):

(127) a. Italians are good skiers.
b. Frenchmen eat horsemeat.

At first sight, these might seem to be just some more cases of the characterizing property interpretation, that is, characterizing sentences. If they were, we would try to analyze them as we do a characterizing sentence with an indefinite subject NP (see section 1.2 above):

(128) Dutchmen are good sailors.
GEN[x;](x **are Dutchmen;** x **are good sailors**)

But the generic quantification in (128) is not warranted; for although *Dutchmen are good sailors* is true, we certainly would not conclude that any randomly picked Dutchman will turn out to be a good sailor. There are several possibilities which might save this general style of analysis. One is to assume that (128) is evaluated with respect to a stereotypical modality; then it would only claim that being a good sailor belongs to the stereotypes of a Dutchman. Or we could tamper with the restrictor or with the interpretation of **GEN**, changing it in such a way that it yields truth conditions which seem to be correct (cf. Geurts 1985). For example, it seems that the main sentence stress in (128) can be on *good*. Given the correlation between sentence accent and the partitioning between restrictor and matrix (see section 1.2.2), we can claim that **good** is part of the matrix, whereas **sailor** is part of the restrictor. We then get a more plausible semantic representation that amounts to 'Dutch sailors are good sailors', an analysis which was already suggested by Arnauld (1662).

(129) Dutchmen are GOOD sailors.
GEN[x;](x **are Dutchmen** & x **are sailors; x are good (as sailors)**)

However, we also get this reading with an accent on *sailors* (where we can assume that *good sailors* is in focus), and so just assuming different partitionings will not give us a general solution.

It should be noted that these examples require kind-denoting subjects, for they are not adequately paraphrased by indefinite singulars (e.g., *A Dutchman is a good sailor* and *A Frenchman eats horsement* are in fact *not* true.) Consider the following examples:

(130) a. The potato contains vitamin C.
b. Potatoes contain vitamin C.
c. A potato contains vitamin C.

(131) a. The Dutchman is a good sailor.
b. Dutchman are good sailors.
c. A Dutchman is a good sailor.

Whereas the examples in (130) have the same truth conditions (at least at the level of detail with which we are concerned here), examples (131a,b) differ from (131c) in that (131c) makes a stronger claim than (131a,b). With (131c) we can more or less expect that a random Dutchman we pick out will turn out to be a good sailor—must as with all the examples of (130), we can expect a random potato to contain vitamin C. The somewhat weaker claim of (131a,b) can be paraphrased as: The Dutch are known to have good sailors. Or: The Dutch distinguish themselves from other comparable nations by having good sailors. It is this somewhat weaker interpretation which we call the *distinguishing property interpretation*, as it seems to express a property that distinguishes the subject referent from other entities that might belong to the same category. (See also Wilmet 1988.)[42]

F. If the object in the situation described is only relevant as a representative of the whole kind, then a property can be projected from the object to the kind. We call this the *representative object interpretation*. Languages, and maybe registers within a language, seem to differ in their readiness to employ this interpretation. For example, whereas German speakers agree that example (132a) has a representative object interpretation, English speakers have difficulties in getting this reading with the English equivalent, (132b).

(132) a. Der Fuchs ist wieder in den Hühnerstall eingebrochen.
b. The fox broke into the chicken house again.

But elsewhere English allows for this kind of interpretation, witness (124f). Also, certain dialects of English can get the representative object interpretation with *Mister;* compare (132c):

c. Mister Fox broke into the chicken house again.

G. If some object belonging to a kind has a property which is exceptional for objects of that kind, the kind can be assigned the same property. The property is felt to be relevant not only to the object, but also to the kind itself. Let us call this the *avant-garde interpretation*, since the exceptional object can be considered the 'avant-garde' of the kind (Gerstner & Krifka 1987; see also Carlson 1977b, Heyer 1985, 1987, and Corblin 1987, who describes these cases as expressing "un record à porter au crédit de l'espèce"). Note that not just any old exceptional property will give rise to this interpretation, but that the property really must be considered relevant and important for the kind. Note also that such properties are episodic. This can be seen in the following squish of examples:

(133) a. Man learned to solve cubic equations in the 16th century.
b. ?Man broadjumped further than 8.90 meters in 1968.
c. *Man ate 128 pretzels in one hour in 1976.

42. There have been attempts to reduce all sentences with kind-referring NPs to this type, e.g., Platteau 1980 and Galmiche 1983. But such a "reduction" comes with a price: it means that we cannot take such sentences as *The lion has four legs* to be felicitous, because the property of having four legs certainly is not distinctive for lions with respect to other cats, or mammals, or even vertebrates.

These sentences differ in acceptability because achievements in sports like broad jumping are not considered as particularly relevant for man, and the pastime of pretzel eating even less so. This is in contrast with the solving of mathematical equations or landing upon celestial bodies.

Another aspect of the avant-garde interpretation is that we have to pick out the "right" kind in the kind hierarchy to which to attribute the property (see Kleiber 1990). For example, we might express the first landing on the Moon also as follows:

(124) g.' The American set foot on the Moon in 1969.
g." The primate set foot on the Moon in 1969.

But (124g') seems to be a predication on a kind that is too "low" in the hierarchy, whereas (124g") seems to be too "high." It seems that predications of this type preferably are about "basic-level" kinds (cf. section 1.3.3); predications on lower-level subkinds are possible if a contrast with other subkinds on the same level is implied. For example, (124g') is good in case, say, the Chinese had set foot on the Moon before 1969.

H. Examples like (124h) (cf. Carlson 1977b, Schubert & Pelletier 1987) involve a comparison of the specimens of a kind along a certain dimension of their occurrence. Note that they cannot be treated as characterizing sentences, as they do not involve properties of individual specimens—thus, (124h) cannot be rephrased as *A wolf is getting bigger as we travel north.* We have to analyze such *internal comparison interpretations* as yet another class, perhaps comparable to sentences about normal objects like *The road is getting rougher as we travel north.*

Let us now reconsider the examples in (124) as a whole. It is surely quite astonishing to get such an array of different interpretations. The readings range from attributing properties strictly to an (abstract?) kind, to attributing properties to all members of the kind acting in concert, to attributing properties to the "average" of a group (and not necessarily to any instances), to attributing characteristic properties which hold of "randomly chosen" individuals, to attributing distinguishing properties, to attributing exceptional properties to the kind because of an avant-garde member of the species, to attributing a comparative property to a kind that relates specimens along a dimension. Furthermore, it is remarkable that these different readings do not hinge on the presence of specific linguistic elements. The situation is clearly different from our prototypical characterizing sentences, where we can claim to have only one interpretation scheme, and where the covert operator can be made explicit by adverbs such as *typically, in general,* or *usually.* So how should we treat the range of meanings we find? This is a fertile topic for future research. We will comment a bit further on this problem in the following section.

1.3.5. Kind-Oriented and Object-Oriented Modes of Talk

In this section, we will look at the notion of a kind and its relation to objects more thoroughly. We start with an unusual, but not at all far-fetched, example. Imagine a cage in a zoo with three lions in it, and a father pointing at them and telling his children:

(134) Look kids, this is the lion.

It seems obvious that *the lion* should be analyzed as a kind-referring NP here. In the case at hand, we deal with what we have called the representative object interpretation of the NP. Note, for example, that (134) can be continued with a generic sentence:

It lives in Africa.

Here *it* should clearly be analyzed as coreferent with *the lion* in (134) and therefore as referring to the kind *Leo leo.* But how could this be? The father is pointing at three actual animals, which surely do not make up the whole kind *Leo leo.* And even if it were the case that the lion was a more endangered species than it actually is and these three lions in the cage were the last surviving lions, it still seems clear that the father is not pointing at the kind *Leo leo,* since kinds are not defined solely by their existing specimens. So, how *can* this be?

One way to explain it might be to assume an ontology where it is possible that a kind is in some way "identical" with the objects, or with collections of objects, that belong to it.[43] With such an ontology the father could point to three lions and say that "this is the lion" (as the three are, in this new sense of the term, "identical" with the kind *Leo leo*), and later say that this same kind lives in Africa. Of course, such a move needs a somewhat unusual notion of identity—so unusual that we probably ought not call it "identity', so let's call this relation **IS** (plural: **ARE**) instead. An important difference between

43. An alternative way of looking at this puzzle is to view reference to collections as providing a "deferred reference" to the kind. The following discussion is couched in terms of "identity" rather than "deferred reference", but it seems to us that the points made could equally well be phrased in terms of the latter, *mutatis mutandis.* See Nunberg (1993) for further discussion on deferred reference.

identity and **IS** is that the latter relation must be relativized to the sort of entities we identify. Otherwise, we could prove that, for example, any two lions **ARE** the same, because they **ARE** the kind *Leo leo* and normal identity is a transitive and commutative relation.

It is actually easy to define the **IS**-relation we need in terms of normal identity and the realization relation **R** (see section 1.3.2 above).

(135) $\mathbf{IS}(x,y) \Leftrightarrow_{df} (x = y \vee \mathbf{R}(x,y))$

That is, if x and y are either both objects or both kinds, then **IS**(x,y) holds if and only if they are identical. And if x is an object and y a kind, then **IS**(x,y) holds if and only if x is a realization of y. Note that **IS** is still reflexive and transitive, but not symmetric; thus it fails to be an equivalence relation.[44] Our initial example (134) can now be rendered as follows. Let **a** be the object which is the collection of the three lions in the cage. Then we have:

(134') a. This [**a**] is the lion [**Leo leo**]: **IS(a, Leo leo)**.
b. It [**Leo leo**] lives in Africa: **lives in(Leo leo, Africa)**.

As natural as this approach appears to be, there is a problem with it. For, if the approach is correct, then it should *always* be possible to talk about kinds instead of their realizations; after all, the objects **ARE** the kinds. For example, the sentences in (136) should be equally appropriate to describe a situation in which a gorilla walks across a street into a pub.

(136) a. A gorilla walked across a street into a pub.
b. The gorilla [generic interpretation] walked across the street [generic interpretation] into the pub [generic interpretation].

To develop a stable terminology, we will say that (136a) belongs to the *object-oriented mode* of speaking, whereas (136b) belongs to the *kind-oriented mode* of speaking. Roughly, in the kind-oriented mode, NPs that are ambiguous between a kind reading and an object reading are generally intended to be interpreted at the kind level. Although the kind-oriented mode of speaking in (136b) sounds rather odd at first sight, we have already pointed to examples in which it is perfectly natural to talk in this mode, namely (134) and the examples of the avant-garde interpretation and the representative object interpretation given in (124f,g).

Considering the nature of the data, it seems futile to look for hard grammatical criteria that determine when we can use the kind-oriented mode. Instead, the criteria we expect to find will have a more pragmatic flavor. For example, when we do not care about the object-level identity of the objects, as in the sentence *We filmed the grizzly in Alaska*, we can (and often will) choose to talk in the kind-oriented mode. If we *do* care about object-level identity, then we have to switch to the more fine-grained object-oriented mode.

The "default" mode surely is the object-oriented mode.[45] The reason probably is that this mode is more informative and versatile. It is more informative as it provides the hearer with "quantitative information." It is more versatile as it allows for anaphoric reference to the same object, and not only to the same kind. For example, in (136a) it is said that one gorilla, one street, and one pub are involved in the reported event, and it is possible to refer back to the same objects later, say, in *He found that it was closed.* In (136b), on the other hand, it is unclear how many individual men, hats, streets, and pubs are involved, and it would be impossible to refer explicitly to the same objects in later discourse. To sum up: there are pragmatic reasons why we normally choose the object-oriented mode, and there are also pragmatic reasons why we sometimes deviate from this default and choose the kind-oriented mode.

Some facts suggest that there is variation between languages and speech communities in their readiness to choose the kind-oriented mode. An important test case is the use of noun incorporation. In many languages, a syntactic object can occur in two forms; either as a separate phrase or incorporated into the verbal predicate. According to Mithun's survey of noun incorporation (Mithun 1984), kind-referring nouns, nouns which do not introduce a discourse referent, and nouns which do not refer to salient entities in a discourse are normally incorporated (in those languages that make use of incorporation). Furthermore, the incorporated nouns must be syntactically simple; typically, they consist only of a noun stem. One might argue from this that incorporated nouns refer to kinds, and that noun incorporation is a syntactic device to stay in the kind-oriented mode.

Mithun observes that anaphoric reference to incorporated nouns is at least strongly disfavored. Unfortunately, she does not discuss anaphoric reference to kinds; but we might consider some data from German, a language in which

44. Compare the discussion in Grice & Code 1979 (and in Code 1985, 1986), who also use IS for this sort of relation, and use what they call **HAS** for a somewhat different one. They are explicating Aristotle, but it seems nonetheless that their **IS**-relation is quite similar to ours, in that it relates items within a given hierarchy. The **HAS**-relation relates items from different hierarchies, as in *Callicles is pale*, which is analyzed as **HAS(callicles,paleness)**. On the semantics of the unusual notion of identity in Artisotle, see Pelletier 1979.

45. At least in the cultures and languages we are familiar with. Perhaps science fiction stories can make us believe that there are other possibilities; and we regularly hear of tales from "pop" anthropology describing cultures and languages that do not view object-oriented talk as primary.

noun incorporation is not infrequent. Here we find that with the incorporated nouns, anaphoric reference to objects *is* blocked indeed, whereas anaphoric reference to kinds is still possible.

(137) a. Hans fuhr Mercedes$_i$. *Er$_i$ war grau. / Das$_i$ ist ein zuverlässiger Wagen.
'Hans drove Mercedes$_i$. *It$_i$ was gray. / That$_i$ is a reliable car.'
b. Hans fuhr einen Mercedes$_i$. Er$_i$ war grau.
'Hans drove a Mercedes$_i$. It$_i$ was gray.'

The noun *Mercedes* in (137a) is incorporated, even though this is not reflected in the orthography. (For example, it is a bare word stem which cannot be expanded to a phrase—e.g., **Hans fuhr schnellen Mercedes;* this is a clear sign of incorporation (Baker 1988).) If indeed noun incorporation indicates the kind-oriented mode, then languages which noun-incorporate heavily are languages which employ this kind-oriented mode more extensively than (for example) English does.

1.3.6. Kind Reference in Characterizing Sentences

In this section, we will look at sentences which exhibit both types of genericity at the same time, that is, both kind reference and characterizing predication. One set of examples consists of sentences with kind-referring NPs in the characterizing property interpretation, such as (124c). In them, both types of genericity—kind-referring NPs and characterizing predication—occur simultaneously. With the introduction of the **IS**-relation, we are in a position to tackle this problem. The general solution will be to assume that there is a variable which **IS** the kind the NP refers to. This is not simply an ad hoc rule invoked only for this purpose, because the same analysis is in effect with ordinary proper names. Consider the following examples:

(138) a. Simba roars when he smells food.
GEN[x,s;]**IS**(x,**Simba**) & x **smells food in** s; x **roars in** s)
= **GEN**[x,s;](x = **Simba** & x **smells food in** s; x **roars in** s)
b. The lion roars when it smells food.
GEN[x,s;](**IS**(x,**Leo leo**) & x **smells food in** s; x **roars in** s)
i) = **GEN**[x,s;](**R**(x,**Leo leo** & x **smells food in** s; x **roars in** s)
or: ii) = **GEN**[x,s;](x = **Leo leo** & x **smells food in** s; x **roars in** s)

Since *Simba* refers to an object, in (138a), the **IS**-relation reduces to ordinary identity. On the other hand, *the lion* in (138b) refers to the kind *Leo leo*, so the relation **IS** can be either the realization relation R or the identity relation, depending on whether x refers to an object or to a kind.

In the second interpretation of (138b), (138b,ii), where x refers to a kind, the predications 'x smells food in s' and 'x roars in s' of course have to be understood in the kind-oriented mode of speaking. And this in turn allows for situations s in which the lions that are smelling the food are different from the lions that roar. That this is indeed a possible meaning of the generic sentence (138b) can be verified by considering the scenario in which lions live in packs, the more sensitive females smell the food, but only the oldest male has the right to roar. Sentence (138b) might be uttered to describe this scenario. (But due to our tendency to avoid the kind-oriented mode, this interpretation is chosen only very rarely.)

Under our analysis, sentence (138b) in its interpretation (138b.i) is quite similar in meaning to (139):

(139) A lion roars when it smells food.
GEN[x,s;](x **is a lion** & x **smells food in** s; x **roars in** s)

The only difference between the representations concerns what the values of x can be. In (139) x has to be a single lion. But under the reasonable assumption that groups, or sum individuals, can stand in the **R**-relationship to kinds as well as ordinary individuals can,[46] the x in (138b.i) could also be a group of lions.[47] This leads us to conclude that our set of objects *does* contain sum individuals, and that the predicate use of the bare plural NP *lions* applies to sum individuals of lions—including single lions as a limiting case. We would then predict that *the lion* (in its kind-referring interpretation) patterns more closely with *lions* (in its kind-referring interpretation) than with *a lion*. This is indeed borne out: *the lion* and *lions* allow for collective predicates like *gather near acacia trees*, whereas *a lion* does not allow for those predicates (Gerstner 1979).

(140) a. *A lion gathers near acacia trees when it is tired.
GEN[x,s;y](x **is a lion** & x **is tired in** s; y **are acacia trees** & x **gathers near** y **in** s)

46. The assumption is reasonable, at least given example (134), where *the lion* refers to a group of three lions.

47. The similarity between (138b.i) and (139) is already predicted in fact by our earlier description of the relation between predicative and kind uses. Accepting the plausibility of defining δ_p as $\lambda x[\mathbf{R}(x,\delta_\kappa)]$ (that is, as the set of objects which realize the kind δ_κ), and also the plausibility of defining the kind-referring use in terms of the predicative use (so that δ_κ equals $\iota x \forall y[\delta_p(y) \leftrightarrow \mathbf{R}(y,x)]$—that kind of which every object in the extension of δ_p is a realization), amounts to predicting the noted similarity between these sentences.

b. Lions gather near acacia trees when they are tired.
GEN [x,s;y](x **are lions** & x **is tired in** s; y **are acacia trees** & x **gathers near** y **in** s)

c. The lion gathers near acacia trees when it is tired.
GEN[x,s;y](**R**(x **Leo leo**) & x **is tired in** s; y **are acacia trees** & x **gathers near** y **in** s)

The fact is that whenever the predicate *gather* can be felicitously applied to an x, that x must be a group of individuals. The reason that (140a) is ruled out is that x cannot refer to a group of individuals in such a scenario. Examples (140b,c) are good, in contrast, because the value of x *can* be a group of individuals in these cases. As we said, this is our reason for assuming that bare plural NPs can apply to groups and that the realization relation **R** can have groups in its domain. (In passing, note that (140b) also has a second interpretation, similar to the one in (140c), as *lions* may refer to the kind *Leo leo* as well.)

It may seem problematic to allow that not only single entities, but also sum individuals may stand in the **R**-relation to kinds, given examples like the ones in (141) below (from Hinrichs 1985). It might seem as though (141a) ought to be true if we allow sum individuals—whereas it is intuitively false, and it might seem as though (141b) would be false for a sum individual—although it is intuitively true.

(141) a. The lion has bushy tails.
GEN[x;y](**R**(x, **Leo leo**); y **are bushy tails** & x **has** y)

b. The lion has a bushy tail.
GEN[x;](**R**(x,**Leo leo**); **DST**(λz∃y[y **is a bushy tail** & z **has** y)])(x))

However, we can explain why the intuitive truth values result, even if we allow sum individuals to be specimens of kinds. The answer has to do with verbal predicates being distributive. Recall from section 1.2.3 that the **DST**-operator distributes the basic predicate to atomic entities. When x refers to an atomic entity, the **DST** operator will simply apply the verbal predicate to that entity. So (141b) gets the intuitively correct interpretation. (141a), on the other hand, is bad because x might refer to an atomic entity, and in that case there is no corresponding y to which the predicate *are bushy tails* applies—there is only a y of which *is a bushy tail* holds.

This explanation is at odds with a theory developed by Kleiber (1990) to explain certain differences between definite singular and definite plural generic NPs in French. His observations carry over to English:

a. The bobcats avoid each other.
The armadillos are numerous in Texas.

b. *The bobcat avoids each other.
*The armadillo is numerous in Texas.

According to Kleiber, the explanation for these differences is that singular definite NPs are mass-noun-like; it is for this reason that they shun reciprocals and predicates like *be numerous*. But if that's so, then we should not expect there to be distributive readings either, because distributing terms also don't combine with mass nouns (consider the oddness of *The cattle has a bushy tail*). So, we need some other explanation of these phenomena. Our conclusion is that the (b)-examples violate a "formal" constraint each rather than a semantic or conceptual one: reciprocals require plural antecedents, and the predicate *be numerous* requires a plural subject. Indeed, we find that these constraints *can* be violated without any conceptual difficulty, as in the following attested German example:

> Der Deutsche ist ja selbst ein Ausländer, jedenfalls, behandelt er sich gegenseitig so.
> 'The German himself is a foreigner, at least he treats one another like that.'

Coming at the problem from the opposite direction, we find that singular collective NPs that semantically *should* allow for reciprocals and predicates like *be numerous* in fact resist them, as seen in **The family hates each other* and **The family is numerous*, adding evidence to the assumption of a purely "formal" morphological restriction rather than any semantic or conceptual restriction.

In section 1.2.4 we noted that although there do not exist sentences like (142a) below, examples like (142b) may be found. The **IS**-relation helps us explain this. Consider the following contrast (for simplicity, we treat *have a mane* as a one-place predicate):

(142) a. *Simba has a mane when it is male.
GEN[x;](x **Is Simba** & x **is male**; x **has a mane**)
= **GEN**[x;y](x = **Simba** & x **is male**; x **has a mane**)

b. The lion has a mane when it is male.
GEN[x;y](x **IS Leo leo** & x **is male**; x **has a mane**)
= **GEN**[x;y](x **R Leo leo** & x **is male**; x **has a mane**)

We argued in section 1.2.4 that the reason why a sentence of the type in (142a) is bad is that it fails to be a proper generalization, since the variable x is "tied to just one individual" and there is no other variable over which we are

generalizing. The situation is different in (142b), where x is not "tied to just one individual" but ranges over all realizations of the kind **Leo leo,** that is, over all lions. This is our explanation of why object-referring specific NPs and kind-referring specific NPs behave differently in characterizing sentences of this sort.

Another case of "mixed" genericity can be constructed with indefinite nouns in their taxonomic interpretation. Since taxonomic nouns are predicates true of kinds, we should be able to construct characterizing sentences with them, that is, sentences which are both characterizing and kind-referring at the same time. This is indeed possible, as already shown with the examples in (31) (section 1.1.4). Consider the following:

(143) A bird flies. (cf: 'One bird flies'.)

This sentence has at least two readings: It may claim that any individual bird typically flies, which would be a 'nonspecific' reading; or it may claim (though not everyone gets this reading easily) that an individual bird species typically flies—that is, the species will have specimens that fly—which would be a 'specific' reading. The first interpretation is a generalization over individual birds, and the second one is a generalization over bird species. These two interpretations follow from the possible interpretations of the count noun *bird,* which can apply either to individual birds or to bird species. Our method generates the following two representations:

(143′) a. **GEN**[x,s;](x **is a bird** & **in** s; x **flies in** s)
b. **GEN**[x;](x **is a bird species;** x **flies**)

In the first case, *flies* has to be interpreted as an episodic predicate, as it is related to a situation s. In the second case, *flies* must be interpreted as a predicate with a kind-referring subject, x, in the characterizing property interpretation (an instantiation would be, for example, *The robin flies*). As we have seen, sentences in the characterizing property interpretation can be spelled out with the help of the **IS**-relation. Therefore we can transform (143′b) into the following equivalent representations:

(143′) b. i) **GEN**[x;](x **is a bird species; GEN** [y,s;](**IS**(y,x) & y **in** s; y **flies in** s))
ii) **GEN**[x;](x **is a bird species; GEN**[y,s;](**R**(y,x) & y **in** s; y **flies in** s))

(At least they are equivalent formulas if we disregard the arcane possibility that x = y). Here we have another case of a nested **GEN**-operator. The formula says that for the usual bird species x, it will usually fly, that is, for the typical specimen y of x in a normal situation s, y will usually fly in s.

1.3.7. Notions, Concepts, and Other Pseudo-Kinds

In this subsection we discuss several cases that look like kind-referring NPs at first sight, but, as we will ultimately conclude, refer to something else after all. Let us start with examples of the following type, which were discussed (for French) by Corblin (1987) and Kleiber (1990):

(144) In medieval times, the child didn't exist.

This constitutes a problem, as an NP like *the child* does not occur as a kind-referring term in many other contexts. For example, a sentence like *The child is demanding* does not sound very good (in the kind-referring interpretation), even though it would be considered true if *the child* were to refer to a kind. We follow here the explanation of Kleiber (1990), who proposed that *the child* in (144) does not refer to a kind at all, but to something we will call a *notion,* and that can (144) can be paraphrased as 'In medieval times, people didn't have the notion of 'child'.' One test that distinguishes notion-referring NPs from regular kind-referring NPs is that they can be replaced by constructions like *the notion of . . .* , or *the concept of . . .* , which is not possible for kind-referring NPs. It seems that only singular definite NPs can refer to notions; in (144) we cannot replace *the child* by *children,* or *the children,* without distorting its meaning.

Reference to notions is certainly interesting in its own right, especially the problem of separating it from reference to words themselves. But it is not a case of kind-reference, and we will not be concerned with it any further here.

Consider now the difference between singular definite NPs and plural definite NPs. At first sight, it seems that plural definite NPs can act as kind-referring NPs as well, since examples like (145) seem to have a natural reading:

(145) The dinosaurs are extinct.

However, plural definite NPs differ in several respects from singular definite NPs (see Kleiber 1990 for an extensive survey on French). Most importantly, they are not restricted to well-established kinds.

(146) a. The lions that have toothaches are particularly dangerous.
b. ?The lion that has toothaches is particularly dangerous.

In chapter 11 of this volume, Krifka develops a theory that assumes, in addition to kinds the designation of nominalizations of "well-established" predicates),

also what we might call *concepts* (which are the designation of nominalizations of arbitrary predicates).

Another case of NPs that at first look to be kind-referring, but in fact are not, can be seen in examples like the following:

(147) a. The nose is in the center of the face.
b. The meat is more expensive than the vegetables.

According to Kleiber (1981, 1990), the subjects in these examples are not kind-referring, but instead are "dependent" definite NPs. The examples express generalizations over certain entities or situation types: faces in (147a) and meals, perhaps, in (147b)—where for each such entity or situation there is a unique object that can be denoted by *the nose* or *the meat*. (See also Link, this volume, for a discussion of cases of "dependency.")

Furthermore, we have seen that in Spanish, the definite article may be used as an indication that the NP occurs in the restrictor of the generic operator (see the end of section 1.2.5, where we discussed Laca's (1990) treatment of sentences such as *Los arquitectos construyen las casas* 'Architects build houses'). Again, this is not a case of a kind-referring use of definite NPs; the NP itself should be analyzed as semantically indefinite, the definite article being only something like a "theme marker." There seem to be similar cases in other Romance languages, such as Romanian (as Ileana Comorovski informs us) and French; consider the following example of Kleiber's (1990):

(148) Le chien qui aboie ne mord pas.

Here *le chien qui aboie* should not be understood as designating a kind; after all, this NP contains an episodic predicate, which we already know not to designate a kind. We capture the meaning of (148) better if we translate it as a characterizing sentence with an indefinite subject (or with a bare plural subject with the same meaning):

(148′) a. A dog that barks doesn't bite.
b. Barking dogs don't bite.

These both are to be represented as characterizing sentences, with the definite article of (148) serving only to indicate that the predicate *dog* is in the restrictor of the characterizing sentence:

(148″) **GEN[x,s;] (x is a dog & x barks in s: ¬x bites in s)**

1.4. FURTHER ISSUES

In sections 1.2 and 1.3, we discussed the essential properties of characterizing sentences and kind-referring NPs. In this final section we will take up some subjects that we had set aside in order to simplify the discussion of those central topics. We will not offer any detailed discussion of the various analytic options available with the issues raised below, nor do we have any fixed position about them that we wish to advocate. Rather, these issues are merely laid out and their resolution is left to the readers and to future research.

1.4.1. Quantificational Predicates

Some readers may be wondering why we have not mentioned such verbal predicates as *be widespread, be common, be abundant, be rare,* and *be scarce*. In the literature, these predicates are normally treated as kind-selecting predicates, on a par with *be extinct* or *be invented* (see, e.g., Carlson 1977b). These predicates are different from kind predicates, however, in that some of them can be combined with indefinite noun phrases without forcing a taxonomic reading. This is borne out in the following examples:

(149) a. The rhino will become extinct soon.
b. Rhinos will become extinct soon.
c. *A rhino will become extinct soon. (only taxonomic reading O.K.)
(150) a. The rhino is common.
b. Rhinos are common.
c. A rhino is common. (nontaxonomic reading)

Example (150c) is not acceptable for all speakers; the parallel (152b) below is more universally accepted. Furthermore, verbal predicates such as *be common* can easily be combined with subjects which do not refer to well-established kinds, unlike the classic kind-selecting predicates (as before, we assume here that rhinos with blue eyes do not constitute some special type of rhino, but rather that this is a truly accidental, hit-or-miss property of rhinos):

(151) a. *Rhinos with blue eyes will become extinct soon.
b. *A rhino with blue eyes will become extinct soon.
(152) a. Rhinos with blue eyes are common.
b. A rhino with blue eyes is common.
c. *A rhino with blue eyes is widespread.

These examples indicate that predicates of the class of *be common* (in contrast to *be widespread,* as indicated in (152c)) should not be treated as ordinary kind predicates, because they lack the selectional restriction that says they may

only apply to kinds. On the other hand, sentences with predicates such as *be common* can't be analyzed as characterizing sentences either. For one thing, sentences such as *Rhinos are common* or *The rhino is common* express generalizations for the kind Rhino rather than for individual rhinos or groups of rhinos. Furthermore, insertion of adverbial quantifiers, such as *always* and *usually*, leads to a drastic change in meaning, as in the following sentences, which can only be understood on a taxonomic reading of the subject NP:

a. Rhinos are always/usually common.
b. A rhino is always/usually common.

Also, predicates such as *be common* cannot be applied to ordinary individuals at all, as in **Simba is common*, contrary to predicates of characterizing sentences.

How, then, should we analyze such predicates as *be common?* Consider the sentence *A rhino (with blue eyes) is common*. It does not express a property of a specific rhino, nor does it express a generalization over individual rhinos. Instead its meaning is 'The chance of encountering a (blue-eyed) rhino is high', that is, it is a statement about the distribution of rhinos. It seems most natural then to analyze such predicates as extensional second-order predicates, that is, as predicates which can be applied to such first-order predicates (NPs) as *a rhino*.

Such an analysis of predicates like *be common* would be similar to the analysis of quantified noun phrases (such as *every rhino*) found in generalized quantifier theory (see Barwise & Cooper 1981, Westerståhl 1989). In this theory, quantifiers such as *every* are analyzed as two-place relations between sets, and quantified noun phrases are analyzed as second-order predicates which are applied to verbal predicates. A sentence such as *Every rhino yawned* is true if and only if the set of rhinos is a subset of the set of yawning entities. In generalized quantifier theory, a quantifier is dependent upon a universe of quantification, M. The interpretation of most natural language quantifiers does not depend on the size of M (see the "extension" postulate in Westerståhl 1989, sec. 3.2). There are some natural-language quantifiers, however, which do seem to depend on M. One example proposed in the literature is the context-dependent interpretation of *many* and *few* (Westerståhl 1985, 1989). A sentence like *Many A's are B* is true in case the number of A's which are B exceeds some fraction of the cardinality of the universe. For example, in a universe of 10 entities, 5 may count as many, but not in a universe of 1,000 entities. Clearly, this fraction cannot be given a fixed value because *many* (and *few*) are vague.

Returning now to predicates such as *be common:* it seems natural to analyze these predicates in a manner similar to that applied to quantified NPs such as *many rhinos* or *few rhinos*, where the interpretation depends on the size of the universe or on the frequency of occurrence in the universe of the elements described by the subject predicate. For this reason we shall call such predicates *quantificational*. However, they differ from quantificational NPs, especially syntactically. Syntactically, these verbal predicates cannot be decomposed into a quantifier and another predicate (unlike, say, *many rhinos*, which can be decomposed into *many* and *rhinos*). Furthermore, they are applied to a nominal predicate (unlike quantificational NPs, which are applied to a verbal predicate).[48] Semantically, however, quantificational predicates such as *be common* depend on the universe of quantification in a manner similar to that of the interpretations of *many* and *few* as indicated above.[49]

Up to now, we have taken for granted a universe M which is accessible to the interpretation of quantificational predicates. The choice of universe is often left open, that is, it must be inferred from the context. But it can also be linguistically specified, most typically by a locational or temporal phrase as in (154). This is true for quantified sentences in general, as shown in (155):

(154) a. Rhinos are rare in the Serengeti.
b. Two hundred years ago, rhinos were common.
c. Water is rare in the Kalahari.

(155) a. Many rhinos were killed in the Serengeti.
b. Two hundred years ago, few rhinos were killed.
c. This summer, little water was used.

The analysis of quantificational predicates must be refined in other respects as well. For example, in *be common*, as well was in the similar *be widespread*, there is a meaning component implying that one can come across the entities in question at many places all over the universe; a sentence such as *Rhinos are common in Africa* seems to be false in case there are many rhinos in Africa, but all of them gathered at a single place, say, in the Ngorongoro crater. Therefore, a proper formulation of quantificational predicates such as *be common* or *be widespread* would need some topological component. (Moltmann 1991 discusses these types of quantifiers, which she calls "metrical quantifiers," also suggesting the need for a topological component).

48. They may not be the only quantifiers of this type; for example, one could analyze the existential predicates *there is* and *there are* similarly as quantificational predicates which must be applied to a nominal predicate.

49. Note that this makes them nonconservative in the sense of Barwise and Cooper (1981): we need information about the whole universe to evaluate a sentence like *A rhino is common*.

An interesting case of interaction of quantificational predicates with kind reference can be seen with the following examples, due to Barbara Partee:

(156) a. Endangered species are common.
b. Endangered species are rare.

In one reading, the most natural one, (156a) says that there are many endangered species, or that the frequency of endangered species in the universe is greater than some limit. Such sentences presuppose a Platonic universe with kinds as entities. On this reading (156a) is perfectly consistent with (156b), on the reading of the latter that it is typical for an endangered species to be rare (that is, to have few specimens). Of course, the truth conditions of this reading of (156b) must be checked with respect to the universe of objects, not of kinds.

In concluding this section, we should point out that the category of quantificational predicates is larger than the few examples mentioned here might suggest. In fact, there are operators which can transform an ordinary verbal predicate into a quantificational predicate, for example *on average* (which was mentioned, e.g., by Smith 1975) or *up to* with individual-level predicates:

(157) a. The rhino weighs four tons on average.
b. Rhinos weigh four tons on average.
c. A rhino weighs four tons on average.
d. Rhinos weigh up to six tons.

We shall not explicitly formulate a semantic rule for the modifiers *on average* or *up to* here. But it should be obvious that such a rule will need the extension of the subject to determine an average value for whatever the relevant dimension for the verbal predicate may be. Therefore we must assume, again, that a complex verbal predicate, such as *weighs four tons on average*, is a second-order predicate.

1.4.2. *Any*-NPs in Characterizing Sentences

We haven't yet considered NPs with the determiner *any*, such as in (158):

(158) Any tiger is dangerous.

The relation of *any* and the so-called indefinite generic article has been discussed by Vendler (1967), Perlmutter (1970), Smith (1975), Nunberg and Pan (1975), and Burton-Roberts (1976), among others. In fact, Perlmutter (1970) derives the "generic" indefinite article *a* from the determiner *any*.

Two different analyses of *any* have been proposed in the "classical" literature: *any* has been analyzed as a wide-scope universal quantifier (by, e.g., Hintikka 1980) and as an indefinite determiner with certain co-occurrence restrictions (by, e.g., Ladusaw 1979). From our data we can derive an argument for the second analysis. As mentioned in section 1.2.5, nominal quantifiers can be contextually restricted, whereas this is not possible for characterizing sentences and sentences with adverbial quantifiers in general. Generic sentences with *any*-NPs clearly pattern with characterizing sentences in that they do not allow for contextual restrictions, as shown by the following examples:

(159) There were lions and tigers in the circus ring.
a. Every lion / all lions / each lion / the lions / most lions / many lions / no lion had a mane.
b. A lion had a mane.
c. Lions had a mane.
d. Any lion had a mane.

The quantificational universe of the NPs in (159a) is restricted to the lions introduced in the initial sentence. This is not possible in (159b) and (159c) if these sentences are read as characterizing sentences.[50] (Sentence (159b) can be read as a particular sentence as well, in which case *a lion* is naturally interpreted with respect to the restricted universe. The point we are making is that (159b,c) cannot be understood as characterizing sentences and simultaneously be interpreted with respect to the restricted universe.) Sentence (159d) patterns like (159b,c) in that it is not restricted to the lions which were introduced in the initial statement. Therefore, according to this argument, *any lion* should not be analyzed as a quantified NP, but as an indefinite NP similar to *a lion*.

In contrast to *a lion*, the NP *any lion* is (at least in certain instances) a *negative polarity item*. According to Ladusaw (1979), negative polarity items occur within the scope of *downward-entailing operators*. An operator is defined as downward-entailing if an expression in its scope can be replaced *salva veritate* (i.e., without affecting the truth of the sentence) with a semantically stronger expression, that is, an expression with a more restricted extension. The paradigm case of a downward-entailing context is the scope of negation:

(160) John didn't see a tiger.
⇒ John didn't see a female tiger.

50. To readers having difficulty interpreting (159b,c) as characterizing, we point out that we have all along given examples of characterizing sentences in the past tense (see section 1.2), and have remarked that the past tense *had* can generally be replaced by *used to have* (section 1.1.2). The characterizing reading of (159c) is the same as that of *Lions used to have a mane*.

If the first sentence of (160) is true, then the second sentence, where *tiger* has been replaced by the more restrictive expression *female tiger*, is also true. It is in these contexts that negative polarity items are acceptable, for example in *John didn't see any tigers*.

If negative polarity items only occur in downward-entailing contexts, then we should be able to show that the restrictor of the **GEN**-operator is a downward-entailing context, since negative polarity items such as *any*-NPs may be found there. As we remarked in section 1.2.2, characterizing sentences can be analyzed as a special type of conditional sentences where the restrictor corresponds to the protasis (i.e., the antecedent):

(161) a. A tiger has orange fur, marked with black stripes.
b. If something is a tiger, it has orange fur, marked with black stripes.
GEN[x;](x **is a tiger; x has orange fur, marked with black stripes**)

Since the protasis of a conditional sentence is known to be a context which licenses negative polarity items (Ladusaw 1979)—as in *If you spot any tigers then report to the Ministry of Tourism*—we should not be surprised to find negative polarity items such as *any tiger* in the restrictor of characterizing sentences.

If being in a negative-polarity-licensing position (such as the restrictor of the **GEN**-operator) is what really allows for *any*-NPs, then we should not find them in positions which have sometimes been considered generic, namely the subjects of quantificational predicates (see section 1.4.1 above). And indeed, as noted by Smith (1975), we cannot replace an indefinite NP with an NP with the determiner *any* in these cases:

(162) a. A rhino (with three legs) is common.
b. *Any rhino (with three legs) is common.
(163) a. A rhino weighs four tons on average.
b. *Any rhino weighs four tons on average.

However, a serious theoretical problem with the downward-entailingness of the main clause of conditional sentences and the restrictor of characterizing sentences in that these contexts actually fail to be strictly downward-entailing, as demonstrated in (164):

(164) A tiger has orange fur, marked with black stripes.
a. ⇒ A female tiger has orange fur, marked with black stripes.
b. ⇒ An albino tiger has orange fur, marked with black stripes.

(Nor, for that matter, are they upward-entailing, as the reader can easily verify.) One story line we could phrase is this: The reason we cannot draw the conclusion in (164b) is that the strengthening from *tiger* to *albino tiger* introduces the more specific rule that albino animals are white, interacting with and preempting the generic rule concerning the color of tigers. Interestingly, if (165), which makes use of NPs with *any*, is true, then so are (165a,b), as well as (164a,b):

(165) Any tiger has orange fur, marked with black stripes.
a. ⇒ Any female tiger has orange fur, marked with black stripes.
b. ⇒ Any albino tiger has orange fur, marked with black stripes.

Heim (1984) develops a theory in which it is not *general* downward-entailingness which licenses a negative polarity item in a position, but rather downward-entailingness with respect to the position of a negative polarity item and with respect to a set of alternatives determined by the negative polarity item in question (see also Rooth 1985 and Krifka 1993). Clearly this phenomenon is also related to the nonmonotonic reasoning considerations we pursued in section 1.2.6 in trying to account for the semantics of the **GEN**-operator. We shall not pursue this topic further here, and refer the reader to the works cited in this paragraph as well as to Asher & Morreau (chapter 7, this volume).

Burton-Roberts (1976) notes some differences in acceptability between indefinite NPs and *any*-NPs in generic sentences. One of her examples is *A beaver / *Any beaver is an amphibious rodent*. The reason why the *any*-sentence sounds odd seems to be that the predicate expresses a necessary, even definitional property which holds of every beaver. But then the "strengthening" of *a beaver* to *any beaver* does not make much sense because the default rule held without exception in the first place. This explanation can perhaps be made more precise by assuming that a sentence with an *any*-NP is more "complex" than the corresponding sentence with an indefinite NP, and that, as a pragmatic maxim, the simpler expression is used if the more complex one does not differ from it in meaning. (See the more recent analysis by Kadmon and Landman (1993), which makes critical use of the notion of strengthening for the analysis of *any*.)

Nunberg and Pan (1975) try to capture the difference between *a*-NPs and *any*-NPs by assuming that the extension of the *a*-NP is restricted to individuals which are typical representatives, whereas the *any*-NP is to be understood more widely, including all the atypical cases as well. A problem with adopting

this analysis is that it cannot explain why sentences such as **This is any lion* (pointing to a specific lion which is possibly not very typical for its species) are bad. (See also Kadmon & Landman 1993.)

In discussions of the treatment of English *any*, a controversial point is whether the *any* in generic sentences like *Any tiger eats meat* is "the same word" that appears in negative polarity contexts such as *I didn't see any cars on that street*. While it is commonly assumed that the most desirable analysis would unify the treatment of these two instances (the line of thought tentatively pursued above), the notion of a unitary analysis has not gone unchallenged in the literature (Carlson 1982 presents some empirical reasons to distinguish between the two); it is, furthermore, commonplace to talk descriptively about a "free-choice *any*" in opposition to a "negative polarity *any*." When classified this way, the free-choice *any* has a distribution that is almost entirely limited to generic, as opposed to episodic, sentences, a matter emphasized by Enç (1991), while the polarity *any* may appear equally well in either.

1.4.3 Gerundives, Infinitives, and Nominalizations

In the preceding sections, we have only considered sentences with nominal arguments. However, the notion of genericity can also be applied to (sentences containing) different kinds of verb-based arguments, as already observed by Carlson (1977b). Conrad (1982) offers a survey of the relevant phenomena, and Chierchia (1982a, 1984) and Weir (1986) give a treatment in a formal semantic theory; see also Portner 1992.

There is quite a range of syntactically and morphologically different types of verb-based arguments in English (and in other languages). In English, we observe gerundives such as *driving a car* or *John's chewing tobacco*, infinitives such as *to chew tobacco* or *for John to drive a car*, and nominalizations like *the winning of the chess match*. Also, there are derived nominals such as *the resistance*, which we will not examine here.

First, we note that all these deverbal expressions may be kind-referring. This is brought out by the following examples, which combine them with a predicate that selects for kinds (the predicate nominal *a bad habit*). Here the subjects of the sentences refer to a type of event, namely, events of chewing tobacco.

(166) a. Chewing tobacco is a bad habit.
b. To chew tobacco is a bad habit.
c. The chewing of tobacco is a bad habit.

Second, we observe that they may be subjects of characterizing sentences:

(167) a. Chewing tobacco (usually) calms John down / upsets John.
b. To chew tobacco (usually) calms John down / upsets John.
c. The chewing of tobacco (usually) calms John down / upsets John.

The first versions of (167a–c) most normally assert that whenever John chews tobacco, this (usually) calms him down. We assume that the subject argument place is controlled by an NP in the main clause (here, *John*). The second versions of (167a–c) most normally assert (although the (b)-sentence might be questioned) that whenever someone chews tobacco, this (usually) upsets John. These cases are instances of so-called "arbitrary control," similar to the kind-referring cases of (166).

Finally, we have cases where gerundives and nominalizations are used to refer to a specific situation. This seems impossible for infinitives.

(168) a. Chewing tobacco calmed John down / upset John.
b. *To chew tobacco calmed John down / upset John.
c. The chewing of tobacco calmed John down / upset John.

The first version of (168a) says that a particular situation in which John chewed tobacco calmed him down. The status of (168b) is not quite clear. According to the survey of Conrad (1982), infinitives cannot refer to particular situations; however, he cites examples like *To hear her expressing it made me feel that I could hide nothing from her*, which seem to us to be commonplace.

Disregarding the issue of control (a large issue to disregard, to be sure!), these facts can be described by assuming that gerundives and infinitives behave similar to bare NPs. They have two readings. First, they have an indefinite reading in which they apply to events or situations and refer either specifically to some event (as in 168a)), or in which they are subjected to a quantificational operator like **GEN** (as in (167a,b)). Second, there is a definite reading in which they refer to a kind (which has as realizations the events of the indefinite reading); this is the case with (166a,b) and also, in a second analysis, with (167a,b). Nominalizations can be analyzed as definite NPs. In (166c) and (167c), they refer to a kind, and in (168c), they refer definitely to some event. Thus, verb-based arguments do not constitute something new; they are simply special cases of the phenomena we have analyzed above.

There is a problem with the analysis of verb-based arguments as kind-referring NPs: unlike the kind-referring NPs we have considered so far, which were related to well-established kinds, these verb-based arguments can be

formed quite productively. For example, we can construe such kinds as *the trespassing of this area*. Therefore, we would probably conclude that the verb-based NPs refer to "concepts" (see section 1.3.8 for this wider notion). This holds even for NPs like *chewing tobacco*, which might arguably be related to a well-established kind, since the meaning of these NPs clearly is built up compositionally and hence should not be a lexical entry, like well-established kind-referring NPs.

Of course, there are important differences between gerundives, infinitives, and deverbal nominalizations—differences having to do with aspectual distinctions (gerundives and nominalizations are telic and infinitives are atelic), specify (infinitives tend to be nonspecific), or the syntactic categorization (nominalizations are NPs, whereas infinitives and gerundives are clearly verbal categories).

Up to now we have taken the verb-derived subject in its simplest analysis, namely as a predicate over events. However, this subject might itself be a generic predicate, at least in the gerundive case (see Weir 1986). One example is (169):

(169) John's chewing tobacco impresses Mary.

In addition to one generic reading saying that whenever John chews tobacco this impresses Mary, there is a second one saying that John's habitually chewing tobacco impresses Mary. Gerundives of characterizing predicates behave similar to gerundives of other stative predicates. They generally can be paraphrased by the expression *the fact that . . . ;* this implies that they refer to propositions or facts. We also note that they cannot be paraphrased by a *when*-clause if they do not contain some argument that has an open variable.

(170) a. The fact that John chews tobacco impresses Mary. (paraphrase of (169))
b. When John chews tobacco, this impresses Mary. (only the noncharacterizing reading of the *when*-clause)

(171) a. John's knowing French impresses Mary.
b. The fact that John knows French impresses Mary.
c. *When John knows French, this impresses Mary.

If we render the sentence *John chews tobacco* as

GEN[s;y,e](**John in** s; **chew**(**John**,y,e) **in** s & **tobacco**(y))

and we take ^p to refer to the proposition expressed by p, then we can give the following analysis for (169):

(169') **impress**(**GEN**[s,y,e](**John in** s; **chew**(**John**,y,e) **in** s & **tobacco**(y)), ^...)

This says that Mary is impressed by the proposition that John habitually chews tobacco. Of course, a more detailed semantic analysis would also express that it is presupposed that John chews tobacco. (See also Zucchi 1990.)

1.4.4. Generic Anaphora

We will briefly discuss generic anaphora.[51] Consider the following examples:

(172) a. John killed a spider$_i$ because they$_i$ are ugly.
b. John didn't keep a spider$_i$ because they$_i$ are ugly.

The natural reading of the second clause of (172a,b) is that generally, spiders are ugly. *They* should be analyzed as referring to a kind (see Carlson 1977b and Webber 1978, who assume that *they* refers to a "generic class"). For example, *they* in this configuration allows for the interpretations typical for kind-referring NPs, such as the representative object reading in *John killed the spider because they once frightened his girlfriend.* Generic anaphora of this sort can be explained if one assumes that an NP composed of a common noun always introduces the kind that is associated with the common noun into the discourse. (See, e.g., Webber 1978, Frey & Kamp 1986, and Root 1986. See also ter Meulen, this volume, for another discussion of similar sentences.)

In the examples we have so far considered, the generic pronoun is plural. But it can also be singular, as in (173a). If the antecedent is plural, as in (173b), the pronoun must be plural as well. In the case of a mass noun antecedent, given in (173c), the pronoun has to be singular.

(173) a. John found a dodo$_i$, although it$_i$ was believed to be extinct.
b. John found some dodos$_i$ although they$_i$ were / *it$_i$ is believed to be extinct.
c. John drank some milk$_i$ even though he's allergic to it$_i$/*them$_i$.

These facts can be explained via certain interacting principles. The first principle is that a plural NP can refer to a kind if the kind is denoted by a count noun, as in (173b) (cf. the use of bare plurals as kind-referring terms), but not if it is denoted by a mass noun, as in (173c). This allows for *they* to refer to a kind like *Raphus Cucullatus,* since this kind is denoted by the count noun *dodo,* but it excludes that *they* could refer to a kind like *Lac* since this is denoted by the mass noun *milk.* The second principle concerns agreement; it

51. See ter Meulen (this volume) for a more comprehensive and slightly different treatment.

says that if the antecedent is plural—that is, has a marked agreement feature—then the pronoun must bear the same feature. This excludes the use of *it* in (173b) to refer to *dodos*. The third principle says that in cases where a singular pronoun would be ambiguous as to reference to an individual entity or to the kind, a plural pronoun will be chosen to refer to the kind. But if it is clear for other reasons that the pronoun refers to the kind, for example because it is an argument of a kind predicate as in (173a), then singular pronouns are also allowed. The third principle, then, serves to disambiguate between different readings.

Another phenomenon which is related to generic anaphora is indefinite pronouns such as *one* and *some*, or German *ein-* and *welch-*, as in the following examples:[52]

(174) a. John saw a spider$_i$, and Mary saw one$_i$, too.
b. John bought milk$_i$, and Mary bought some$_i$, too.

(175) a. Otto sah eine Spinne$_i$, and Anna sah auch eine$_i$.
b. Otto kaufte Milch$_i$, und Anna kaufte auch welche$_i$.

Indefinite pronouns can be analyzed as *referring* to a kind which is introduced in the preceding context, and as *introducing* a realization of this kind.[53] Thus, although they are indefinite expressions, they share some referential properties with definite expressions.

Finnish offers an interesting case of indefinite pronouns; in that language it is possible to distinguish between reference to a group and reference to a kind, by using pronouns in the elative or partitive case, respectively (I. Alho, pers.comm.):

(176) Markku tuntee kymmemem lingvistiä, ja Fred tuntee
Mark knows ten linguists and Fred knows

(a)	heistä	kuusi
	them.ELATIVE	six.ACC
(b)	heitä	kuusi
	them.PARTITIVE	six.ACC

'Mark knows ten linguists, and Fred knows (a) six of those ten. (b) six of them, i.e., six linguists.'

Let us now turn to indefinite generic NPs. First, there are cases in which indefinite generic NPs can be antecedents of anaphora (note that the opening sentence of (177) is a characterizing sentence):

(177) A lion$_i$ is a ferocious beast. It$_i$ has huge claws.

52. See also van Langendonck 1980a for French and Dutch examples.
53. See Webber 1978 for a similar account.

There are two ways this example can be interpreted. First, if we assume that the indefinite NP *a lion* is the antecedent of *it*, then we must explain how it is possible that an indefinite NP in a quantificational structure (which is what we assume it to be in the first sentence of (177)) can be related to a pronoun outside of the scope of this quantification. One answer might be to claim that, actually, the pronoun is not outside the scope at all, but that the second sentence has to be interpreted with respect to the restrictor introduced by the first one. That is, in interpreting the second sentence, one must be able to "look into" the first one. There are different ways this can be done. One option was investigated as *modal subordination* by Roberts (1987); another was investigated as *context change semantics* by Schubert and Pelletier (1989). But we also can take another route and claim instead that the indefinite NP *a lion*, even in these characterizing sentences, introduces a kind just as the indefinite NPs discussed above did—and it is this kind which the pronoun picks up.

Another interesting piece of behavior of generic indefinites was identified by Postal (1970) and Wasow (1972). Contrary to other indefinite NPs and to quantificational NPs, generic indefinites allow for backwards anaphora:

(178) If he$_i$ can't afford to rent an entire house, then a new faculty member$_i$ should rent a simple room to save money.

Heim (1982, 226) suggests a special rule that says that indefinites have widest scope with respect to the generic operator. Essentially then, (178) would not be analyzed as containing two generic sentences, one embedded in the other as in (179a), but rather only one, as in (179b).

(179) a. **GEN($\neg\Diamond$ x affords to rent entire house; GEN (x is a new faculty member; x should rent a simple room to save money)**
b. **GEN($\neg\Diamond$ x affords to rent entire house & x is a new faculty member; x should rent a simple room to save money)**

One way or another we have to construct the restrictor using the *if*-clause and the generic indefinite NP. The details of this are quite unclear.

1.4.5. Natural and Nominal Kinds, and the Establishment of Kinds

We have analyzed kinds as a special sort of individual and kind-referring NPs as names of kinds. The semantics of proper names and of natural kind terms forms an important topic of discussion in modern works in philosophy of language, including Donnellan 1966, 1972, Putnam 1970, 1975, and Kripke 1972, among others. In this section we want to recapitulate this discussion and ask whether the basic conceptual distinctions developed in it are

relevant to a linguistic treatment of kind reference. For reasons of space, the summary of the philosophical discussion will be quite sketchy; for a more detailed overview, the reader is referred to the introduction of Schwartz 1977 and to Salmon 1989.

According to the semantic framework accepted as standard since the time of Frege, there is a distnction between the *sense* (or *intension*) and the *denotation* (or *extension*) of an expression. The sense can be seen as something like a "conceptual description" which serves to pick out the denotation; for example, the sense of the phrase *the author of "Der Mann ohne Eigenschaften"* is some conceptual description which picks out the man Robert Musil (in the actual world). According to this standard, Fregean ("descriptional") view, every designating expression has both an intension and an extension; hence proper names like *Robert Musil* have them too. This leads to problems, however. To begin with, it is not obvious what should count as a valid conceptual description for a proper name. We could choose some arbitrary identifying properties—for example, we could give *Robert Musil* the sense *the author of "Der Mann ohne Eigenschaften,"* or maybe the sense *the winner of the Kleist award in 1923*, or some conjunction or cluster of such properties. But then we could never be sure whether people are talking about the same individual, since the identifying properties a speaker connects with a name may differ between speakers, and the standard view takes it that a necessary condition for "talking about the same entity" is to use the same intension or sense. And even if speakers agree on some prominent properties, there remain problems. For example, if we take *the author of "Der Mann ohne Eigenschaften"* as the defining property of the name *Robert Musil*, then the sentence *Robert Musil is the author of "Der Mann ohne Eigenschaften"* becomes a necessary truth, which is obviously not the case—Robert Musil could have decided not to write that novel. A related problem in such theories is that the denotation of a name is world-dependent. For example, if we take the sense of *Robert Musil* to be *the winner of the Kleist award in 1923*, then *Robert Musil* would pick out Franz Kafka in those possible worlds where the Kleist award was conferred on Franz Kafka in 1923.

For reasons such as these, Kripke (1972) and others proposed a *nondescriptional* theory of meaning for proper names, with the central tenet that proper names refer directly to entities, without a mediating descriptive concept. For example, the name *Robert Musil* directly refers to the person Robert Musil. Consequently, speakers have to rely on something other than conceptual descriptions in order to be sure they are talking about the same individual when using a proper name. The basic assumption, in the most common variants of this new view, is that when using a proper name, speaker$_1$ refers to the same individual as speaker$_2$ who first acquainted him$_1$ with that individual under that name. And this transmittal process might be traced back until we get to speakers with firsthand experience. For example, a speaker may associate the name *Robert Musil* with the person who is referred to by the term *Robert Musil* in some history of German literature; and the author of that history might associate the name with the person called *Robert Musil* by Adolf Frisé (Musil's editor), who in turn may have firsthand knowledge of Musil, having met the author in his Swiss exile. This is called the *causal theory of reference*, because reference is fixed by causal links of acquaintance, and the first or fundamental use of a certain name to refer to a person or object called a "baptism". Note that the causal theory of reference essentially embodies an equivalence relation, since it assumes that a speaker using a proper name refers to the same individual as another speaker using that proper name.

Names of kinds often behave similarly to proper names, a point which was brought forward by Kripke and especially by Putnam. A famous example concerns the kind name *gold*. We cannot reduce the meaning of *gold* to a list of necessary conceptual descriptions. For example, if we were to assume that *a yellow metal* is one of gold's necessary descriptions, it could turn out that this coloration is an optical illusion or caused by ever-present impurities. But even in such a case, we would still be referring to the same substance as *gold* refers to.[54] One might be tempted to think that some "better" conceptual description would work. Perhaps a better candidate would be *the chemical element with atomic number 79*. But note that *gold* was used to refer to gold before science found this property, which we today consider to be essential. Also, the sentence *Gold is the element with atomic number 79* would be an analytical truth, although its truth was, in fact, a scientific discovery. Furthermore, using this meaning of *gold* we would never know whether we were talking about the same stuff as people in the last century, for whom other properties were essential.

The gist of the nondescriptional theory for kind terms is that we use kind terms to refer to the things that are "the same as" some things considered to be *paradigms* of the kind, and not to whatever happens to satisfy a certain description. Therefore we have two essential components for the semantics of natural kind terms: some sort of equivalence relation (embodied in "the same as") and some sort of indexical relation (embodied in the reference to paradigm cases).

54. Actually, pure gold is *not* yellow.

The problems now are (i) to determine the nature of the equivalence relation, and (ii) to determine the nature of the paradigms. The nature of the paradigms might seem to be the easier question to answer: any exemplar should do—any quantum of gold, any lion. But of course, this is not quite right: the exemplars have to be *prototypical* and may not be "abnormal" or "exceptional." As for the equivalence relation, we can distinguish among, and make use of, several criteria. For chemical elements like gold, the current view is that the essential criteria is the number of protons in the atomic nucleus. For biological species such as *Leo tigris*, the tiger, we came to agree upon criteria such as capability of inbreeding (which reflects similarities on the DNA level). For languages, we came to agree upon criteria such as mutual comprehensibility. For diseases, we often use common causes, like infection with the same virus. For chairs, we can have functional criteria such as the intended use of the object. For more culturally determined items such as music, we would have to take into consideration a criterion like function in society. (There might be a tribe that claps hands at certain social occasions, and although this doesn't count as music in familiar western and eastern societies, it might nonetheless perform the same social function in this tribe's society as music does in ours, and for that reason we might wish to refer to it by the kind term *music*.)

We can combine the nondescriptional view with our earlier formalization by claiming that for any object x and any kind y, the fact that x is a realization of y can be traced back to the existence of a paradigm x′ of y and an equivalence relation between x and x′. If we have a predicate $\mathbf{PARADIGM}_y$ which applies to paradigm cases of a kind, and a relation '$\approx_y$' which is the relevant equivalence relation for the kind y, we can define the realization relation **R** for kinds as follows:

(180) $y \in \text{KIND} \rightarrow [\mathbf{R}(x,y) \leftrightarrow \exists\, x'[\mathbf{PARADIGM}_y(x') \,\&\, x \approx_y x']]$

There might be variations and historical changes in both conjuncts on the righthand side of the definition of **R**, that is, both in the relevant equivalence relation and in the relevant-paradigm cases. A good example is the somewhat recent conceptual separation of the kind *fish* into the kinds *whales* and *fish* (proper). Here, the older equivalence relation (which had to do with shape and place of living) got replaced by another one (genetic similarity), and the new paradigm cases were chosen such that they belong to the class *fish* (proper). Putnam (1975) argues that we can employ different equivalence criteria in different contexts; for example, a plastic lemon can be called *lemon* in certain contexts, although it surely fails to be species-equivalent to paradigm cases of lemons: In general, the type of equivalence relation we choose is likely to be determined by the classification of kinds; for example, we use the atomic number for *gold* because gold is an element, and we use genetic similarity for *fish* because fish are animals.

There are two concepts of natural kind terms, a narrow one and a broad one, which differ in the nature of their equivalence relations. Kripke (1972) considers mainly equivalence relations associated with the physical internal structure of things, and therefore uses examples such as *gold, heat, hot,* etc. Putnam (1975) employs a wider usage of 'natural kind term', including terms denoting artifacts such as *pencil* whose equivalence relation is likely to include functional criteria.[55] As far as natural language goes, there seems to be no difference between strict natural kind terms such as *gold* or *tiger* and more general ones such as *music* or *pencil*. For example, both allow for definite generic NPs:

(181) a. Gold was one of the first metals to attract man's attention.
b. Music was developed in a very early stage of human history.
c. The tiger is thought to have originated in northern Eurasia.
d. The pencil was first described in 1565 by the Swiss scholar Conrad Gesner.

(To be sure, there are some distinctions between very specific kinds; for example, *be extinct* is applicable only to biological kinds, and *be invented* only to artifact kinds, except of course for metaphorical uses.)

Is there a linguistic distinction between natural kind terms (in the broad sense) and the so-called *nominal kind terms*, which must be analyzed as descriptions? Standard examples cited for nominal kinds are nouns such as *bachelor* (which can be described as "an unmarried male of marriageable age"), *pediatrician* ("doctor specializing in the care and medical treatment of children"), or *weed* (which the *Encyclopedia Britannica* ingeniously defines as "any plant growing where it is not wanted"). However, it seems that we can get definite generic NPs with these nouns, suggesting that they are not pure nominal kind terms:

(182) a. The bachelor had a major influence on the *Sturm und Drang* movement of the late 1700s.
b. Although the pediatrician has specialized in childhood maladies, he remains a generalist who looks after the whole patient.
c. The weed was an important factor in last year's economic disaster.

55. One might object to calling artifacts natural kinds, but Putnam (and others) argue for a strong similarity between them.

1.4.6. Generic vs. Episodic Interpretations of Bare NPs: The Early Theory of Carlson

The analysis of genericity we have argued for in this introductory chapter appears to differ in several respects from the first elaborate formal theory of the semantics of generic sentences, which was developed by Carlson (1977a,b, 1979, 1982).[57] In this section, we will compare that theory to the framework developed here and discuss the interpretation of bare NPs, for which Carlson's theory provides an ingenious treatment. Further discussion can be found in Carlson's contribution to this volume (chapter 4). We will see that, although there are indeed a number of important differences between the two theories, many of the apparent conflicts are merely a matter of emphasis, and on some issues either theory could adopt either approach.

Carlson's theory is mainly concerned with bare plural NPs in English, although he also examines bare mass nouns and kind-referring NPs containing the definite article. His basic idea is to unify the two interpretations of bare plural NPs, the *generic* (kind-referring) and the *existential* (indefinite), by claiming that the existential interpretation is kind-referring as well. For example, the subject NPs in the both of the following sentences are analyzed as referring to the kind *Canis:*

(186) a. Dogs are good pets.
b. Dogs are sitting on my lawn.

Carlson gives a battery of convincing arguments for this unified analysis of bare plurals:

1. *Lack of ambiguity.* If bare plural NPs were ambiguous between a generic and an existential interpretation, we should expect sentences in which a bare plural occurs to be ambiguous as well. However, we do not find such ambiguities. Sentence (186a) only means that, in general, realizations of the kind *Canis* are good pets, whereas (186b) only means that some realizations of that kind are sitting on my lawn.

2. *Scope phenomena.* If bare NPs in the 'existential' interpretation are indefinite NPs, then they should behave similarly to other indefinites. In particular, they should have a specific (or wide-scope) and a nonspecific (or narrow-scope) interpretation when they interact with other scope-ambiguous operators. However, Carlson argues with several types of examples that bare plural NPs in the 'existential' interpretation are always nonspecific (have narrow scope). This distinction between bare plurals and other indefinite NPs is borne out in examples such as the following:

(187) a. Minnie wishes to talk to a young psychiatrist.
i) Minnie wishes that there is a young psychiatrist and she talks to him.
ii) There is a young psychiatrist and Minnie wishes to talk to him.
b. Minnie wishes to talk to young psychiatrists.
i) Minnie wishes that there are young psychiatrists and she talks to them.

Example (187a) has two readings: *a young psychiatrist* may take narrow scope or wide scope. (187b), however, has only the narrow-scope reading. Therefore a treatment of this phenomenon along the lines of indefinite NPs would be implausible.

3. *Anaphora phenomena.* Carlson observes that it is possible to have anaphoric links between 'generic' and 'existential' bare NPs, as in these examples:

(188) a. My mother hates raccoons$_i$ [generic] because they$_i$ [existential] stole her sweet corn last summer.
b. Raccoons$_i$ [existential] have stolen my mother's sweet corn every year, so she really hates them$_i$ [generic] a lot.

Another case in point, observed by Mats Rooth (1985), concerns the anaphoric connection between bare plural subjects and reflexive pronouns (see Rooth, Chapter 6, and ter Meulen, Chapter 8 in this volume):

(189) a. At the post-WW III peace meeting, Martians$_i$ presented themselves$_i$ as almost extinct.
b. *At the post-WW III peace meeting, some Martians$_i$ presented themselves$_i$ as almost extinct.

According to Rooth, (189a) is acceptable for most people with the reading that *themselves* refers to a kind even if *Martians* has an existential interpretation, whereas he claims that this reading is unavailable for (189b). If we assume that the reflexive is coreferential with the subject and must refer to a kind because of the kind-level predicate *be extinct,* then we have an argument for Carlson's analysis: *Martians* in (189a) refers to the kind *Homo(?) martis* even in the 'existential' interpretation, whereas the NP *some Martians* in (189b)

57. See also Chierchia 1982b for another version of this theory; and compare our remarks in section 1.2.2 above.

can't refer to the kind (since it is an indefinite NP), and hence the sentence is bad.

4. *Multiple interpretations with conjoined predicates.* This argument was brought forward by Schubert and Pelletier (1987) in support of Carlson's theory. In sentences such as those in (190) below, the bare NP is the subject of a conjoined verbal predicate. (They bring up similar arguments with relative clauses a la (190c) and with other constructions.) One of the conjuncts requires a 'generic' interpretation and the other an 'existential' one. If there is an ambiguity to be traced to bare NPs, we would predict that such sentences are unacceptable because the 'generic' interpretation does not satisfy the second conjunct and the 'existential' interpretation does not satisfy the first conjunct. But these sentences are good, which leads us to prefer Carlson's uniform analysis.

(190) a. Snow is white and is falling right now through Alberta.
b. Dogs are mammals and are barking right now in front of my window.
c. Sulfuric acid, which is a transparent liquid, can be found in the lower cabinet.

Carlson's theory captures these observations with the assumption that 'generic' and 'existential' bare plural NPs are interpreted uniformly as names of kinds, and that the different interpretations are generated solely by the verbal predicates (see section 1.2.2 above). This assumption explains the lack of ambiguity. It also explains why bare plurals have narrow scope: because the existential quantifier is part of the word meaning of the verb, it cannot interact with other operators in the sentence and consequently must take narrow scope. Carlson's theory also accounts for the anaphora phenomenon: in cases such as (188a,b), both *raccoons* and *they* refer to the same entity, the kind *Procyon;* it is the verbal predicates which introduce or do not introduce an existential quantifier over realizations. In particular, this explains the fact that an 'existential' bare plural subject can show coreference with a kind-referring reflexive pronoun, as in (189). Finally, the different interpretations of conjuncts, as in (190), are no longer a problem since the predicate of each conjunct applies to the kind denoted by the subject; the only difference is that one is "internal" to the verbal predicate, and this difference will generate the 'existential' vs. 'generic' interpretations.

However, Carlson's theory also faces some problems, which have led van Langendonck (1980b), de Mey (1982), Weir (1986), Gerstner and Krifka (1987), and Wilkinson (1988) to abandon it in favor of the assumption that bare NPs are ambiguous between an indefinite and a definite, kind-referring interpretation. We shall mention some of these problems and how they are handled by these new theories. And then we shall contrast these theories with the initial one of Carlson (1977b), leaving it somewhat open as to how much of the original theory can be maintained in a new theory.

One problem is presented by the distributional differences between bare NPs like *horses* and NPs with a definite article that denote a kind, like *the horse.* Carlson's theory, in which they denote the same entity, the kind *Caballus,* must explain, then, why bare NPs easily yield an episodic reading as in (191a), whereas kind-referring NPs with a definite article either do not, as seen in (191b), or else do only in the avant-garde or representative object readings, as in (191c) (see also section 1.3.4):

(191) a. Horses stampeded through the gate.
b. The horse stampeded through the gate. (not same meaning as (a))
c. The horse came to America with Columbus.

The theory also has to explain why bare NPs are possible in *there*-constructions whereas definite NPs are not (Weir 1986):

(192) a. There are horses stampeding through the gate.
b. *There is the horse stampeding through the gate.

One way to account for this is to assume that the bare NP *horses* is an indefinite NP, and not a kind-denoting name.

A second problem is that even in characterizing sentences, bare NPs and kind-referring definite NPs may behave differently. For example, (193a) is a characterizing sentence which might say: Whenever a farm has pigs, they are kept in the pen behind the farmhouse. (193b) does not have this reading.

(193) a. Pigs are kept in the pen behind the farmhouse.
b. The pig is kept in the pen behind the farmhouse. (not same meaning as (a))

Again, one way to account for this is to assume that *pigs* is an indefinite NP and not a kind-denoting game.

Another problem becomes more obvious when we look at other languages, since some languages seem to distinguish syntactically between a 'generic' and an 'existential' interpretation of bare NPs. One example is Finnish. In this language, a bare NP in subject position is in the nominative case when interpreted as 'generic', and in the partitive case when interpreted as 'existential' (note that the verb is singular with partitive subjects):

(194) a. Koirat haukkuvat.
dogs.NOM bark.PL
'Dogs bark.'
b. Koiria haukku.
dogs.PART bark SG
'Dogs are barking.'

(195) a. Maito on makeaa.
'Milk (NOM) is sweet.'
b. Maitoa kaatui pöydälle.
'Milk (PART) was spilled over the table.'

French uses a definite article in the first type of case, and an indefinite (or partitive) article in the second:

(196) a. Le lait est doux.
b. Du lait était renversé sur la table.

(Both in Finnish and in French, partitive subjects also have a tendency to be postposed.) In Japanese, in the 'generic' case the subject is marked by the topic postposition *wa*, and in the 'existential' case it is marked by the nominative postposition *ga*:

(197) a. Inu wa hasiru.
dog TOP run
'Dogs run.'
b. Inu ga hasitte iru.
dog NOM run PROGR
'Dogs are/A dog is running.'

Even in English, there are some differences between the two interpretations. Bare NPs in the 'existential' interpretation appear to pattern with indefinite NPs; for example, they bear the same sentence accent as the corresponding sentence with an indefinite NP, and both bare NPs and indefinite NPs have a tendency to move to a postverbal position with the *there*-construction. Bare NPs in the 'generic' interpretation lack these properties (see also Laca 1990).[58]

(198) a. A DOG is sitting on my lawn.
DOGS are sitting on my lawn.
b. There is a DOG sitting on my lawn.
There are DOGS sitting on my lawn.
c. DOGS are good pets. (only good with a contrastive interpretation)
d. *There are DOGS good pets.

58. Recall that main sentence stress is indicated by capitalization.

Carlson explains these differences with the nature of the verbal predicates; he points out, for example, that it is a property of stage-level predicates to allow the *there*-construction (see also Milsark 1974). However, it is not a natural consequence of his theory that indefinite NPs like *a dog* and bare NPs in the 'existential' interpretation should act similarly.

Another set of problems concerns the narrow scope phenomena. Although there is a clear tendency for bare NPs in the 'existential' interpretation to be interpreted with narrow scope, this is not always the case, as pointed out for German by Kratzer (1980); the same point can be made for English (Schubert and Pelletier (1987) discuss a variety of similar examples):

(199) a. Hans wollte Tollkirschen an den Obstsalat tun, weil er sie mit richtigen Kirschen verwechselte.
b. John intentionally put belladonnas into the fruit salad because he took them for cherries.

On a plausible reading (though a reading not everyone seems to get), John didn't want belladonnas in the fruit salad, nor did he believe that the kind *Atropa belladona* is the kind *Cerasus*. This, however, is implied by the only reading (199a,b) have in Carlson's theory. The more plausible reading says that John wanted to put some objects x into the fruit salad which were, in fact, belladonnas; and the reason for this was that he (mis)took x for cherries. To get this reading, *belladonnas* must have wide scope with respect to *intentionally*, as it refers to specific belladonnas; and the pronoun *they* must refer to x. These two requirements cannot be reconciled if the object x is introduced by a verb-internal existential quantifier. But there seems to be no problem at all if we analyze *belladonnas* on a normal indefinite NP, which can have wide scope over embedding operators, and whose referent can be picked up by pronouns in later discourse. An account in Carlson's theory would at least have to involve additional assumptions.

Even in cases which lack scope ambiguities, anaphoric reference to the objects in question is possible:

(200) John saw apples$_i$ on the plate, and Mary saw them$_i$, too.

In the most natural reading, *apples* and *them* refer to the same objects. According to Carlson, they refer to the same kind, and it is only the predicate *saw* which introduces objects. But since the existential quantifier has necessarily narrow scope (because it is introduced internally in the lexical semantics of the verb), *them* isn't within the scope of this existential quantifier, and it is therefore not obvious how to express that *apples* and *them* should refer to the

same apples. Whatever solution to this problem can be found within Carlson's framework also needs to work for sentences where the anaphoric relation is not to the objects but rather to the kind (under the guise of "different manifestations of the same kind"). Consider (201):

(201) John ate apples$_i$ and Mary ate them$_i$, too.

Surely there is a reading of this sentence where John and Mary ate the same apples, and another in which John and Mary ate different apples. How can we arrange it so that both readings are available?

Note that there is no problem with the anaphoric relationship in cases such as (188b) if we assume (as suggested above) that indefinite NPs introduce not only an object, but also a kind into discourse. In (188b), the indefinite *raccoons* in the antecedent position would introduce some specific raccoon(s) as well as the kind *Procyon*. It is this kind which is picked up by the pronoun *they*. We find the same phenomenon with other types of indefinite NPs, for example in *A raccoon has stolen my mother's sweet corn last year, so she really hates them.*

The kind reflexive phenomena (cf. (189)) seem to be a good argument for Carlson's original theory. Certainly they are more convincing than cases with an existential antecedent and a generic pronoun (like (188b)), since we must assume that the reflexive enforces coreference between the relevant argument places. And if *Martians* in (189) were an indefinite NP, the antecedent argument would be an x such that **R**(x,**Homo martis**); this cannot be identical with the kind **Homo martis** as required by the reflexive pronoun and the predicate *be extinct*. Unlike Carlson, we need to say that speakers who find (189a) acceptable have a kind-referring interpretation of *Martians*, even if in fact only some members of this kind were actually involved. The theory developed here allows for this, calling it an example of the representative object interpretation of sentences with kind-referring NPs (cf. section 1.3.4).

The case of conjoined predicates constitutes another argument for the early Carlson theory. The theory under development here is forced to deny sentences such as (190a,b) full semantic acceptability. Intuitions of the authors of this chapter differ on their acceptability. But even if they are not fully acceptable, Carlson's theory might explain this by saying that the coordination of a proper kind-level predicate such as *be white* and a predicate like *be falling right now throughout Alberta* (which reduces kinds to specific realizations) is stylistically awkward because the predicates express very different types of properties. The theory developed here might be able to cope with these sentences as well, by claiming that the bare plural indeed refers to a kind, and that the verbal predicates such as *be falling right now throughout Alberta* are interpreted in the kind-oriented mode (see section 1.3.5). The alleged marginal status of these examples would be explained, then, by the fact that the kind-oriented mode is quite rare in English.

One further clear strength of Carlson's theory is its ability to explain the lack of ambiguity in sentences with bare NP subjects. He is clearly correct in assuming that it is the nature of the verbal predicate which determines the interpretation of bare NPs as 'generic' or 'existential'.

The theory of bare plural NPs presented in Carlson (1977b) assumes that *all* such NPs denote kinds. When the sentence as a whole is about "ordinary" individuals or about stages of such individuals, then it is the role of other elements in the sentence to convert the basic NP meaning (of denoting a kind) into a sentence which mentions, or otherwise brings into play, these other types of things. Thus, in Carlson's early theory, *dogs* designates the kind Dog; *dogs with three legs* designates the kind Dog with Three Legs; and *Dogs Barking in the Kitchen* designates the kind Dog Barking in the Kitchen. It is a separate question whether *sentences* such as (202) below are "about" the kind Dog or "about" individual dogs.

(202) a. Dogs make good pets.
b. Dogs with three legs are rare.
c. Dogs barking in the kitchen irritate me.

(And indeed, except impressionistically, it is quite difficult to know what it means for a sentence to be "about" something. After all, the various levels of semantic representations of even such sentences as *Dogs are barking outside right now* "mention" both a kind and individuals in Carlson's theory. This seems merely a matter of which representation we are investigating.) Some predicates, such as *be extinct*, are kind-selecting, and therefore sentences employing them will (at the intuitive level) be "about" kinds and not "about" ordinary entities. Other predicates, such as *be barking*, are "stage selecting," and therefore sentences employing them will (at the intuitive level) be "about" stages (or ordinary individuals, in certain other theories). So much is pretty well agreed by all theories. Sentence (203a) below is "about" kinds while sentence (203e) is "about" individuals (ordinary ones or stages, depending on the theory). However, the status of other sentences in (203) is not so clear. Carlson (1977b) tended to favor interpreting all of them as being "about" kinds.[59] The theory presently being developed suggests that, on the contrary,

59. He noted that this was not forced upon us by his theory, but that it was the most "natural" interpretation of these sentences.

these three sentences are "about" individual dogs; however, we wish to point out that this is not required by the theory—merely suggested. Various of the authors of this chapter characterize these intermediate cases differently.

(203) a. Dogs are extinct. (kind predicate)
b. Dogs are common. (quantificational predicate)
c. Dogs make good pets. (NP in restrictor)
d. DOGS bark when the bell rings. (NP in matrix)
e. DOGS are barking. (NP not in scope of **GEN**-operator)

The centerpiece for both analyses (Carlson 1977b and the present one), at least with respect to bare plural NPs, is the analysis of sentences such as (203c). The two theories make similar claims in two important respects: First, they both trace back two seemingly distinct uses of bare NPs to a uniform interpretation—kind names in Carlson 1977b and indefinites in the present theory. Second, both theories burden the rest of the sentence (that is, the verbal predicate) with the task of distinguishing between the two uses of bare NPs—in Carlson 1977b by distinguishing between individual-level and stage-level predicates, and here by distinguishing between sentences which have the bare NP in the restrictor of a **GEN**-operator and sentences in which the bare NP occurs outside of the scope of a **GEN**-operator.

1.5. CONCLUDING REMARKS AND OUTLOOK

Let us repeat here the main points of this introduction to the syntax and semantics of genericity.

Perhaps the most important result is that genericity is not a uniform concept. We must distinguish between kind reference on the one hand and characterizing predication on the other. Each of these has been called 'genericity' in the past, and there are certain intuitive similarities between them. Furthermore, they may interact with one another. However, we think that it will be crucial for future research to keep these notions separated.

In the case of characterizing predication, we argued for the assumption of a dyadic operator that relates a restrictor to a matrix and binds at least one variable. We then used this arrangement to explain different generic readings by assuming different partitions of the semantic material into the restrictor and the matrix, a matter that requires far more detailed investigation than given here (see Diesing 1992 for a recent investigation). We treated habitual sentences as quantifications over situations, in contrast to generalizations over individuals. And we discussed possible ways to spell out the semantics of the genericity operator.

In the case of kind-referring NPs, we showed that the nontaxonomic variety

behaves like proper names, whereas the taxonomic variety arises as a special interpretation of common nouns. We had a look at the range of meanings that sentences with kind-referring NPs can exhibit, and we suggested investigation of two "modes of speaking": the standard object-oriented mode and the kind-oriented mode, which, although simpler, occurs only in special circumstances. We examined kind-referring NPs in characterizing sentences, and we looked at NPs that refer to entities similar to kinds ("notions" and "concepts").

Finally, we discussed some additional subjects. We argued for a distinction between quantificational predicates (such as *be common*) and proper kind-predicates (such as *be extinct*). And we showed that *any*-NPs can be seen as behaving like indefinite NPs in characterizing sentences. We also looked at gerundives, infinitives, and nominalizations, arguing that they are semantically similar to NPs. Generic anaphora was explained as a second layer in the anaphorical process, on top of the well-known "object anaphora." We summarized the philosophical discussion of natural kinds and made some observations concerning the establishment of kinds. Finally, an analysis of bare plurals in English that is connected with the present theory was compared with their treatment in Carlson 1977b.

Several other, relevant subjects were not treated in this chapter. An example is the interaction of genericity and negation; note that we have only looked at affirmative sentences. One interesting phenomenon is the scope of negation. A sentence like *Mary doesn't smoke a cigarette after dinner* can mean that it is not the case that Mary habitually smokes a cigarette after dinner, that is, negation may have wide scope. It is not so clear whether it can have narrow scope as well, that is, whether the sentence can mean that Mary habitually does not smoke ($\stackrel{?}{=}$ objects to smoking) a cigarette after dinner. Other cases can have either scope. For example, *Cows do not eat nettles* can mean either that cows do not have the habit of eating nettles, or that they have the habit of not eating nettles (that is, in situations that contain nettles, they do not eat them).

Furthermore, in the discussion of characterizing sentences, we concentrated on the covert **GEN**-operator. We did not investigate in any detail the relationship between this operator and others that are overtly expressed, such as *always, typically, usually, mostly, sometimes*, etc. Sometimes the differences are rather subtle, sometimes quite evident.

Also, we did not mention the lively research going on under the title of "arbitrary interpretations," which often have been seen as related to genericity. Arbitrary interpretations occur within a range of different constructions, for example with the suppressed and uncontrolled subject argument of infinitival constructions as in (204a), with unspecified arguments as in Italian

(204b), with overt arbitrary pronouns such as French *on* or German *man* as in (204c), and with reflexive constructions as in Italian (204d).

(204) a. It is not clear how [to solve this problem].
b. L'ambizione spesso spinge e [a comettere errori].
'Ambition often pushes one [to make mistakes].'
c. Man zeigt nicht mit dem Finger auf Leute.
'One doesn't point with the finger at people.'
d. In Italia si beve molto vino.
'In Italy, people drink a lot of wine.'

Recent research on a number of languages, such as Italian (Jaeggli 1986, Rizzi 1986, Cinque 1988, Chierchia 1990), Greek (Condoravdi 1989a), French (Authier 1989), Polish (Kanski 1992), Persian (Karimi 1989), and Korean (Kim 1991), points toward the view that arbitrary interpretations are essentially like a general indefinite referring to persons; if the sentences have a generic flavor, then this is due to additional generic operators in them. Interestingly, it seems that in many cases this indefinite cannot be the only predicate in the restrictor. For example, Karimi points out the following contrast in Persian:

(205) a. *Mamolan ghost-e khook ne-mikhorand.
usually meat-GEN pig not-eat.3PL
'Usually, people don't eat pork.'
b. Dar een shahr, mamolan ghost-e khook ne-mikhorand.
In this city, usually meat-GEN pig not-eat.3PL
'In this city, people usually don't eat pork.'

Another area which we have neglected is semantic models for nominalization phenomena. The problem here is that a predicate, like *lions* or *chewing tobacco*, can be treated as a referring expression (as in *Lions are extinct* or *Chewing tobacco is a bad habit*). And sometimes it even seems that a predicate is applicable to itself, as in *Fun is fun*. The challenge is to provide model structures that allow for this. Perhaps one way is to carefully relax the type theory that underlies traditional model-theoretic semantics—of course without allowing the antinomies for the prevention of which type theory was invented to arise again. Several theories have been developed to do just this; see Chierchia 1982a, Turner 1983, Bealer & Mönnich 1989, and articles in Chierchia, Partee & Turner 1989.

2 STAGE-LEVEL AND INDIVIDUAL-LEVEL PREDICATES

Angelika Kratzer

That I am sitting on this chair is a very transitory property of mine.[1] That I have brown hair is not. The first property is a *stage-level property* in the terminology of Carlson (1977b). The second property is an *individual-level property*. Stage-level properties are expressed by *stage-level predicates*. And individual-level properties correspond to *individual-level predicates*. A number of grammatical phenomena have been shown to be sensitive to the distinction between stage-level and individual-level predicates. *There*-insertion sentences (Milsark 1974), bare plurals (Carlson 1977b), and absolute constructions (Stump 1985) are relevant examples. Here are some illustrations:

THERE-INSERTION
(1) a. There are firemen available.
b. *There are firemen altruistic.

BARE PLURALS
(2) a. Firemen are available.
b. Firemen are altruistic.

ABSOLUTE CONSTRUCTIONS (Stump 1985, 41–43)
(3) a. Standing on a chair, John can touch the ceiling.
b. Having unusually long arms, John can touch the ceiling.

Altruistic and *having unusually long arms* are typical individual-level predicates. *Available* and *standing on a chair* are typical stage-level predicates. The contrast between (1a) and (1b) is a contrast in grammaticality. The contrasts between (2a) and (2b) and between (3a) and (3b) are contrasts in interpretation. (2a) can mean that there are available firemen, but (2b) cannot mean that there are altruistic ones. (3a) can mean 'If John stands on a chair, he can touch the ceiling', but (3b) cannot mean 'If John has unusually long arms, he can touch the ceiling'.

If a distinction between stage-level and individual-level predicates is operative in natural language, it cannot be a distinction that is made in the lexicon

1. This paper was completed and submitted in December 1988, and appears here unchanged. Naturally my thinking about these topics has changed, largely due to the responses the paper has received during the six years it has circulated informally.