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POLARITY IN NATURAL LANGUAGE: PREDICATION, QUANTIFICATION AND NEGATION IN PARTICULAR AND CHARACTERIZING SENTENCES

ABSTRACT. The present paper is an attempt at the investigation of the nature of polarity contrast in natural languages. Truth conditions for natural language sentences are incomplete unless they include a proper definition of the conditions under which they are false. It is argued that the tertium non datur principle of classical bivalent logical systems is empirically invalid for natural languages: falsity cannot be equated with non-truth. Lacking a direct intuition about the conditions under which a sentence is false, we need an independent foundation of the concept of falsity. The solution I offer is a definition of falsity in terms of the truth of a syntactic negation of the sentence. A definition of syntactic negation is proposed for English (Section 1).

The considerations are applied to the analysis of definites in non-generic sentences and the analysis of generic indefinites. These two domains are investigated in breadth and some depth and the analyses compared and connected. During the discussion of non-generic predications with definite arguments and their respective negations (Section 2), a theory of predication is developed, basic to which is the distinction between integrative and summative predication. Summative predication, e.g., distributive plural, leads to contrary, all-or-nothing, polarity contrasts due to the fundamental Presupposition of Indivisibility. Furthermore, levels of predication are distinguished that are built up by various processes of constructing macropredications from lexical predicates. Given this analysis, particular (i.e., non-generic) quantification (Section 3) can be reanalyzed as an integrative, first-order form of predication that fills the truth-value gaps created by summative predication. The account comprises both nominal and adverbial quantification and relates quantification to the simpler types of predication discussed in Section 2.

An analogous line of argumentation is developed in Section 4 for indefinite generics (and similar constructions, including donkey-sentences) and generic quantification. It is argued that the generality of simple generic predications is not due to any quantificational elements, but results from the lack of referential anchoring of argument terms. In Section 5, the results are linked to pragmatic and cognitive considerations about the role of polarization in natural language communication, explaining the varying degrees of rigidity characteristic for different types of predications and quantifications.

The discussion leads to the conclusion that the type of polarity contrast is determined by the often complex type of predication. Polarity contrast in natural language is not a uniform phenomenon, but locally constructed for each predication on the basis of a contrast frame defined by the respective presuppositions of the predication.[1]

[1] I would like to thank all those who made it possible to present this paper in its present form. The participants of the colloquium on *Recent Developments in the Theory of Natural Language Semantics* in Blaubeuren (Germany) in Oct. 1994 gave many interesting and encouraging comments on a talk about the subject, in particular Bill Ladusaw. I am also indebted to Regine Eckardt, Larry Horn, Ekkehard König, Ewald Lang and Renate Musan and two anonymous referees of the journal for comments on the paper. Amy Romig and Tim Skellett helped me to adjust my personal Pidgin somewhat closer to the standard, although they did not manage to keep me from insisting on some of my stylistic and terminological idiosyncrasies. A previous version of this paper was published 1995 by the

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0. INTRODUCTION

The complex analysis developed in this paper is the result of many analyses I undertook over several years. At the beginning stood the observation that quantificational analyses of plural definites and certain generic constructions (such as donkey-sentences or generic bare plurals) are logically inadequate.[2] According to traditional truth-functional analyses of sentences such as

(1)a. the books are written in Dutch

the plural definite is to be understood as a universal quantifier. Sentence (1a), therefore, is given the same analysis as sentences (1b) and (1c), namely something like (1d).

(1)b. all the books are written in Dutch
c. every book is written in Dutch
d. $\forall x(\mathbf{book}(x) \rightarrow \mathbf{written\text{-}in\text{-}Dutch}(x))$

While one might accept as a rough approximation that (1a) and (1b–d) are *true* under the same conditions, they are, however, *false* under drastically different conditions. (1b–d) are clearly false iff one or more of the books are not written in Dutch, but (1a) is false, as I will argue below, iff (2a) is true:

(2)a. the books are not written in Dutch

Now, if the same type of analysis is applied to (2a) as has been to (1a), we obtain

(2)d. $\forall x(\mathbf{book}(x) \rightarrow \neg\mathbf{written\text{-}in\text{-}Dutch}(x))$

as its semantic representation, which clearly is not the negation of (1d). Something must be wrong here, either (1d/2d) is not the appropriate analysis of (1a/2a), or (2a) is not the negation of (1a).

The solution I am going to develop argues for the first option. I will claim, and offer evidence for the claim, that (2a) *is* the negation of (1a) and that the pair of sentences (1a) and (1b), although they share the conditions for being true, are subject to different conditions of falsity. It immediately follows for the practice of truth-conditional semantics that in these cases it is insufficient to give truth conditions only in terms of

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[2] Unknown to me, the same observation was made by Fodor (1970, cf. pp. 153–168), but it apparently was not adopted by the main stream theories.

conditions for being true and equate falsity with non-truth. One basic (though not central) point I want to make in this paper is therefore a methodological point:

(A) A proper definition of truth conditions for natural language sentences must always specify not only the conditions under which a sentence is true, *but also explicitly the conditions under which it is false.*

In the actual practice of theoretical semantics, the specification of falsity conditions is often neglected. It is apparently left to the assumption of *tertium non datur*,[3] which yields the default regulation:

(B) A sentence is false iff it is not true.

I take the position that (B), in this formulation, is empirically invalid for natural language and I will argue below that some of the semantic analyses currently discussed or considered valid are either inadequate, by incorrectly applying that principle, or incomplete by not determining the conditions of falsity (and/or the presuppositions of the sentence).

Dropping principle (B) opens the door for investigating the nature of polarity contrast in natural language. I will argue that natural language negation does not always yield the same type of polarity contrast. For instance, while negation of a simple sentence with a singular count definite subject NP usually[4] yields a complementary contrast (relative to the definiteness presuppositions and maybe other, independent, presuppositions) the contrast between a simple sentence with a plural definite subject and its negation is an all-or-nothing, i.e., contrary, contrast. These observations lead to a closer analysis of the underlying mechanisms of predication, e.g., those involved in predication with plural arguments. The result is an outline of a system of predicational processes that result in different complex types of predication, including quantification proper. The type of polarity contrast, then, depends on the type of predication.

As I will argue in due turn, abandoning the *tertium non datur*, i.e., detrivializing the theme of negation, requires first of all an independent definition of falsity. Such a definition will be given in Section 1: a sentence is false iff its syntactic negation is true. Hence, the main topic of Section 1 will be a definition of syntactic negation for English (any such definition

[3] Latin, lit. "there is no third", the principle according to which for any (declarative) sentence there are exactly two possibilities: the sentence is either true or false. The principle is also called the Law of the excluded middle.

[4] That is, with an "integrative" predicate, see Subsection 2.2.

is necessarily language-specific.) On this basis, several types of predication with non-generic definite arguments will be analyzed in Section 2, which introduces the basic distinctions between summative and integrative predication and between primary and macropredication, and the Presupposition of Indivisibility. I will argue that definites, due to their logical properties, are never quantifiers proper. In Section 3, adverbial and nominal quantification in their non-generic ("particular") mode are related to the non-quantificational types of predication investigated in Section 2. I will argue that this mode of quantification is based on explicit or implicit definite reference to the domain of quantification. Section 4 turns to the analysis of several types of generic constructions, i.e., *characterizing* sentences in the terminology of Krifka et al. (1995). In an argument parallel to the one in Sections 2 and 3, I will vote for a non-quantificational analysis of generics without explicit quantifiers. An explanation of genericity will be offered in terms of a mechanism that does not involve universal quantification. In Section 5, I will discuss basic pragmatic and cognitive aspects of polarization, taken as a basic strategy of communication by means of natural language. The results are summed up, and further perspectives indicated, in Section 6.

1. Negation and Falsity

The section is devoted to one problem: a definition of negation (for English) and falsity. After arguing that the *tertium non datur* is not valid – at least not *a priori* – for natural languages (Subsection 1.1) and that we are not in a position to base falsity on direct intuition (Subsection 1.2), a distinction is drawn between the syntactic and the semantic notions of negation and negativity (Subsection 1.3). In Subsection 1.4 I will then offer a (partial) definition of syntactic negation for English, definition (E), that will allow a sound definition of falsity (Subsection 1.5) and will be fundamental to the discussion in the rest of the paper. Definition (E) is in need of several comments, given in the second half of the section. Standard syntactic negation will be distinguished from metalinguistic negation on the one hand (Subsection 1.6) and lexical inversion or morphological negation on the other (Subsection 1.7). Subsection 1.8 will briefly turn to the matter of double negation. A generalization of (E) that also covers focus constructions will be proposed in Subsection 1.9.

1.1. *The Tertium Non Datur in Logic and in Natural Language*

The *tertium non datur* principle is fundamental to standard classical logic, including the majority of the logical systems used in Formal Semantics. Such systems are technical constructs that legitimately may be based on whatever principles are considered useful. Natural languages, however, are not deliberately constructed systems. Whether the *tertium non datur* holds true or not for natural language is an *empirical* question. In order to answer the question, we need an independent criterion for the truth and the falsity of arbitrary sentences. Only then is it possible to decide if (certain types of) sentences are false iff they are not true, or if there is a third possibility of being neither true nor false.

I will argue that the polarity contrast inherent to a proposition is always "binary", but only in relation to specific non-trivial[5] conditions. These conditions are the semantic presuppositions resulting from the type of predication: referentiality presuppositions, sortal restrictions and the Presupposition of Indivisibility (PI) to be defined below. All these create a real *tertium* in the case of failure. This is not to be interpreted as postulating further truth-values in addition to TRUE and FALSE. Rather it constitutes a plea for the assumption of truth-value gaps. In particular, PI leads to cases of contrary (rather than complementary) contrast. As I will argue, the presupposition-loaded contrasting case is what most reasonably meets the intuition of a sentence being false. Under these circumstances, a definition of the conditions under which a sentence is true would not suffice as a complete definition of its truth conditions: we would not know which parts of the conditions for truth are asserted and subject to polarity inversion and which ones are presupposed.

Let P(S), for any sentence S, be the (conjunction of the) conditions S presupposes, and T(S) and F(S) the conditions under which it is true or false, respectively. Assume that for two sentences, A and B, (i) T(A) and T(B) are identical, (ii) P(B) is $P(A) \wedge P'$, i.e., B presupposes all conditions A presupposes plus an extra, independent, condition P'. Then A and B would differ in their overall truth conditions as illustrated in Table 1.

From T(A) and T(B) alone (which include the respective presuppositions) we cannot derive the different conditions of falsity. If we define, however, both T(S) and F(S) for a sentence S, we can determine P(S) as the negation of T(S)-or-F(S). There are many types of such sentence pairs

[5] By "non-trivial conditions" I mean conditions which positively rule out certain cases, i.e., non-void conditions.

Table 1

P(A)	*fulfilled*			*not fulfilled*
P(A) $\wedge$ P'	*fulfilled*		*not fulfilled*	
T(A)	*fulfilled*	*not fulfilled*		
sentence A	TRUE	FALSE		(no truth value)
sentence B	TRUE	FALSE	(no truth value)	

with T identical and P different, some of which will be analyzed below, for instance:

(3) a. every pig is hungry
  b. the pigs are hungry

(4) a. all pigs are fat
  b. pigs are fat

(5) a. John met Paul
  b. John met PAUL[6]

(6) a. John met PAUL
  b. John met only PAUL

It follows that there is no such thing as "the same truth conditions, but different presuppositions" – not for those presuppositions that are considered part of the propositional meaning of the sentence.

1.2. *Truth is Basic, Falsity Isn't*

There is a strong bias in our intuition concerning conditions for being true and conditions for being false. The linguistic literature on negation provides a splendid illustration of the unreliability of intuition in this regard. Our linguistic competence furnishes us with the ability to interpret sentences. Part of that is the ability to determine the conditions under which a sentence is true and, consequently, to determine the conditions under which a sentence is not true. This is our basic intuition as far as truth conditions are concerned. If there are in principle *three* possibilities for (declarative) sentences – to be true, to be false, or to be neither – this means that falsity is not a notion based on direct intuition.

The fact that our intuition about truth is basic is reflected in the philosophical position that truth is an irreducible notion. This is Frege's position

[6] Small capitals represent contrastive focus.

and Tarski's result. Truth, then, need not be and cannot be defined. We are still left, though, with the necessity to define what it means for a sentence to be false.

Polarization in natural languages manifests itself in the existence of negative and (yes/no type) interrogative counterparts for almost all types of declarative sentences. The negative and interrogative counterparts are systematically constructed by basic syntactic rules. As far as I know, these two manifestations of polarization in natural languages are universal.

A natural way of defining falsity on the basis of elementary linguistic facts without taking refuge to a basic intuition of falsity is, thus, (C), in a yet preliminary formulation to be refined below:

(C) **Definition**
A sentence is false iff its syntactic negation is true.

The definition, in this formulation, is inadequate in that it suffers from two prototypical assumptions: First, if the term *negation* is taken in the syntactic sense, (C) is formulated as though falsity had to be defined only for positive sentences, i.e., those sentences that can be negated; and second, it presupposes the prototypical case of a sentence (a) having a negation at all and (b) having only one negation. Both conditions need not be fulfilled, as will be discussed later in this section.

It might be argued that if our basic intuitions are confined to the judgement of the conditions under which a sentence is true, truth-conditional semantics could rightly confine the analysis to these conditions, redefining (or maintaining) the concept of truth conditions accordingly. However, such one-sided truth conditions would fail to capture an essential part of the descriptive meaning of natural language sentences: the semantically constructed contrasting case. As I take it, any statement that is claimed to be true can only be claimed to be so with respect to a clearly defined polar contrast. The polar contrast, expressible by the negation of a sentence, provides the point made with any assertion. It is the difference in terms of the contrasting cases that accounts for the intuition that sentence pairs such as those in (3) to (6) above differ in meaning.

The plea for giving up the *tertium non datur* for natural language, or at least for treating it as an empirical matter rather than an axiom, is not to be taken as implying the assumption of more than two truth values. Truth values are positive results of evaluation procedures. The lack of a result is not a result of the same kind. The binary alternative between two opposite truth values TRUE and FALSE is obviously rooted in the structure of natural language, but no further alternative values can be regarded to be so.

1.3. *The Semantic Notions of Negation and Negativity*

For the discussion following now, it is crucial to distinguish between "negation" in the syntactic sense and in the semantic sense. Let us start with a simple example: We would judge that (7a) is false if (7b) is true, and that (7b) is false if (7a) is true:

(7)a. I'm glad
b. I'm not glad

Sentence (7b) is the negation of sentence (7a) in a double sense: in the *syntactic* sense, as it contains the additional word *not* in the proper position, and in the *semantic* sense because it is true iff (7a) is false. Sentence (7a), on the other hand, is the negation of sentence (7b) in the semantic sense, but it obviously is not the negation of (7b) in the syntactic sense.

In order to avoid terminological confusion, I will restrict the use of the term *negation* in the following to the syntactic sense: the 'negation' of a sentence is the result of an appropriate syntactic operation by which a lexically negative element is added to the sentence or is substituted for a positive element. I assume that in the default case a (positive) sentence has exactly one well-defined negation. I will therefore loosely talk of "*the* negation of a sentence".

Related to the notion of negation, and likewise ambiguous, are the notions of *positive* and *negative* sentences. The use of these terms, too, will be restricted to the syntactic level. A positive sentence is a sentence that is not the syntactic negation of some other sentence. Negative sentences are syntactic negations of positive sentences. The definition is sound as long as one assumes – as I will do – that double syntactic negation is impossible.

For the 'semantic negation' of a sentence, I will use the term *polarity counterpart*.

(D) **Definition**
Two sentences A and B are *polarity counterparts* of each other iff: A is true iff B is false, and vice versa.

The definition implies that polarity counterparts carry the same semantic presuppositions.[7] Since the polarity-counterpart relation is defined semantically, there may be two or more polarity counterparts to a given sentence: all sentences truth-conditionally equivalent to a counterpart of the sen-

[7] Semantic presuppositions are presuppositions in the classical sense of Frege's.

tence are counterparts of it.[8] Given a proper definition of syntactic negation, there is a natural candidate for *the* polarity counterpart of a sentence: namely the negation of the sentence (if there is a unique one) or, in case the sentence itself is negative, the sentence it is the negation of. For instance, (7a) and (7b) are polarity counterparts of each other.

As for the semantic notion of negativity, it is a non-trivial task to distinguish between semantically "positive" and "negative" *sentences*, but a definition appears possible. Research on negative polarity phenomena and duality operators has shown that there are semantic asymmetries between positive and negative sentences and operators.[9] For instance, the majority of natural language sentences are either upward- or downward-entailing with respect to certain syntactic positions, semantically positive sentences being upward-entailing, while semantically negative sentences are downward-entailing. The notions of upward- and downward-entailment can be defined in terms of logical entailment, and this, in turn, in terms of 'trueness' alone. Given a pair of polarity counterparts, we can thus distinguish in many cases between a positive and a negative member.

The monotonicity criterion can also be used for the identification of lexically negative elements. For instance, the particle *not* can be identified as negative on the basis of the fact that if inserted into the proper position of a sentence that otherwise is an upward-entailing environment with respect to a certain syntactic position it turns the sentence into a downward-entailing environment. For example: sentence (7a) is an upward-entailing environment with respect to the position of the AP, as can be seen from the fact that (7c) entails (7a):

(7)c. I'm very glad
a. I'm glad

Insertion of *not* after the finite verb turns the sentences into a downward-entailing environment for the AP; (7b) entails (7d):

(7)b. I'm not glad

[8] Note that two sentences can be polarity counterparts without being negations of each other in the syntactic sense. Cf. the following pairs:

(i)a. some numbers are odd
b. every number is even

(ii)a. today is Monday, Thursday, or Friday
b. tomorrow is Sunday, Monday, Wednesday or Thursday.

[9] See Ladusaw (1979) and subsequent literature on downward monotonicity, also Löbner (1990, ch. 5) on semantic asymmetries between positive and negative members of duality groups.

(7)d. I'm not very glad

Although it appears possible to define the class of semantically "negative" sentences by means of entailment properties, I do not see a way of defining the *correspondence* between pairs of polarity counterparts on this basis. For a positive sentence S, there may be several sentences that entail that the positive sentence is not true. But these sentences would not all be polarity counterparts of S. For instance, on the basis of the monotonicity criterion, we can classify (8a)

(8)a. she often takes the subway

as semantically positive and (8b, c, d) as semantically negative, but only (8d) is a polarity counterpart of (8a):

(8)b. she seldom takes the subway
c. she never takes the subway
d. she doesn't often take the subway

1.4. *The Definition of Syntactic Negation and Negativity*

The definition of the syntactic notion of negation must, of course, be language-specific, but I am confident that a similar definition is possible for every language. As for English, the first approximation (applying only to non-quantificational sentences) would be: The negation of a positive sentence is the same sentence plus VP negation (i.e., negation of the finite verb). VP negation is usually accomplished by using the particle *not* (possibly in connection with the auxiliary *do*) in a certain syntactic position. There may be alternative syntactic means of negation, such as the insertion or substitution of negative words like *no* or *none*. For example, both (9b) and (9c) can be considered regular negations of (9a) (possibly in slightly different readings of the positive sentence):

(9)a. she has money
b. she has no money
c. she doesn't have money

This first approximation is obviously in need of modification. So far, it applies only to sentences where the VP is not in the scope of a higher-order operator, e.g., a quantifier, that can itself be negated. In the following triplets of sentences, the positive a-sentences contain such an operator, the b-sentences are the result of negation of the VP within the scope of the operator, while the c-sentences, with the operator itself being negated or replaced by a negative counterpart, are the proper negations of the a-sentences.

(10)a. sometimes she is on time
b. sometimes she is not on time
c. she never is on time

(11)a. the flag is partly wet
b. the flag is partly not wet
c. the flag is not partly wet

(12)a. every city was destroyed
b. every city was not destroyed
c. not every city was destroyed

In (10), negation of the operator *sometimes* is accomplished not by syntactic insertion, but by lexical substitution. The difference between the b-sentences and the c-sentences is well known as that between inner negation (or subnegation) and outer negation. I presume that, in English, an operator can be negated iff it can be negated *in situ*, i.e., either by modification with a negation word like *not* within the same constituent or via lexical substitution. I am confident that it is possible to define by merely syntactic means (i) whether the VP containing the finite verb is within the scope of an higher-order operator and (ii) whether this operator can be negated and what its negation is. The refined definition of negation, then, is:

(E) **Definition**
Sentence B is a *negation* of sentence A if
(i) in the case the VP containing the finite verb is not within the scope of an operator that can be negated:[10]
sentence B is sentence A plus VP negation.
(ii) in case the VP containing the finite verb is within the scope of an operator that can be negated:
sentence B is sentence A plus the negation of the highest such operator; in some cases, the negation of the operator is formed by substituting a corresponding negative operator.

[10] I assume that the (im)possibility of being negated is a lexical feature of any operator. In the default case, every operator of any logical type αt can be negated with *not*; some operators (such as *already* or *some*) are barred from negation, in which case a negative substitute is defined.

(iii) A is not a negation, according to (i) or (ii), of any other sentence.

I am aware of the fact that defining syntactic negation properly is a fairly complex task. Neg-raising phenomena, for one, have to be accounted for as exceptions from the basic rule (E). They should not, however, present an insurmountable obstacle. For the phenomena discussed in this paper, the rough definition in (E) will do. The types of constructions discussed in Sections 2 to 4 all possess straightforward standard negations.

Since clause (iii) of definition (E) rules out multiple syntactic negation, (E) yields a sound definition of syntactic negativity: a sentence is *syntactically negative* iff it is the syntactic negation of some other sentence.[11]

1.5. *The Definition of Falsity*

We are now in the position to define the notion of falsity on the basis of the notions of truth and syntactic negation:

(F) **Definition**
If a sentence A is the negation of a sentence B according to definition (E), then
A is *false* iff B is true, and
B is *false* iff A is true.

It follows from definitions (D) and (F) that a sentence and its negation are polarity counterparts of each other.

To the extent that definition (F) is sound, we have eliminated the necessity to rely upon any direct intuition as to whether a given sentence is false; instead, we apply our intuition about *truth* to the syntactic negation of the sentence in question (or to the sentence which it is the negation of).

The approach relies on several non-trivial, but probably valid, assumptions. In particular it is presumed that it is possible to determine independently, for the language considered:

1. the regular syntactic operations expressing negation;

[11] There might be idiosyncratic cases where syntactically negative sentences do not have a positive counterpart, i.e., they are negative without being the negation of a sentence. The only case I have met so far is generic quantification with *no* in the singular (e.g., *no dog meows*) which should be the negation of *some dog meows*, which, however does not seem to possess the corresponding generic reading.

2. the higher-order operators, and to decide if they can be negated either syntactically or by substitution;
3. the scope of higher-order operators;
4. the exceptions to which the definition of negation does not apply (e.g., constructions with neg-raising verbs etc.)

I am confident that these problems can be solved. Apart from the syntactic point 3, the remaining three conditions are a matter of very limited sets of specific lexical items. Negative elements can be identified, as noted above, by the marked monotonicity conditions within their scope. Higher-order operators produce scope ambiguities, not only with negation but with a whole range of other operators; neg-raising verbs exhibit a characteristic equivalence of *in situ* and external modification. The direction of monotonicity and equivalence or non-equivalence can be determined without making use of the concept of falsity; all one needs is a test of logical entailment, and this, as noted above, is possible relying on truth judgements alone.

Given all that, we can postulate the following as the proper format of truth conditions for natural languages. It provides conditions not only for truth, but also for falsity, and it has a methodologically sound basis in requiring only intuitions concerning *truth*.

(G) **Postulate**
The *proper format of truth conditions* for natural language sentences consists of:
(a) conditions for truth
(b) conditions for falsity in terms of truth of the syntactic negation
(c) (*concomitantly*) semantic presuppositions as preconditions for being either true or false.

Definition (F) now allows a definition of the notion of semantic presupposition in the classical sense of Frege:

(H) **Definition**
A sentence *semantically presupposes* a condition P iff both the sentence and its negation are only true if P is fulfilled.

The definition is not as general as we might want it, since it hinges on the definition of negation. Thus, it does not define the presuppositions of sentences that are not covered by (E). But the definition is sufficient for our purposes. In particular, it allows a modification of the *tertium non datur* principle, which in this form *is* valid for natural language, since it follows immediately from the definitions given:

(I) **The Law of the Excluded Middle for Natural Language**
If all presuppositions of a sentence are fulfilled, the sentence is either true or false.

1.6. *Negation and Metalinguistic Negation*

It is important, at this point, to comment on the relationship between the notion of negation defined here and what is called metalinguistic negation. At first glance, the definition appears dependent on an exclusion of metalinguistic negation. For example, I will argue below that the negation of a simple quantifier-free sentence with a definite subject and intransitive verb is formed by VP negation:

(13)a. the students are complaining
b. the students are not complaining

The decision to regard (13b) as the regular negation of (13a) depends on whether clause (i) or clause (ii) of definition (E) is to be applied here. If we considered the definite subject NP as an operator (with scope over the VP) *that can itself be negated*, the regular negation of (13a) would rather be (13c):

(13)c. not the students are complaining

The sentence, however, clearly exhibits the characteristics of metalinguistic negation. The negation is accompanied by marked intonation or other means of emphasis. Pragmatically, it is much more restricted than the standard negation (13b), in requiring, as a rule, a rectification immediately following.[12] Thus, it appears, that our definition needs an additional provision for ruling out the negation of non-standard syntactic positions.

At a closer look, however, definition (E) is not unsound in this respect. Sentences such as (13c) involve contrastive focusing on the subject NP. The proper representation would, hence, rather be (13d) with small caps indicating contrastive focus:

(13)d. not THE STUDENTS are complaining

Rather than being the negation of (13a), I consider (13d) to be the regular

[12] See Horn 1989, pp. 392 ff. for a detailed description of the phenomena.

negation of (13e), i.e., the corresponding positive sentence with the same type of focus on the subject NP:

(13)e. THE STUDENTS are complaining

(13e) means "those who are complaining are the students" and (13d) means "those who are complaining are not the students", correspondingly.[13]

The view proposed here implies that "metalinguistic negation" of this type can be reanalyzed as the result of two grammatical operations: first focusing on the NP and then, independently, applying *standard* (descriptive) negation to the focused construction. Apart from that, there appear to be good reasons not to consider contrastive focusing as a necessarily metalinguistic operation.[14] The majority of these cases can be treated straightforwardly without leaving the level of semantic representation.

But even if the contrast really is metalinguistic, the two steps of, first, focusing and, then, negating can be distinguished. In the case of Horn's example (Horn 1989: 372, original underlining is replaced by small caps)

(14) I'm not a TrotskyITE, I'm a TrotskyIST

I would argue likewise that the metalinguistic, or non-propositional, quality of contrast is not due to some special mechanism of negation, but to a foregoing shift of focus to which, in a second step, standard negation is applied. All these metalinguistic effects can as well be achieved without negation accompanying them. This is obvious from the fact that the same metalinguistic quality is to be observed with the non-negative rectification clauses appropriate after such "metalinguistic negations".

A second form of metalinguistic negation often cited is the sentence embedding construction *it is not the case that*. . . . This type of negation is ruled out by definition (E). (15a) is not a negation of (15b), but rather of (15c):

(15)a. it is not the case that the king of France is bald
b. the king of France is bald
c. it is the case that the king of France is bald

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[13] Löbner (1990, ch. 8) offers a general analysis of contrastive focus according to which the focused term is to be taken as a predicate which applies to an implicit definite argument provided by the focus-embedding construction. In the case of (13e/d), the implicit argument would be *ιx x is/are complaining* and the focus predicate would be *be the students* (constructed by the common type shift from type e to type ⟨e, t⟩).

[14] See McCawley's (1991) reanalysis of *not X but Y* constructions for the same point of criticism of Horn's notion of metalinguistic negation.

I take it that if there is a reading of (15a) that does not claim the presupposition of existence and uniqueness for the definite term *the king of France*, then there is a correspondent reading of (15c). (15a) is the negation of (15c) *in these readings*. Again, the "metalinguistic", i.e., in this case presupposition cancelling, quality of the construction in (15a) is not due to negation itself, but to the embedding construction *it is the case that*. . . .

At this point, it would be premature to claim that all cases of metalinguistic negation can be explained away in this way, i.e., arguing that the negation itself is standard and that the metalinguistic quality is due to some independent, foregoing process also possible without negation accompanying it. The remarks should, however, in any event be sufficient to show that definition (E) is sound with respect to the phenomena treated in this paper.

There is a reliable positive test for descriptive vs. metalinguistic negation in the case of simple sentences falling under clause (i): If replacement by a boolean opposite[15] is lexically possible and equivalent to explicit VP negation, then the syntactic negation is descriptive. We will apply this criterion below. Although the number of lexical predicate terms paired with a boolean opposite (such as *possible-impossible*, *on-off*, *present-absent*) is limited, these pairs of predicates suffice for testing if certain *types* of negative syntactic constructions are descriptive or metalinguistic.

1.7. *Syntactic Negation vs. Lexical Inversion*

In view of pairs of boolean opposites in the lexicon, the question arises if replacement of a relevant predicate in the VP by a boolean opposite is another means of syntactic negation. Let us call replacement by a boolean opposite *lexical inversion*. Are, for example, (16/17b) syntactic negations of (16/17a) on a par with the regular negations (16/17c)?

(16) a. she came with her daughter
  b. she came without her daughter
  c. she didn't come with her daughter

(17) a. the radio is on
  b. the radio is off
  c. the radio is not on

The question can be assessed by testing and comparing lexical inversion

[15] A predicate P′ is the boolean opposite of a predicate P iff it yields, for the same domain of arguments, the opposite truth values.

and negation according to definition (E) in constructions that require either syntactically negative or positive clauses. Two standard tests[16] yield a clear result: unlike syntactic negation as defined in (E), lexical inversion does not turn a syntactically positive sentence into a syntactically negative one. The first test concerns tag questions.

(18) a. she came with an umbrella, *did she/didn't she?
b. she came without an umbrella, *did she/didn't she?
c. she didn't come with an umbrella, did she/*didn't she?
d. none of them came with an umbrella, did they/*didn't they?

A further clear criterion is the distribution of *either* vs. *too* in constructions of the form "X *and* Y *either/too*".

(19) a. the radio is on and the TV set too/*either
b. the radio is off and the TV set too/*either
c. the radio isn't on and the TV set isn't on *too/either
d. Mary never turns off the radio and John doesn't *too/either

As a result, we can state that *for simple sentences*, i.e., clause (i) sentences without higher-order operators with scope over the VP, syntactic negation is never accomplished by lexical inversion, but always by explicit VP negation.[17] The delimitation of lexical inversion and syntactic negation is more subtle in the case of higher-order operators, where negation by substitution may occur: some such operators may have lexical opposites too. How about pairs like *many/few* or *often/rarely*? Are they negative substitutes or lexical opposites? The tests applied above help to clarify the question:

(20) a. few came by car, *did they/didn't they?
b. not many came by car, did they/*didn't they?
c. she doesn't often use her car, does she/*doesn't she?
d. she uses her car rarely, *does she/doesn't she?

Unlike the syntactic negations *not many* and *not often*, the lexical opposites *few* and *rarely* do not qualify as syntactically negative. The *either/too* test yields the same result:

(21) a. Mary likes few restaurants here and John *either/too

[16] The criteria are taken from Givón (1993: vol. I, pp. 203f.); there are certainly many more.
[17] This is in accordance with our later result about double negation: obviously, unlike syntactically negative sentences, those obtained by lexical inversion of a positive sentence can undergo syntactic negation.

(21)b. Mary doesn't like many restaurants here and John (doesn't) either/*too
c. Mary doesn't often use her car and John (doesn't) either/*too
d. Mary rarely uses her car and John too/*either

One could postulate a general restriction for syntactic negation by substitution: it is ruled out whenever syntactic negation by the standard negation expression is possible. The only cases left seem to be higher-order operators based on *some*: *some* itself as well as *somewhere*, *sometimes* and the pronominalizations *someone*, *somebody* and *something*.[18]

1.8. *A Note on Double Negation*

Clause (iii) of definition (E) rules out the possibility of (syntactic) non-concord double negation. Bold as this step may appear, it seems to be empirically justified. Apparently, there are no instances of a second negation immediately applying to an embedded negation, i.e., constructions of the structure "not(not(p))". Rather, whenever a negation has scope over another negation, always a third operation appears to intervene. In the famous saying of Paul Watzlawick

(22) "one cannot *not* communicate"[19]

the possibility operator is applied between the two negations. In sentences such as

(23) I'm not NOT glad

which could be followed by a rectification like *I'm just not* VERY *glad*, focusing enters in between.

It should be noted further, that the standard cases cited as instances of "double negation"[20] consist of one syntactic negation applied to a lexically inverted predicate, such as in

(24)a. I'm not unhappy

Thus, in the syntactic sense, (24a) represents a case of single negation, not different from, say,

(25) the flat is not small

[18] One question in this connection is deliberately left untouched: the complex regularities of syntactic negation by nominal *no* such as in *this is no problem*, *I've got no time* and the like.
[19] In Watzlawick, Beavin and Jackson (1967, p. 49); the italics are original.
[20] For example, those in Horn (1991).

(where the invert *small* of the positive *big* or *large* does not exhibit any overt trace of lexical inversion), or (24b) for that matter:

(24)b. I'm not happy

As a result, clause (iii) of definition (E) appears empirically justified. It guarantees that the distinction between syntactically positive and negative sentences is a straightforward matter of surface form and it allows us to introduce a further, very simple, criterion for this distinction: if a sentence can be syntactically negated, it is syntactically positive. Adding the criterion to the ones used in the last section yields the same results about lexical inversion and negation by substitution of a higher-order operator:

(26)a. the radio is not on
b. the radio is not off
c. *the radio isn't not on
d. *not no radios are on
e. she not rarely takes the bus

(All examples are to be taken with unmarked focus structure.)

1.9. *Negation and Focus*

A limitation of the proposed concept of negation is its restriction to what I would like to call the natural focus of a sentence. Natural language sentences can be fairly complex constructions, both syntactically and semantically, involving several predications. Even a simple sentence such as

(27) the owl is asleep

involves three predications: a predication *owl* describing the referent of the subject term, the predication (*be*) *asleep* to be applied to the same object and a predication about the time of reference encoded in the present tense form of the finite verb, qualifying the time as present.

The predications combined in one sentence are hierarchically organized to the effect that there is one predication on top of the whole construction which is in the focus of polarity. The syntax of English, in the unmarked case, places the topmost predicate in the position of the finite verb. If a quantificational NP or adverb is added, the focus is shifted there. These facts are immediately reflected in the proposed definition of negation, in that the expression of negation is located at the syntactic component that carries the focus of the sentence.

The grammatical device of contrastive focusing, i.e., focusing on some other syntactic position, also results in a shift of the polarity focus of the sentence. One variant of focus shift is bare focusing as in

(28)a. JOHN will get the pizza

Another variant is focusing in connection with certain particles "associated with focus" such as *only*, *even*, *also*, or German *schon* ("already") and *erst*.[21]

(29)a. only JOHN will get a pizza

In all cases of (contrastive) focusing, a new polarity focus is established employing the focused term as a predicate (cf. the remarks in Subsection 1.6 about Example (13)). This is not the place to go into that matter. Suffice it to say that the proposed definition of negation can straightforwardly be extended to cover these cases. Given the fact that this type of focusing shifts the polarity focus to some other syntactic position, the negation of the focus position again yields the proper polarity counterparts:

(28)b. not JOHN will get the pizza
(29)b. not only JOHN will get a pizza

Definition (E) of negation can thus be generalized as follows:

(E′) **Definition**
The negation of a sentence is formed by negating the focus of the sentence.

2. DEFINITE ARGUMENTS AND TYPES OF PREDICATION (1)

In this section, I am going to discuss several types of sentences with definite arguments. The primary question in each case will be: what is the regular negation of this type of sentence? I will argue throughout that regular negation is formed by VP negation. Discussing different types of definite arguments, I will introduce corresponding forms of predication, developing an approach to a systematic investigation of predication as a complex linguistic phenomenon. As for definites, the analysis will show that they should not be considered quantifiers proper, but simply individual terms. Polarity contrast as represented by pairs of positive sentences and their negations will turn out to be a heterogeneous phenomenon,

[21] See Löbner (1989: 184ff.) for the analysis of focusing uses of these particles.

negation yielding a complementary contrast in some cases, but an all-or-nothing, i.e., contrary, contrast in others.

The discussion starts with singular count definite arguments (Subsection 2.1), introducing the distinction between integrative and summative predication (Subsection 2.2) and the Presupposition of Indivisibility (Subsection 2.3). In a second step, I discuss mass and singular collective definite arguments (Subsection 2.4) and introduce the concept of macropredication (Subsection 2.5). Plural definite arguments are analyzed in Subsection 2.6. The section concludes with a discussion of the logical type of definites (Subsection 2.7). The whole section is restricted to *particular*, i.e., non-generic, predication which later, in Section 4 will be distinguished from generic predication.[22]

2.1. *Singular Count Definites*

Let us start the discussion with the analysis of simple predications with singular count definite arguments, excluding collective definites.

(30)a. the cow is mad
b. the cow is black

Probably nobody would deny that the negation of (30a) is (31a):

(31)a. the cow is not mad

Intuitive though it be, we are nevertheless obliged to derive this decision from our definition of negation. Sentence (30a) is meant to be read without a contrasting focus on any constituent. The question to be decided, then, is this: is the definite subject NP a higher-order operator that could be negated itself? If so, the negation would be (32):

(32) not the cow is mad

The answer is: (32) is only possible with contrastive stress on *the cow*. It requires a special context in which it is presupposed that something is mad. No such presupposition is triggered by sentence (30a). Hence, (30a) and (32) cannot be polarity counterparts of each other, since polarity counterparts, by definition, would carry the same presuppositions. The

[22] In calling non-generic predication "particular", I adopt the terminology suggested in Krifka et al. (1995). I do this somewhat reluctantly because of the obvious ambiguities arising from this particular use of "particular". Particular predication (and quantification) is to be taken as predication (or quantification) about particular, individual, concrete cases. In earlier publications I used the term "referential" instead. Throughout this paper, the word *particular* is exclusively used in its technical sense.

definite article differs clearly from genuine quantificational determiners such as *every*. Sentences (33a) and (33b) *do* carry the same presuppositions:

(33)a. every cow is mad
b. not every cow is mad

Furthermore, real quantificational determiners admit not only negation but also a number of other modifications that are impossible for the definite article:

(34)a. [almost every]$_D$ cow is mad
b. [absolutely every]$_D$ cow is mad
c. [probably every]$_D$ cow is mad
d. [*almost/absolutely/probably the]$_D$ cow is mad

It might be argued that the incompatibility of these modifications of the definite article is due to the fact that the noun is singular, but the modifications are equally impossible with plural definites. Thus, the definite article is not modifiable at all, including negation (except, perhaps, for specific modifications of a quite different kind such as *the above-mentioned*...).

The argument developed here is based on the syntactic and semantic behaviour of the definite article in general. Of course it also applies to (30b), *the cow is black*, yielding the negation (31b):

(31)b. the cow is not black

The predicate *black*, however, differs from the predicate *mad* in a fundamental way. If an object fulfils the selectional restrictions of the predicate *mad*, it is either mad or not.[23] We would not say that it is possible that parts of the cow are mad and others are not. The only way to have partial madness would be with respect to a limited range of time or a limited range of behaviors. By contrast, predicates like *black* are defined for certain objects as well as for parts of them. A cow is black if it is all black. The question, then, arises: what does (31b) mean? Does it mean that the cow is *all* not black or does it mean that the cow is not entirely black? What is the matter, if the cow is, say, half black and half white, is it, then, black, is it not black?

My answer is this: in such a split, or as I will say later, heterogeneous, case neither the positive (30b) nor the negative (31b) is true, nor is either

[23] Madness may be a matter of degree, but this doesn't concern us here. The crucial point is that, in saying "the cow is (not) mad", we put it that being mad or not mad is a clear and simple pair of alternatives.

false. Polarization just does not work in these cases. Heterogeneous cases produce truth-value gaps. Accordingly, predicates of the class represented by *black* differ from the class represented by *mad* in the possibility of adverbial quantification in terms of parts. These quantifications allow the expression of the intermediate cases. No such modification is possible with the other class of predicates:

(35) a. the cow is partly/half/entirely black
b. the cow is *partly/half/entirely mad[24]

I will argue below that the assumption of truth-value gaps in the heterogeneous cases makes sense since adverbial (and other forms of) quantification can then be interpreted as a linguistic device with the function of filling these truth-value gaps.

Sentence (31b), taken in isolation, would certainly be interpreted as conveying that the cow is *all* not black. It would be misleading, if the cow were black and white. Sentence (31b) can only be used to express that the cow is not entirely black if it is embedded into a context in which the all-or-nothing presupposition triggered by the simple predications (30b) and (31b) is explicitly cancelled such as in (36):

(36) the cow is not black, it's black and white

In cancelling the presupposition, (36) exhibits the metalinguistic quality we opted to exclude when defining negation. Note that (37), which contains an adverb of quantification, is obviously free from this quality. It does not require a rectifying continuation:

(37) the cow is not entirely black

We thus get a very simple logical analysis of the two types of cases discussed so far. The positive sentences express a predication **p** about some definite argument **a** (38a), while the negative sentences express the negation of this simple predication (38a):

(38) a. $\mathbf{p}(\mathbf{a})$
b. $\neg\mathbf{p}(\mathbf{a})$

Negation of the sentence is logically equivalent to the application of the boolean opposite **not-p** of the predicate **p**. If there were only two colours for cows, black and white, sentence (31b) – *the cow is not black* – would

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[24] (35b) is impossible in a reading (parallel to (35a)) where, for example, *the cow is half mad* means "(one) half of the cow is mad". In the available readings irrelevant here, the adverbs define some degree on a scale of madness.

Table 2

a is	mad	not mad
a *is mad*	TRUE	FALSE
a *is not mad*	FALSE	TRUE

Table 3

parts of a **are:**	all black	some black some not black	all not black
a *is black*	TRUE	(no truth value)	FALSE
a *is not black*	FALSE	(no truth value)	TRUE

be equivalent to *the cow is white*. What is not visible in (38), though, is the fact that there are truth-value gaps for predicates of the class represented by colour terms. The difference is illustrated in Tables 2 and 3.

2.2. *Integrative vs. Summative Predication*

I want to call the classes represented by *mad* and *black* in general "integrative" and "summative" predicates, respectively. An integrative predication is defined for its argument as an integral whole, not in terms of its parts. A cow can be said to be mad or not mad as a whole, a radio can be said to be on or not on as a whole. A person can be said to sleep or not to sleep as a whole, and so on.

In contrast, many other predications are *summative*, i.e., if they apply to an argument, the argument may be complex *to this predication*. The predication may apply to proper parts of the argument and it is true of a complex argument as a whole iff it is true of all parts of it. Likewise, it is false of a given argument iff it is false of all parts of it. A summative predication is thus true or false of its argument *as the sum of its parts*.

The formulation "all parts" needs to be refined. First, *relevant* parts are only such parts for which the predication is defined. Every predication, i.e., application of a predicate to one of its arguments, is defined for a certain domain of arguments, determined by the selectional restriction of the predicate with respect to this argument. If the domain of a predication necessarily contains both an object and the parts of the object, the object is "complex to this predication". For instance, if a colour predicate is applied to surface areas, it is defined also for the sub-areas of the surface.[25] Second, "all parts" is to be understood as "all parts of some partition" of the whole. It may happen to be the case that there are no proper parts of the argument, i.e., the argument is minimal within the domain lattice of the predication. In this case, the predication applied to the argument, in effect, is integrative. I will call partitions into parts "admissible" iff they consist of parts that fulfil the selectional restrictions of the predication.

Integrative predications may also be defined both for an object and for parts of it. For instance, the predicate *cheap* may be applied to cars as well as to single parts of cars. However, the resulting truth value of the predication about the whole does not logically depend on the outcome of the predication for any parts of it. A car may not be cheap even if it consists entirely of cheap parts.

(J) **Definition**

A predication is *summative* with respect to a certain argument **a** iff:

it is true/false of **a** iff it is true/false of all the parts of an admissible partition[26] into proper parts of **a**.

A predication is *intergrative* with respect to a certain argument **a** iff:

it is not summative, or equivalently: iff it is true/false of **a** as an integral whole.

Among the lexicalized predicates, certain types can be classified as summative or integrative in general. Mass nouns are summative, count nouns are integrative. The use of the indefinite article (a weak form of the numeral *one*), the plural form or numerals requires a noun predicate that provides countable units of a kind. Obviously, this requires integra-

[25] Note that the restriction to *relevant* parts of the argument solves the "minimal-parts problem". Parts need only be considered as long as they are in the domain of the predicate. Thus, e.g., *the yolk is liquid*, a summative predication, does not take us down to the quarks.

[26] The condition in terms of partitions may be too strong. There might be cases where we have to admit that the relevant parts overlap. Hence, the necessary condition is probably weaker: there must be a *cover* of **x**, i.e., a set of parts of **x** which together cover **x**, such that **p** is true of all members of the cover.

tivity for count nouns.[27] Most adjectives are integrative, e.g., dimensional adjectives in the widest sense such as *big*, *long*, *good*, *intelligent*; others like colour terms are summative. Verbs behave differently with respect to different types of arguments. Agentive arguments are probably always integrative; whatever a person does, she does it as the whole person. Inanimate objects of transitive verbs are, however, often summative arguments. Classical examples are incremental objects, such as the object of *eat*, but incrementality is not a necessary condition. For instance, objects of possession verbs are usually summative: if one owns something, one owns all parts of it.

A careful distinction has to be drawn between the partial application of a summative predication and the partial actual involvement of an object under integrative predication. Thus, if I say (39)

(39)a. she touched the wall

the predication is integrative with respect to the object argument, although only a part of the wall is actually touched (the same holds for the subject argument). Apparently, touching an object *anywhere* counts as touching *it*. *Touch x* means, in this concrete reading, "get into contact with the surface of x". We could easily admit the equivalence

(40) touch x $\Leftrightarrow$ touch x a part of the surface of x

But this does not prove that the predication expressed by *touch* for the direct object argument is not integrative. We could not replace *the surface of x* in definition (40) by *the surface of all parts of x*. We need the whole x for the definition because the meaning of *touch* allows for contact with *any* part of x. (Note that in (40) *a part of the surface of x* could not be replaced by *the surface of a part of x* either, because x might have inner parts without a share in the surface of x). Many predications about objects express only a partial involvement of the object under some aspect. Nevertheless, these predications put it the way as if the object were not composed of equal parts. They are, in a certain sense, *totum pro parte* (the whole for some part) predications.

As will become transparent later, there is a reliable test for integrativity:

[27] Allan (1977: 297f) raises the question why there are no numeral classifiers which classify the objects according to colour. The considerations developed here allow a simple explanation: since numeral classifiers have to provide units for counting, they have to encode integrative predications, such as Gestalt properties, categorizations such as "person" applying necessarily to separable individuals, or standardized measures. Colour predications, being summative, do not yield units; two or more "reds" are still one "red", but two or more oblong objects do not necessarily form an oblong object.

integrative predications cannot be modified with adverbial quantifiers such as *partly*. If, for example, we insert *partly* in (39a):

(39)b. she partly touched the wall

the verb is coerced into a different, summative, reading. If *partly* is related to the subject argument, the subject is turned from an agent into a theme. If we relate the adverb to the object, we gain a coerced accomplishment reading of the verb, in which it would denote a successive touching of the whole wall, coercing the object into an incremental reading accordingly.

An interesting problem to the distinction assumed here is the case of the progressive forms of verbs with incremental objects. Apparently

(41) she was eating the/an apple

is true of the apple even if not all parts of the apple are being eaten. Sentences like these illustrate another variant of the so-called imperfective paradox. I would suggest a solution along the following lines (which is in the spirit of many solutions offered to the imperfective paradox): in interpreting the sentence, we first construct a situation of the type *eat the/an apple*, in which the apple is involved as the sum of all its parts; in a second step, interpreting the progressive, we construct a partial situation out of the underlying one.

As will be discussed in Subsection 2.4, the summative/integrative distinction is related to, but different from, the collective/distributive distinction. We have to postpone further discussion until we turn to the analysis of collective and plural argument terms.

2.3. *The Presupposition of Indivisibility*

Summative predications inevitably lead to truth-value gaps in case the argument is heterogeneous with respect to the predication, i.e., if the predication is true of some parts of the argument but false of others. Thus, they carry the presupposition that the argument is homogeneous, or indivisible, in terms of the crucial property. For integrative predications, the presupposition is trivially fulfilled, since the argument is treated as a whole anyway. Given that any predication is either summative or integrative, we can, thus, postulate a very general presupposition triggered by any predication whatsoever:

(K) **Presupposition of Indivisibility (PI)**
Whenever a predicate is applied to one of its arguments, it is true or false of the argument as a whole.

A similar observation has been made by other authors earlier, but not in this general form. Fodor (1970), e.g., made the observation that plural definites and certain generic NPs carry an all-or-none presupposition. Other authors[28] have meanwhile adopted earlier postulations of mine (e.g., in Löbner 1987a, where I dubbed the condition Presupposition of Argument Homogeneity) for certain applications. Presumably, PI has gone unnoticed due to the usage of predicate calculus frameworks: PI is built into the very basis of predicate calculus in form of the *tertium non datur* on the predicate level, as for any predicate **p** and any argument **a**, it is assumed, in fact presupposed in the technical sense, that the statement **p(a)** is either true or false. The principle PI is even built into the very terminology of predicate logic, namely into the term *individual* (= "the indivisible"). To predicate logic, individuals are not a distinguished ontological category of entities, but simply those entities that can be arguments of first-order predicates. And it is the indivisibility presupposition of predication that makes the arguments "individuals".

It might be argued that PI is too strong. We already discussed possible misunderstandings in connection with integrative predication in the last subsection. Likewise, the objection might be raised that PI is too strong for summative predications. First, it appears to be acceptable to say of a certain object that it is, say, blue even if it is not 100% that colour. We might say

(42) the book is blue

if we refer to a book with a blue jacket printed with letters in some other colour. The acceptability of the predication "blue" would then be a question of disregarding those parts of the cover that are occupied by letters. One way of dealing with the problem would be to treat it as a discrepancy between literal truth and what passes as true on pragmatic grounds. This kind of problem is dealt with in Section 5 below.

Alternatively, we can argue, in the case of colour predications and likewise with other summative predications, that it is not really the whole object to which the predication applies. A black cow is a cow with black fur, not with black flesh. A blue book may be a book with a jacket that is blue on the outside but white on the inside; the cover of the book might be black and its pages white. The point to be observed here is that colour predicates apply to objects not directly but via a cognitive process that

[28] For example, Schwarzschild (1993) and von Fintel (1997).

first selects a certain dimension of the object,[29] where *dimension* is to be taken in a very general sense. Roughly speaking, colour predicates apply either to the surface or the body mass of three-dimensional objects. For instance, a yellow peach might both be a peach with a yellow skin and a peach with yellow flesh, but need not be both. Once the dimension is chosen, the totality condition holds. The case of books shows that the choice of dimension is actually more subtle. The problem with black letters covering a small amount of the visible surface of a book jacket could probably also be explained away by a more differentiated choice of the relevant dimension, e.g., choosing "outer surface background colour of the jacket" instead of just "surface colour". This would be a second way to handle the problem.

PI is not just an ad hoc invention to cope with the cases considered here. It applies to predications in any linguistic form. First, as far as definite arguments are concerned, it is not confined to subject NPs, but it obviously also holds for definite object NPs.

Second, it applies to indefinite and quantified arguments as well. In a sentence like

(43) she ate an orange

the predicate *eat* is integrative with respect to the subject argument and summative with respect to the object argument; the predication expressed by the indefinite NP *an orange* is integrative (due to the count status of the NP). If, disregarding tense and the analysis of the personal pronoun, the sentence is analyzed along the lines proposed in Heim (1982) and Kamp (1981) for the treatment of indefinites as something like

(44) $\mathbf{eat}(\mathbf{she}, x) \wedge \mathbf{1\text{-}orange}(x)$

PI applies to each of the three argument positions. It is trivial for the first argument of **eat** and the argument of **1-orange**; for the second argument of **eat** it renders the non-trivial condition that that "x" which is qualified as an orange be eaten or not eaten as a whole.[30]

Let me add the remark that PI exhibits the usual characteristics of semantic presuppositions. Apart from surviving negation, it is obviously triggered not only by declarative but also by interrogative, imperative or other types of sentences. PI is inherited within complex constructions to

[29] See Lang (1989) and (1990) for an analysis of these processes in the case of dimensional adjectives. Lahav (1989, 1993) discusses the complexities of colour predications.

[30] In a process similar to the choice of the dimension of application for colour predicates, we have to assume that the application of the predication *eat* is restricted to the edible part of the orange, excluding the skin and the seeds.

the same extent as other presuppositions. This can be tested by embedding summative predications into clauses or other subordinate structures. As any other semantic presupposition, PI can be cancelled in corrective additions such as the one in (36).

The most important consequence of PI for the present discussion is only implicit in the general formulation (K) above:

(L) **The Polarity Contrast of Summative and Integrative Predications**
Relative to all other presuppositions of the predication
- summative predication leads to a contrary, all-or-nothing, polarity contrast
- integrative predication leads to a complementary contrast.

In the following I will disregard the other presuppositions of a predication. Thus, if I state that any kind of integrative predication "leads to a complementary" contrast, this is always to be taken as "complementary relative to all the other presuppositions triggered for independent reasons".

2.4. *Mass Definites and Singular Collective Definites*

The discussion of singular definite arguments becomes more complex if we include definite mass and collective terms. In (45a), a definite mass term is combined with an integrative predicate (at least this is the intended interpretation of the predicate):

(45)a. the spinach is served with sesame seeds

Due to the same argumentation as in Subsection 2.2, the negation of (45a) is (45b):

(45)b. the spinach is not served with sesame seeds

Different from the *cow*-examples in (30), however, the sentence has two readings. A "singular" reading, as it were, in which the subject NP is taken to refer to a single quantity of spinach and something like a plural reading with reference to separate quantities of spinach. In this reading, PI is triggered for the whole set/group/collection[31] of quantities of spinach:

[31] I do not want to distinguish between sets, groups, or collections. The distinction is partly dependent on the preference for certain formalizations. I am not concerned with further, more subtle differences related to different logical properties of, e.g., groups vs. collections, although their investigation might be enlightening in connection with the phenomena discussed here. In the present paper, I will use the term "group" as a neutral cover term for

either all or none of the quantities are served with sesame seeds. The second reading is analogous to what would be the portion reading of (45c):

(45)c. the beers are served in heavy mugs

The portion reading is associated with a mass-to-count shift of the noun. The portion shift is, however, not available for all mass nouns. Thus, the problem of two readings of singular mass terms in general remains. The distinction between the two readings is relevant for the possibility of adverbial quantification. Given an integrative predication, adverbial quantification requires a multiple-portion reference of the subject NP:

(45)d. the spinach is partly served with sesame seeds

At first glance, things seem to be different if we replace the predicate by a summative predicate:

(46)a. the spinach is blue

Here, one could argue, it does not matter if we consider the referent of the definite mass term as one coherent body or a group of separate portions. The predication is true of the referent if it is true of all its relevant (in this case: visible) parts. But if adverbial quantification is applied, the distinction turns out to be relevant, again:

(46)b. the spinach is partly blue

The sentence has two readings. In one reading, there is one total quantity of spinach part of which is blue. In a second reading, there are several portions of spinach of which some are blue. Note that, in this case, PI applies to the single portions of spinach: each has to be entirely blue or entirely not. Due to the possibility of the multiple-portions reading, adverbial quantification is available on both the individual-portion level and the sum-of-portions level. So we could express the fact that some portions are entirely rather than partly blue by the sentence

(46)c. the spinach is partly entirely blue

What we encounter here with the multiple-portion reading is a first case of macropredication which will be defined in general in the next subsection. The fact that the two levels are not grammatically distinguished does not contradict the analysis. English is a language in which singular mass nouns cannot take the plural form without undergoing a category

any objects composed of parts of the next-lower level. See e.g., Schwarzschild (1992) for a discussion of sum vs. group approaches.

and meaning shift that turns them into count nouns (e.g., the portion or the sort shift). In other languages such as Chinese or Japanese, a regular plural is not even available for count nouns. Nevertheless it seems reasonable to distinguish a singular and a plural reading of sentences like the Japanese

(47) neko wa deta
"the cat/the cats came/went out"

The analysis offered here attempts to contribute to the understanding of the cognitive mechanisms involved in semantic interpretation. Certainly, the cognitive models constructed for singular readings are different from those for plural readings. Due to grammatical constraints in a given language, it may be impossible to distinguish different readings grammatically.

Things are easier with collective terms, since these are singular count terms for which a plural form is usually available. Again we have to distinguish between summative and integrative predication. The predication in (48a) is integrative at the group level; adverbial quantification is impossible (48b):

(48) a. the crew consists of 18 members
b. *the crew partly consists of 18 members.

The situation changes if we replace the predicate by a predication that is primarily defined for what can constitute the members of the group:

(49) a. the crew is frustrated
b. the crew is partly frustrated

(49a), at the group level, is a summative predication: it is true/false of the group iff it is true/false of each member of the group. The predicate (*be*) *frustrated*, expressing a certain emotional state, is primarily defined for individuals (with a certain complexity of emotional structure). If it is applied to a group of individuals, the domain of the predication is extended from individuals to groups of individuals. At the same time, the predication itself is changed in an obvious way, which could be called homomorphic extension: The new, raised, predicate applies to sums of persons and is true/false of the sum if the original predicate is true/false of each member.

This is the point where we can explain the relationship between the summative/integrative distinction and the traditional distributive/collective distinction. Obviously, collective predication is integrative. The converse is not true: simple integrative predications (e.g., *the cow is mad*) are not collective. Distributive predications are summative, but, again, the converse does not hold. The notions of integrativity and summativity are, hence, more general. They apply independently at different levels of predications (or arguments, correspondingly). The predicate (*be*) *frustrated*, for its primary domain of application, is integrative. Raised to the level of groups, it becomes summative by a process that I will call macropredication. While the concepts of distributivity and collectivity are confined to two levels (individual and group), the newly introduced concepts can be applied to any number of levels. In (50a), three levels are involved:

(50)a. the crews are frustrated

The first level is the level where the original predicate is to be applied: the level of crew members. At this level, the predication is integrative. At the single crew level, the raised predication becomes summative, yielding truth-value gaps for heterogeneous crews. The plural form of the collective noun introduces a third group-of-groups level, to which the predicate is raised again. The result here is a summative predication, too. It triggers PI again; (50a) is true/false iff each group is (homogeneously) frustrated or if each group is not. Consequently, adverbial quantification can be applied at both levels of summative predication: (50b) is ambiguous and (50c) is possible:

(50)b. the crews are partly frustrated
c. the crews are partly entirely frustrated

Needless to state, that in all the types of cases discussed in this subsection, syntactic negation is gained by VP negation.

A last remark should be made about sentences like

(51) the crew gathered in the bar

The predicate here is an integrative group level predicate applied immediately to the group referent of the subject NP. Such predicates are not defined for the level of objects for which (*be*) *frustrated* is defined. Hence, *I gathered in the bar* lacks a truth value due to the failure of the presupposed selectional restriction on the arguments of the predicate. Note that all collective nouns, likewise, are integrative group level predicates. Due to their integrativity, they differ from mass nouns in allowing the plural form. In general, plural is only possible for integrative nouns because the meaning of non-lexical plural, a multitude of equal cases, can only be constructed on the basis of the given noun if the predication allows to single out distinct cases. For that reason, mass terms have to be shifted to an (integrative) sort predicate or an (integrative) portion predicate for pluralization.

2.5. *Summative Macropredication*

The semantic process we encountered in the last subsection will now be defined in general terms. I will call the level of predication defined for lexicalized predicates by their original selectional restrictions their *primary level*. The primary level of non-collective predicates is called *level 0*. The primary level of lexically collective predicates such as collective nouns and certain verbs is *level 1*. As we have seen, a given primary predication can be raised to a higher level by certain semantic processes. The resulting types of predication will be called *macropredication*. The first process we have encountered here is *summative macropredication*. Summative macropredication, e.g., distributive plural, can be based on primary summative or integrative predication. The result, however, is equally summative. Besides summative macropredication, there is also integrative macropredication which will be introduced in the next section about quantification.

(M) **Definition**
Macropredication on the basis of a predication **p** with the domain D(**p**), defined by the selectional restrictions of **p**, is the application of a modification **P** of the predicate **p** to a domain of groups of the objects in D(**p**).

It is important to emphasize that the predicate itself changes through the process of macropredication although it is ultimately defined in terms of the primary predication. Macropredication is not a matter of just applying the *same* predication to a group. For some predicates, this may be possible. For instance, (52) has two readings:

(52) the orchestra is 18 years old

In the distributive reading, the sentence is an instance of level-1 summative macropredication. In its other reading (the orchestra was founded 18 years ago) it is a level-0 integrative predication applied to the orchestra as a whole as an object with a lifespan of its own.

The process of summative macropredication encountered in the last subsection, henceforth Σ, is defined as follows:

(N) **Definition**

For any predication $\mathbf{p}$ with domain $D(\mathbf{p})$
$\Sigma\mathbf{p}$ is a predication whose domain consists of all those groups of elements of $D(\mathbf{p})$ for which $\mathbf{p}$ yields a uniform truth value (i.e., all homogeneous groups within the original domain). For any $\mathbf{x} \in D(\Sigma\mathbf{p})$, $\Sigma\mathbf{p}(\mathbf{x})$ is true/false iff $\mathbf{p}(\mathbf{y})$ is true/false for each $\mathbf{y}$ that belongs to $\mathbf{x}$.

It follows immediately that Σ always yields a summative predication. If we apply the notation to the examples in the last subsection, we see that Σ(*be frustrated*) is applied to the crew in *the crew is frustrated* and $\Sigma\Sigma$(*be frustrated*) to the crews in *the crews are frustrated*. Likewise, the two readings for *the spinach is served with sesame seeds* involve *be served . . .* and *spinach* in the first case, and Σ(*be served . . .*) and Σ(*spinach*) in the second.

2.6. *Plural Definites*

Let us start the discussion with a somewhat more complex example:

(53)a. the books are heavy

The integrative predicate *be heavy* may as well apply to single books as to groups of books. Therefore, the sentence has three readings. (i) The collective reading: the predicate *be heavy* is directly applied at level 1 to the group of "the books": the books taken together have a high total weight. (ii) The distributive reading: the predicate *be heavy* is applied to the single books. The predication then is Σ(*be heavy*) applied at level 1. (iii) If we interpret the subject term as referring to a group of groups of books, e.g., boxes containing books, Σ(*be heavy*) can apply at level 2: the subgroups of books are each heavy, independently of the weight of the single books. Let this be the "level-2" reading. We can represent the three readings by indexing the predicates and arguments with level indices:

(53) (i) $\mathbf{be\text{-}heavy_1\ (the\ books)_1}$
(ii) $\mathbf{\Sigma(be\text{-}heavy_0)_1\ (the\ books)_1}$
(iii) $\mathbf{\Sigma(be\text{-}heavy_1)_2\ (the\ books)_2}$

In the earlier history of Formal Semantics, starting with Montague's PTQ (1973), the issue of plural or mass definites was largely avoided. A second group of papers have offered analyses for the distributive reading of plural definites, among them Bartsch (1973), Barwise and Cooper (1981) and Keenan and Faltz (1985). The latter two did not treat the bare definite article in combination with plural nouns but only "determiners" of the form '*the* + numeral' in that combination. In these approaches, (53a) in its distributive reading would unanimously be treated as truth-conditionally equivalent to (54a), resulting in some notational variant of (54b) as the formal analysis:

(54) a. every book is heavy
b. $\forall x(\mathbf{book}(x) \rightarrow \mathbf{heavy}(x))$

Few authors before Link (1983) bothered to offer analyses for the collective reading of sentences like (53). These analyses agree in treating the sentence essentially as the application of the predicate *heavy* to a complex argument (the totality of the books in the context given), modeling this complex argument either as a set (Scha 1981, Bunt 1985) or as an individual in a lattice with a sum operation by which plural nouns are provided with complex referents (Link 1983). For instance, Link's analysis of the collective reading of (53a) would be:

(55) $\mathbf{heavy}(\sigma{}^{*}x\ \mathbf{book}(x))$

where **book** is a predicate that applies to single books, $\sigma{}^{*}x\ \mathbf{book}(x)$ is the sum of all books, i.e., the complex individual consisting of all books, the term carrying the condition that there is more than one book, and **heavy** is a predicate that may be applied to any sort of individuals, complex or not. According to Link's definitions, (55) is false if either there are less than two books, or the predicate **heavy** is not true of the sum of all books.

For the distributive reading of the sentence, Link (1983) and the other authors on his line agree with the traditional analyses cited above, treating the plural definite NP like a universal quantifier (cf. Landman 1989, p. 563ff., for a discussion of Link's analysis). If this line of analysis is right, sentence (53a) in its distributive reading would be false if one or more books are not heavy. Needless to emphasize again that I consider these falsity conditions wrong. The negation of (53a) is

(53) b. the books are not heavy

In the distributive and in the level-2 reading, (53a) and (53b) both trigger PI and lead to truth-value gaps if some single books or subgroups of books, respectively, are not heavy. This condition, apparently, is not carried out for the distributive reading by the analyses cited. Link's 1983 introduction of a lattice structure in the domain of individuals has paved the way to an analysis of the kind proposed here. However, the analyses adopting his approach did not draw the conclusions concerning the resulting type of polarity contrast. As mentioned above, his analysis of plural and mass definites, in fact all known analyses following his line, are still truth-conditionally equivalent to the universal-quantification analysis.

The level-2 reading of (53a) is paralleled not only in the "plural" (or level-1) readings of the spinach-example above, but also in a second reading of sentences with a collective plural predication such as (56):

(56) the demonstrators dispersed

The sentence has a level-1 reading, with the predicate *dispersed* applying directly to the totality of demonstrators and a level-2 reading with Σ(*dispersed*) applying to a group of groups of demonstrators participating in separate demonstrations. Again, the double plural, as it were, cannot be expressed for grammatical reasons, but the distinction matters because it appears to be possible to modify the level-2 predication by adverbial quantification:

(57) the demonstrators partly dispersed

which would mean, roughly, that some of the demonstrations dissolved.

This is the point to formulate the general result for definite arguments:

> **Result**
> A sentence consisting of a summative predication about a definite NP argument is true iff the predication is true of all parts of an admissible partition of the NP referent; the sentence is false iff the predication is false of all parts of an admissible partition of the NP referent. If the predication is true of some parts, but false of others, the sentence lacks a truth-value.

The second sentence is redundant. The result can be further generalized by dropping the specification "summative". In the case of integrative predications, there are no other admissible partitions but the trivial partition into one part, the whole, since the predication is not about proper parts of the NP referent. Hence, in the case of integrative predication, there are no heterogeneous cases and, consequently, no truth-value gaps due to heterogeneity (although, of course, there may be truth-value gaps as the result of the failure of other presuppositions). In its more general form, the result of our considerations of definite argument NPs is therefore:

(O) **Result**
A sentence consisting of a predication about a definite NP argument is true iff the predication is true of all parts of an admissible partition of the NP referent; the sentence is false

iff the predication is false of all parts of an admissible partition.

The result that certain common constructions such as distributive plural are instances of the failure of *tertium non datur* may appear unattractive. The common notion of negation combines at least the following conditions: (a) negation is syntactically simple, uniform, and unrestricted (b) negation is semantically uniform in yielding a complementary contrast. Our treatment of negation fulfils the first condition and violates the second. But given that the semantic interpretation of the negated simple sentences with summative predications is correct, there is no way to reconcile the two conditions. If we gave priority to the complementarity condition, we would have to consider *the cow is not entirely black* as the regular syntactic negation of *the cow is black.* But this would mean to sacrifice the first condition, because (i) the formal relation between the sentence and its would-be negation is both special and not straightforward and (ii) the sentence would share its negation with the sentence *the cow is entirely black*, which intuitively has a different meaning. Even worse, sentences like *the spinach is served with sesame seeds* or *the demonstrators dispersed*, that allow an integrative as well as a higher-level summative reading would have to be provided with two different negations, the simple variant and the *not all/not entirely* variant.[32]

The question of complementarity, in fact, is more complex in any event since complementarity is never absolute. Even if we were able to define complementary negation in the sense meant here, i.e., negation that includes the heterogeneous cases, it still would be complementary only *relative* to the other presuppositions of the sentences. A complementary contrast can only be established within a given frame of cases. The frame for complementary contrast between sentences is defined by the presuppositions of the sentence. When I said in the previous paragraph that the negation of sentences with summative predication yields a non-complementary opposition, I did not refer to the specific contrast frame for this type of sentences. Rather, I adopted the superframe, as it were, for both summative macropredication and quantification which contains the heterogeneous as well as the homogeneous cases. What I claim in postulating PI is that the contrast frame for summative predications does not

[32] The problem is caused in English due to non-explicit plural readings for mass terms or double-plural readings for plural terms. In languages without plural marking it would constitute a fundamental problem for negation: the same sentence would have a simple negation in its singular reading and a different, more complex negation in its distributive plural reading.

contain the heterogeneous cases. Relative to this frame the negation *is* complementary.[33]

2.7. *The Logical Type of Definites*

On the basis of result (O), we are now in the position to determine on logical grounds the appropriate logical type of definite NPs. In the Montagovian tradition, continued by the GQT (Generalized Quantifier Theory) approach, all NPs are treated as quantifiers, i.e., second-order predicates. This is a technical decision chosen to obtain a uniform analysis of NPs. However, I want to argue, the GQT approach is inadequate, both logically/semantically and syntactically.

As for the semantic/logical aspect of the analysis, second-order predicate logic, such as the system L(GQ) in Barwise and Cooper (1981), provides us with a clear semantic criterion for the distinction between individual terms and quantifiers. In this system, both (individual) terms and quantifiers combine with one-place first-order predicates to form a sentence. Let **n** be a variable for either a term or a quantifier and let us denote the proper syntactic combination of **n** and a one-place first-order predicate **p** as "**n** + **p**". If **n** is a term, "**n** + **p**" stands for "**p(n)**", if **n** is a quantifier, it stands for "**n(p)**". Now, the combination "**n** + **p**" has different logical properties for terms and quantifiers respectively. In technical terms, individual terms are boolean homomorphisms with respect to all boolean operations. Since the boolean operations are interdefinable, it suffices to reduce the homomorphism properties to homomorphy with respect to, e.g., boolean negation and boolean conjunction. Let us, hence, introduce further metanotations. For any one-place first-order predicates **p** and **p′**, let "**not-p**" be the boolean negation of **p**, i.e., the predicate that yields the opposite truth values for each argument; let "**p-and-p′**" be the boolean conjunction of **p** and **p′**, which is true of any argument iff both **p** and **p′** are true of it. Let "**not-s**" be the boolean (descriptive) negation of a sentence **s** and "**s-and-s′**" the boolean conjunction of **s** and **s′**. Then, **n** is a full boolean homomorphism if the following conditions hold:

(58) a. $\mathbf{n} + (\mathbf{not\text{-}p}) \Leftrightarrow \mathbf{not\text{-}(n + p)}$
b. $\mathbf{n} + (\mathbf{p\text{-}and\text{-}p'}) \Leftrightarrow \mathbf{(n + p)\text{-}and\text{-}(n + p')}$

[33] The situation is similar to cases of lexical opposites usually considered complementary: for example, the pair *female/male* is complementary only within a frame which excludes cases of hermaphrodites or asexuals.

The equivalences in (58) can be divided into four entailments that are known as separate properties:

(59)a.	consistency:	**n + (not-p)** $\Rightarrow$ **not-(n + p)**
b.	completeness:	**not-(n + p)** $\Rightarrow$ **n + (not-p)**
c.	monotonicity:[34]	**n + (p-and-p′)** $\Rightarrow$ **(n + p)-and-(n + p′)**
d.	conjunctivity:	**(n + p)-and-(n + p′)** $\Rightarrow$ **n + (p-and-p′)**

It is well known, that "real" quantifiers such as ∀ and ∃ violate one or more of these conditions. The universal quantifier is monotone, conjunctive and consistent, but not complete, since "**not-(∀ + p)**" does not entail "**∀ + (not-p)**". The existential quantifier, like all weak quantifiers, is complete and monotone, but neither consistent nor conjunctive. If, however, **n** is an individual term, it obviously fulfils all four conditions.

What we have shown above is that definite NPs, too, are full boolean homomorphisms. The properties of consistency, monotonicity and conjunctivity are uncontroversial. Our claims about the proper negation of predications with a definite argument amount to the fourth property of completeness: the negation of the VP predicate *is* the negation of the sentence with a definite subject NP. Falsity of the predicate for the possibly complex argument is the same as falsity of the sentence.

Does that prove that definite NPs are logically terms rather than quantifiers? Yes, it does. In model theory, quantifiers that fulfil all four conditions in (59) are called ultrafilters. It can be shown[35] that, for any ultrafilter **u**, either (i) there is an individual **i** such that for all **p u(p)** $\Leftrightarrow$ **p(i)** or (ii) there is no finite predicate **p** at all, for which **u(p)** is true. A finite predicate is a predicate that is true, in the given universe of discourse, only of a finite number of individuals. Certainly, we want to keep this option open for almost all lexicalized predicates, except for certain mathematical predicates. Thus, case (ii) is irrelevant: the application of an ultrafilter quantifier is always equivalent to the application of the predicate to an individual term. Since definites do provide a referent proper, there is no reason whatsoever to consider the combination of a predicate with a definite argument not a first-order case of the application of the predicate to an individual term. There could be no stronger argument on logical grounds than this. Definite NPs *behave* logically like individual terms and hence just *are* individual terms.

Apart from the analysis of negation developed here, there is syntactic

[34] It is easily shown that (59c) is equivalent to the usual formulation of monotonicity: **n** is monotone iff, if **p** entails **p′**, **n + p** $\Rightarrow$ **n + p′**.
[35] See Bell and Slomson (1974: 107f) for the theorem.

evidence to the non-quantificational status of definites. For one, as mentioned in Link (1991), plural definites (and mass definites alike, I would like to add), do not lead to the scope ambiguities that genuine quantifiers inevitably produce. In fact, definite NPs do not have scope at all. The results on negation developed here prove the scopelessness of definites with respect to negation: if definite NPs had scope, contrary to the facts, a distinction should be possible between inner negation (scope of the definite over negation) and outer negation (scope of the negation over the definite). Second, as mentioned above, the definite article, along with other definite determiners such as demonstratives and possessives, is not capable of other modifications characteristic for quantificational expressions like *every* or *all* (cf. $[[$*almost/absolutely all*$]_D$ N$]_{NP}$ vs. $[$*$[$*almost/absolutely the*$]_D$ N$]_{NP}$). Third, definites can occur in the genitive NP of partitive constructions such as *each of the children*. If they were quantifiers they would lack a nuclear scope constituent in this position. Quantifiers proper can not fill this position. Conversely, only quantifiers proper, but not definite NPs, are possible in the first NP position[36] of partitive constructions.

It should be noticed that the semantic and logical properties of definites do not depend on their form. Personal pronouns, proper names, demonstrative or possessive NPs exhibit the same semantic and logical behaviour as argument terms.

3. Particular Quantification: Types of Predication (2)

3.1. *Kinds of Quantification*

In the last section, we discussed exclusively cases of simple (i.e., non-quantificational) particular predication. The discussion will now be completed by an analysis of particular quantification. Usually no distinction is drawn between particular and generic quantification. But the distinction is necessary and well met by the linguistic data. Non-quantificational predication can be safely distinguished into the particular mode and the generic mode. While particular predication is about single, particular,

[36] The position of *each* in *each of the students* is an NP (DP) position rather than a mere D position, as can be seen from the fact that certain quantificational determiners undergo pronominalization in this position (*no* to *none*, *every* to *everyone*).

referentially anchored cases, generic predication is about abstract cases.[37] Analogously, we can distinguish between quantification about particular cases and about abstract cases, respectively. The linguistic data for either kind of quantification are different. Consider the following examples:

(60) a. no apples contain vitamin B12
b. most apples are red
c. some apples are sour
d. every apple is sweet

The sentences can be interpreted either as instances of particular quantification or as instances of generic quantification.[38] The particular reading can be diagnozed by means of the following equivalences. First, in this reading, the sentences are implicitly partitive, admitting explicitly partitive paraphrases (note that *no* and *every* require pronominalization in the partitive construction while other quantificational quantifiers don't):

(61) a. none of the apples contain vitamin B12
b. most of the apples are red
c. some of the apples are sour
d. every one of the apples is sweet

Second, nominal particular quantifications can be paraphrased by adverbial quantifications in terms of portions:

(62) a. (*no paraphrase*)
b. the apples are mostly red
c. the apples are partly sour
d. the apples are all/entirely(?) sweet

The quantificational NP is replaced by a definite plural NP that refers to the total group of apples in the domain of discourse, i.e., the group that constitutes the domain of quantification. Quantification is expressed by an adverb that specifies the portion of the whole for which the predication is true. To the extent that the predications involved are summative, the sentences in (62) possess a second reading according to which the quantification, i.e., portion specification, applies at level 0 to the single apples. In the reading intended here, the portion is specified for level 1. There is

[37] The notion of an "abstract case" can be made more precise in cognitive ontologies such as the one proposed in Barsalou et al. (1993). In their ontology, an abstract case is cognitively represented by a "model" frame (cf. pp. 31 ff.) rather than an "individual" frame.

[38] The case of *all* is different: particular *all* appears to require the definite article (*all the N*), while generic *all* is used without the article (*all N*).

no adverb for expressing a zero portion in English, but there seem to be such adverbs in other languages (e.g., the NPI *zenzen* in Japanese).

By contrast, generic quantifications are distinguished (i) by not allowing partitive paraphrases and (ii) by possessing adverbial equivalents with different adverbs. There are two sets of adverbs available in these cases, adverbs of temporal frequency like those in (63) and modal adverbs of necessity, probability and the like, e.g., *usually*, *normally*, *probably*, *possibly*, *necessarily* or *inevitably*.

(63) a. apples never contain vitamin B12
b. apples mostly are red
c. apples sometimes are sour
d. an apple is always sweet

The subject NPs in this type of paraphrase are generic: indefinites with the indefinite article, bare plurals or bare mass nouns.

The set of quantificational determiners available for particular quantification contains all determiners that can be used for generic quantification plus determiners exclusively used in the particular mode: *each*, *both*, *either*, *neither*, singular *some* and the numerals for numbers greater than 1.[39] We will first discuss particular quantification and turn to generic quantification in Section 4. Both types, or modes, of quantification will be discussed in their nominal and their adverbial variants. Floated quantifiers such as *all*, *each*, and *both* are subsumed under adverbial quantification due to their syntactic position, although these expressions are not adverbs.[40]

In this section, we will first discuss particular adverbial quantification (PAQ), showing that it yields a shift from summative to integrative predication at the same level of predication (Subsection 3.2). We will then turn to nominal singular (Subsection 3.3) and nominal plural quantification (Subsection 3.4). These operations yield integrative macropredications at level 1 and 2, respectively. Particular quantification on a mass noun argu-

[39] I have argued elsewhere (Löbner 1987a and Löbner 1990) that cardinality predicates, including numerals, and *most* do not represent genuine quantifiers because they depend on certain context conditions for their quantificational force. The distinction need not bother us here.

[40] There is a third variant of quantification, with quantificational adjectives, which I will not discuss in the following. It is exemplified by formulations such as *the entire crew VP* or (German) *die ganze Mannschaft VP*. This variant is very restricted; it is very close to adverbial quantification in that the quantificational adjective is embedded into what can be the subject NP of an adverbial quantification. Needless to say that definite NPs with a quantificational adjective do not behave like "simple" definites in creating truth-value gaps due to PI (see below: quantification in general does not create these truth-value gaps).

ment is analyzed in Subsection 3.5. It will be argued that particular quantification in general is a process that turns an underlying summative predication into an integrative predication. The underlying predication involves definite reference to the domain of quantification. Hence, the function of particular quantification can be seen as filling the truth-value gaps resulting from PI for summative predications with definite arguments. The results will be summed up in Subsection 3.6. The question of the logical type of particular quantifiers is addressed in Subsection 3.7. Following the discussion of particular quantification, the latter will be compared to summative macropredication (Subsection 3.8). A summary of the system of types of particular predications discussed in Sections 2 and 3 is given in Subsection 3.9. The section is concluded with a reflection on hidden operations in the system and their justification (Subsection 3.10).

3.2. *Particular Adverbial Quantification*

Examples of particular adverbial quantification (PAQ) were already mentioned in connection with summative predication in the last section. The first point to be stated is the fact that PAQ is only possible as a modification of a summative predication. Thus, the sentences in (64) are acceptable while those in (65) are not:

(64)a. the cow is partly black
b. the spinach is partly bitter
c. the crew is partly frustrated
d. the students are partly bored

(65)a. *the cow is partly mad
b. (*)[41] the spinach is partly served with sesame seeds
c. *the crew has partly 18 members
d. *The students are partly more than the course can take

Second, PAQ can apply at each level where the predication is summative. Thus,

(66)a. the crews are partly frustrated

has two readings: if the PAQ is applied at level 1, the single crew level, (66a) is true if each crew is partly frustrated and false if each crew is not partly frustrated. Applied at level 2, PAQ yields the reading that some

[41] (65b) is acceptable, but not in a level-0 reading about a single portion of spinach – not if we accept *is served with sesame seeds* as an integrative predicate.

of the crews are (entirely) frustrated vs. no crew is (entirely) frustrated. Consequently, PAQ, in such sentences, can be applied twice, once at each level:

(66)b. the crews are partly_2 entirely_1 frustrated

Double PAQ appears also possible with mass NPs:

(67)a. the spinach is partly_1 entirely_0 bitter

but impossible with non-collective plural NPs unless level 2 is explicitly indicated. (67b) appears impossible, while (67c) is acceptable because level 2 is explicitly introduced by the plural *classrooms* which forces a partition of the students into groups of groups (here, "floated" *all* appears to be more natural as a PAQ device than *entirely*):

(67)b. *the girls are partly all bored
c. the students are partly all sitting in their classrooms

The result of applying PAQ at the highest level of predication is inevitably a polarity contrast without truth-value gaps. Unlike the underlying summative predication, the PAQ modifications are defined for heterogeneous arguments as well as for homogeneous ones. For instance, (64c) is true if the crew is heterogeneous, and *the students are all bored* is false in that case. Hence, PAQ transforms a summative predication into an integrative predication at the same level. The predication is integrative because the argument is judged as a whole. For example, the truth criterion for universal adverbial quantification is: does the whole contain no parts for which the predication is false? Although the conditions for truth, in this case, are the same as for summative predication, the conditions for falsity are clearly different. The domain of the underlying summative predication is extended as to cover any complex objects composed of positive or negative parts. If **s** is a summative predicate with domain D(**s**), and **paq** is a PAQ operator, the domain D(**paq**(**s**)) consists of arbitrary sums[42] of elements in D(**s**). If **paq** is applied to Σ(**p**), D(**paq**(Σ(**p**)) is the set of arbitrary groups of elements in D(**p**). It follows that, for any summative predicate **s**, D(**paq**(**s**)) is a proper superset of D(**s**).

Negation of PAQ sentences is formed by negating the quantificational adverb. If all other presuppositions are fulfilled, PI does not lead to truth-value gaps. For instance, if (68a) is not true, it is false, and (68b) is true:

[42] If s is a level-0 summative predicate, the distinction between sums and groups matters: sums are of the same level as their components while groups are one level above their members.

Table 4

single cases/parts	all true	some true, some false	all false	type
the N VP	TRUE	(gap)	FALSE	summative pred.
the N not VP	FALSE	(gap)	TRUE	neg. of summ. pred.
the N ***partly*** *VP*	TRUE		FALSE	PAQ
the N not ***partly*** *VP*	FALSE		TRUE	negation of PAQ
the N ***all/entirely*** *VP*	TRUE	FALSE		PAQ
the N not ***all/ent.*** *VP*	FALSE	TRUE		negation of PAQ

(68)a. the students are partly frustrated
b. the students are not partly frustrated

Negation can as well be applied prior to PAQ:

(68)c. the students are partly not frustrated

Thus, the PAQ expression may have scope over a negation and may itself be in the scope of negation (inner negation vs. outer negation). The negation of (68c) would be (68d):

(68)d. the students are not partly not frustrated

In Table 4, summative macropredication is compared with PAQ at the same level. The comparison shows that PAQ fills the truth-value gaps of the underlying summative predication. For the homogeneous cases, the results of PAQ with *partly* and *all/entirely* coincide with the results of summative predication. In general, upward monotone PAQs coincide with positive summative predication, while downward monotone PAQs (not represented here) would coincide with negated summative predication. The truth-value gap is filled differently by different PAQs. Thus, there is not a single process of predicate modification involved here, such as Σ for the formation of a summative macropredication, but several different processes.

3.3. *Particular Nominal Quantification with Singular Count Nouns*

Particular nominal quantification (PNQ) can be divided into three groups of constructions. One group consists of particular nominal quantification with singular count nouns (PNQ-s), comprising PNQ with *each*, *every*, *some*, *one*, *no* and the rather obsolete *many a*. The set of quantificational determiners that take a plural noun (PNQ-p) is *all* (*the*), *most*, *many*, *several*, *a few*, *both*, *some*, *few*, *no* and the numerals. A third set of determiners can be used for nominal quantification with mass nouns (PNQ-m): *all* (*the*), *most*, *much*, *some*, *little*, *no*. The lists are not complete.[43] In this subsection, we will discuss PNQ-s.

As stated above, PNQ-s sentences possess an equivalent explicitly partitive paraphrase or, at least, are interpreted partitively. This view is shared by GQT, where a limited domain of discourse is presupposed of which the domains of quantification are subsets that could be referred to by *the N* with the noun in the plural. Thus the domain of quantification for the sentences in (69a, b, c), taken in the particular reading, would be the referent of the definite subject NP in (69d):

(69) a. each/every shop is closed on Sundays
b. some shop is closed on Sundays
c. no shop is closed on Sundays
d. the shops are closed on Sunday

Negation of PNQ sentences is formed according to clause (ii) of definition (E) because the quantificational NP is a higher-order operator with scope over the VP. The quantificational determiners *every* and *all* can be negated by *not*, while *some* is negated by substituting *no*. For some reason, *each* can neither be negated in situ nor by wide-scope VP negation.

Again, the quantificational sentences lack the truth-value gaps of summative macropredication in (69d). In view of the facts that (1) PNQ sentences possess equivalent explicitly partitive paraphrases, (2) possess equivalent PAQ paraphrases with definite subjects and (3) obey identical contextual conditions as the corresponding plural definites, we regard PNQ-s with head noun N and predication **p** as a modification of the predication $\Sigma\mathbf{p}$ about the referent of *the* N_{plur}.[44] This yields an immediate explanation for the equivalence of PNQ-s sentences with their PAQ paraphrases in general, although individual nominal quantifiers may not entirely match with individual portion adverbs. The grammatical mechanism is as follows: the noun following the quantificational determiner defines the single case to which the predication in the nuclear scope is to be applied. The resulting integrative macropredication is true or false depending on the result of the application of the predicate to all contextu-

[43] In particular, I want to exclude *any* from the discussion here.

[44] Note that floated quantifier constructions provide further evidence: When the quantifier in *each egg is numbered* is "floated", the subject changes into a plural definite: *the eggs are each numbered*.

Table 5

<table>
<tr><th>single cases</th><th>all true</th><th>some true, some false</th><th>all false</th><th>type</th></tr>
<tr><td>the N_{pl} VP</td><td>TRUE</td><td>(gap)</td><td>FALSE</td><td>Σ</td></tr>
<tr><td>the N_{pl} not VP</td><td>FALSE</td><td>(gap)</td><td>TRUE</td><td>negation of Σ</td></tr>
<tr><td>every N VP</td><td>TRUE</td><td colspan="2">FALSE</td><td>PNQ-s</td></tr>
<tr><td>not every N VP</td><td>FALSE</td><td colspan="2">TRUE</td><td>negation of PNQ-s</td></tr>
<tr><td>some N VP</td><td colspan="2">TRUE</td><td>FALSE</td><td>PNQ-s</td></tr>
<tr><td>no N VP</td><td colspan="2">FALSE</td><td>TRUE</td><td>negation of PNQ-s</td></tr>
</table>

ally relevant single cases of the kind. The quantificational determiner specifies the criterion of evaluation of the total of results.

PNQ-s with *each*, e.g., and with nuclear scope **p** yields a predication **each-p** at level 1 (if **p** is level 0). D(**each-p**) is the set of all groups of elements in D(**p**), and hence a proper superset of D(**Σp**). The predicate **each-p** is true of **x** iff **p** is true of all members of **x** in D(**p**). The truth and falsity is defined in terms of **x** as an integral whole. Hence, again, the resulting predicate is integrative and does not exhibit truth-value gaps of the kind characteristic for summative macropredication.

There is one important difference between PNQ-s and PAQ: PNQ-s raises the level of predication indicated by the grammatical structure of the sentence by 1. Due to that fact, PNQ-s is not restricted to summative predicates in its nuclear scope. The explanation is straightforward, given the analysis offered here. The operand proper of PNQ-s is not the predicate **p** in the nuclear scope, but **Σp**; **Σp** is summative, regardless if **p** is summative or integrative. – Let me further mention, for the sake of completeness, that PNQ-s may result in a level-2 predication if the nuclear predicate is level-1 and the head noun is collective, e.g., in

(70) every crew gathered in its/their tent

An analogue of Table 5 illustrates the relationship between summative macropredication and PNQ-s.

3.4. *Particular Nominal Quantification with Plural Nouns*

At first glance, PNQ with plural nouns might appear to represent the same type of predication as PNQ-s. But this is not the case. PNQ-p with non-collective nouns admits collective, i.e., level-1 predicates in its nuclear scope:[45]

(71)a. all the/most/many/some/few/no students gathered in their classrooms

b. *every/each/some/no student gathered in his or her classroom/classrooms

Clearly the latter is ruled out by our analysis of PNQ-s: the predicate in the nuclear scope, being integrative at level 1, is not defined for the single cases specified by the head noun. We obtain an explanation for the cases in (71a) if we assume the same kind of grammatical mechanism for PNQ-p *taking into account the difference in grammatical number*: PNQ-p yields an integrative quantification at the level of groups of groups. The domain of quantification consists of cases defined by the head noun in its given plural form and the VP in its surface form. Since the head noun is plural, the single case consists of the VP predication applied to a group. As a border case, PNQ-p admits a single subgroup reading (the partition has only one member):

(71)c. all the/most/many/some/few/no students gathered in their classroom

To demonstrate the analysis for a concrete case, let us consider PNQ-p with *all* (*the*). Applied to a level-1 predication **p**, it yields an integrative level-2 predication **all-p**. While D(Σ**p**) is the set of partitions of the denotation of the plural head noun into homogeneous subgroups, the domain D(**all-p**) is the set of partitions of the denotation of the plural head noun into arbitrary subgroups and hence a proper superset of D(Σ**p**). **all-p** is true of **x** iff **x** is a partition such that **p** is true of each subgroup in **x**.[46] Thus, plural nominal quantification is quantification over subgroups rather than quantification over atomic individuals.

The analysis accounts for the possibility of collective predicates in the nuclear scope, but it appears more complex than necessary if the predicate is distributive. According to the analysis just offered, (72) and (73) are logically equivalent:

[45] This was already observed in Vendler (1967). In the case of a numeral combined with a plural noun, the collective reading appears to be possible only for sufficiently great numbers. See also Gillon (1992: 630f.) for the same line of analysis.

[46] Actually, here and below, the term *partition* should be replaced by the term *cover*. A cover of x is a set of subgroups of x whose total sum is x. Cf., e.g., van der Does (1993) for a discussion of the conditions relevant here. Partitions are covers without overlap.

(72) all the students are bored
(73) every student is bored

The predicate in (72) is Σ**b** (**b** for *be bored*). (72) is true iff there is a partition of **s** (the group of all students) such that Σ**b** is true for each group in the partition. Hence, **b** is true of every member of **s**. Conversely, (73) entails (72) for any choice of a partition of **s** into subgroups.

There is, however, an intuitive difference between PNQ-s and PNQ-p even for distributive predicates: intuitively, the plural variants seem to be less strict, an effect we will discuss in Section 5. Compare the sentences in (74) and (75):

(74) a. all students are bored
b. some students are bored
c. no students are bored

(75) a. every/each student is bored
b. some student is bored
c. no student is bored

The difference is not due to any differences in truth conditions. (74b) might seem to require the existence of more than one positive case at level 0, i.e., more than one student that is bored. But this is not carried out by the truth conditions of the sentence: (74b) is not false if exactly one student is bored. If (74b) is understood as meaning that more than one student is bored, this may be due to a scalar conversational implicature. Likewise in (74c), the plural cannot have a strict >1 meaning, because (74c) is clearly false if there is just one positive case at level 0. It follows that *no* is the substitutional negation of *some* in its plural use as well as in the singular. Furthermore, (74c) is truth-conditionally equivalent to (75c) if the predication is distributive, as (74a) is to (75a).

I claimed in the last subsection that PNQ-s applied to a predicate **p** fills the truth-value gaps of Σ**p**. It follows from the analysis of PNQ-p that, in the case of a *distributive* predicate **p**, the quantification fills the truth-value gaps of $\Sigma\Sigma$**p**. The question could be raised if there is any need for filling these gaps. After all, $\Sigma\Sigma$**p** readings for predications with a plural definite argument seem a clear case for Occam's razor. For a sentence like

(76) the students are bored

a $\Sigma\Sigma$**p** reading would be truth-conditionally equivalent to the simpler Σ**p** reading. While this is so, the function of PNQ-p is still well motivated for cases such as (77) that are based on an integrative level-1 predication:

Table 6

subgroups	*all true*	*some true, some false*	*all false*	type
the N_{pl} *VP*	TRUE	(gap)	FALSE	Σp (p level 1)
1 ***all*** N_{pl} *VP*	TRUE	FALSE		pos. PNQ-p
2 ***most*** N_{pl} *VP*	TRUE	FALSE		pos. PNQ-p
3 ***many*** N_{pl} *VP*	TRUE	FALSE		pos. PNQ-p
4 ***some*** N_{pl} *VP*		TRUE	FALSE	pos. PNQ-p
not all N_{pl} *VP*	FALSE	TRUE		neg. of 1
not many N_{pl} *VP*	FALSE		TRUE	neg. of 3
few N_{pl} *VP*		FALSE	TRUE	neg. PNQ-p
no N_{pl} *VP*		FALSE	TRUE	neg. of 4
the N_{pl} *not VP*	FALSE	(gap)	TRUE	negation of Σp

(77) the students gathered in their classrooms

These cases show that **Σp** readings at level 2 *are* relevant for certain types of predication. In addition, there might be a pragmatic motivation for PNQ-p quantification rather than PNQ-s given the effects of group quantification vs. individual quantification just mentioned and discussed below in Section 5.

The relationship between summative macropredication and PNQ-p is illustrated in Table 6. The table is divided into positive and negative cases in order to illustrate the different ways the truth-value gaps of summative predication are filled by individual variants of PNQ-p. I do not consider *few* the lexical negation of *many*. The two quantity adjectives are in the same non-complementary opposition as, e.g., *thick* and *thin*. The negation of *many* is *not many*, which may be "more" than "few".

The more elementary quantifiers, called logical quantifiers in GQT, *all* (also *every* and *each* in the case of PNQ-s), *some* and *no*, are semantically simple in that they fill the truth-value gaps uniformly: the heterogeneous cases receive a uniform truth value. The so-called non-logical quantifiers such as *most*, *many* and *few* fill the gap by fixing a critical point on the quantity scale between the two homogeneous poles "nothing" and "all". The truth value is TRUE (or FALSE) above that point and FALSE (or TRUE) below it. What is common to these types of quantification is their property of monotonicity. Upward monotone quantification defines a lower bound for truth on the quantity scale while downward monotone quantification defines an upper bound. Non-monotone quantifiers such as *many but not all* would yield a tripartite partition of the scale with two critical points distinguishing three intervals.

Let us add at this point the rules of negation for PNQ-p quantification. Among the quantificational determiners, *all* (*the*), *many* and, marginally, *most* are negated with *not*. *Several* and *few* are not negatable, *a few* enjoys a stylistically marked, litotic variant *not a few*, which, however, is no exact polarity counterpart. The numerals can be negated by '*not* Num N' in their "at least n" reading, but lack a proper polarity counterpart when read as "exactly n". Apparently, the quantifiers that yield mid-scale quantity specifications with both a lower and an upper bound condition resist syntactic negation.

3.5. *Particular Nominal Quantification with Mass Nouns*

The last type of quantification to be mentioned here is PNQ-m, i.e., particular nominal quantification with mass nouns.

(78) a. all the spinach is bitter
b. much spinach is bitter
c. some spinach is served with sesame seeds
d. no spinach is served with sesame seeds

In their particular readings, the sentences quantify over subquantities of the referent of *the spinach* in the given context. If the predicate **p** is integrative, such as in (78a, b), PNQ-m must be regarded as a modification of an underlying $\Sigma\mathbf{p}$ predication (analogously to the cases of PNQ-p with collective predicates). If the predicate is summative, as in (78a, b), the level-1 interpretation seems to be unnecessary, since (78a) and (78b) are truth-conditionally equivalent with simple level-0 PAQ:

(79) a. the spinach is entirely bitter
b. the spinach is partly bitter

We prefer the level-1 analysis nevertheless, for the same reasons as above. Thus, again, quantification yields an integrative quantification at the level above the one grammatically indicated. Since that is level 0, PNQ-m operates at level 1. The analysis of PNQ-p applies to PNQ-m analogously. This is not surprising in view of the fact that PNQ-m largely involves the same quantificational lexemes as PNQ-p.

3.6. *Summary on Particular Quantification*

The analysis of PAQ and PNQ yields a uniform result:

- Particular quantification is an integrative predication about the domain of quantification.
- Semantically, particular quantification is a modification of a summative predication at the same level.
- The domain of particular quantification as an integrative predication includes the domain of the corresponding summative predication plus the heterogeneous cases.
- The domain of quantification is explicitly denoted as a whole by a definite NP in the case of PAQ. It is denotable by a definite mass or plural count NP in the case of PNQ. For PNQ-p and PNQ-m, we have to assume a level + 1 reading for the mass or plural count noun denoting the domain of quantification.
- Particular quantifications are predications at different levels. If the level grammatically indicated by the predicate is n,
  - PAQ applies at the same level.
  - PNQ applies at level n + 1. PNQ-p requires n to be 1 or higher.
- Particular quantification yields a truth value by evaluation of the single cases in the domain of quantification.
  - In the case of PAQ, a single case consists in applying the predicate to a relevant part of the referent of the definite NP.
  - In the case of PNQ-s, a single case consists in applying the (singular) predicate to the individuals that could be denoted by the head noun in its singular form.
  - In the case of PNQ-p, a single case consists in applying the (plural) predicate to the groups of individuals that could be denoted by the head noun in its plural form.
  - In the case of PNQ-m, a single case consists in applying the (singular) predicate to the relevant parts of the denotation of the head noun in its level-0 reading.
- PAQ and PNQ are functionally equivalent if constructed appropriately.[47]

Consequently, particular quantification can be considered a variety of processes that allow the construction of types of integrative predication, in particular integrative macropredication, that are not available by other

[47] This is not meant to imply that for each variant of PNQ there is a logically equivalent PAQ variant. The particular quantificational adverbs need not match exactly with particular quantificational determiners.

means of grammar (plural) and lexicon. It should be pointed out that adverbial quantification, although not particularly elaborated in English, is superior to nominal quantification in two regards. First, it is applicable at every level, including level 0 where nominal quantification is not available. For example,

(80) the cow is partly black

cannot be expressed by nominal quantification except by introducing further lexical material. Second, adverbial quantification is cognitively more transparent since it takes the form of an overt modification of the underlying summative predication and makes the involved reference to the domain of quantification as a whole explicit. In view of this fact, adverbial quantification appears to be more natural than nominal quantification and it should be expected that there are languages that possess PAQ but not PNQ devices.

3.7. *The Logical Type of Particular Quantification*

The analysis of particular quantification yields a result that may appear amazing to logicians at first sight, but in fact is a rather trivial consequence of applying the group conception now commonly used for the description of plurals to the description of quantification as well. According to the analysis developed here, quantification operates on two operands: a group individual defined by its restriction and the predicate in its nuclear scope. The general format of quantification is, hence, (81):

(81) $\mathbf{d}(\mathbf{a}, \mathbf{p})$

where **a** is the domain individual and **p** the predicate. The relationship between the two operands and the surface ingredients of quantification depends on the type of quantification. For adverbial quantification, **a** is immediately denoted by the subject NP and **p** is immediately expressed by the VP. For nominal quantification, **a** is a partition of the denotation of *the* + **n**, where **n** is the head noun in its singular form for mass nouns and in its plural form for count nouns. The partition itself is one in terms of the head noun in its given form, i.e., in terms of portions of "**n**" for PNQ-m, in terms of single "**n**"s for PNQ-s, and in terms of groups of the kind "**n**'s" for PNQ-p. In each case, the predicate **p** is immediately defined by the VP in its given form. Since differences in the level of predication do not affect the logical type, in this approach, the resulting logical type of particular determiners is $\langle e, \langle\langle e, t\rangle, t\rangle\rangle$ rather than $\langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$, the type assigned in GQT.

Particular quantification regarded in this way, besides being a second-order predication about the embedded predicate **p**, i.e., $\lambda p_{\langle e,t\rangle}\ \mathbf{d}(\mathbf{a}, p)(\mathbf{p})$, is at the same time a *first-order* predication about **a**,

(82) $\lambda x_e\ \mathbf{d}(x, \mathbf{p})(\mathbf{a})$

Compared with the simple summative predication $\mathbf{p}(\mathbf{a})$ with the same (complex) argument and the same (macro)predicate, the quantificational predication $\lambda x\ \mathrm{d}(x, \mathbf{p})$ in (82) is integrative and hence free of truth-value gaps. It states about the referent of **a** as an integral whole to which extent the predicate **p** is true of its parts, the extent being specified through the respective determiner **d**. Particular quantification can thus be considered the construction of an integrative macropredication $\mathbf{p_d}$.[48]

Following Frege (1892), Montague (1973) and the GQT approach considered quantification as a second-order phenomenon, as predication about the predicate in the nuclear scope. This view focuses on the argument **p** of the format $\mathbf{d}(\mathbf{a}, \mathbf{p})$ in (81), isolating the predication $\lambda p\ \mathbf{d}(\mathbf{a}, p)$. It allows a technically uniform treatment of the subject-predicate combination in natural language sentences as the application of some generalized quantifier **q** to the predicate encoded in the VP. As a consequence, the determiner of the subject NP is assigned a key role in the semantic structure of the sentence. Implicitly in Montague (1973), and explicitly in Barwise and Cooper (1981), the determiner of the subject NP is generally analyzed as a two place operator that takes two predicates: the restrictor predicate **n** encoded in the head noun of the subject NP and the nuclear scope predicate **v** given by the VP:

(83)a. $\mathbf{d} = \lambda\mathbf{n}\lambda\mathbf{v}\ \mathbf{d}(\mathbf{n})(\mathbf{v})$

The determiner **d** determines the overall semantic structure of the sentence as some particular type of quantification, while the subject NP itself operates on the VP as a second order predicate:

(83)b. $\lambda\mathbf{v}\ \mathbf{d}(\mathbf{n})(\mathbf{v})$

Hence, the *real* predicate of the sentence, according to the GQT approach, is not the grammatical predicate, i.e., the VP, but the subject NP, while the *real* subject is the grammatical predicate. While this can be claimed to be so if the subject NP really *is* a quantifier proper, this cannot be a cognitively, and logically, adequate *general* model of sentence semantics. The logical languages used in Formal Semantics are essentially means of expressing the operator-argument structure of a sentence. We *may* content

[48] See the definitions of **each-p** and **all-p** above for instances of $\mathrm{p_d}$.

ourselves with the formulation of just some variant within the class of logically equivalent representations of a sentence. This would mean to apply the criterion of proper truth conditions as the main criterion of adequacy. But we can go a step further and apply, in addition, the criterion of whether the semantic representation by logical formulae yields a cognitively plausible operator-argument structure. In fact, it appears that, at least implicitly, this criterion plays a central role in the discussion of different types of representations. Under this criterion, it *does* matter if a definite NP is interpreted as an individual term or as a quantifier.

It is in this sense that I consider the GQT approach inadequate for definites (and indefinites as well).[49] If it were adequate in this sense, we should expect that the key trigger for the whole semantic processing of a sentence is recoverable for the recipient from the surface structure of the sentence. However, (i) there are cases without any determiners in the subject NP, such as bare mass nouns and bare plurals (which, in their generic use, are discussed in the next section). It could be argued that it is the *lack* of a quantifier that triggers an extra mechanism like insertion of an invisible existential quantifier. But this would certainly not constitute a good solution in terms of efficient processing. (ii) The probably most common determiner function is the expression of definite reference. In English, definiteness is fairly consistently expressed by the use of the definite article, but there are many languages that do not mark definiteness, such as Russian or Chinese. (iii) Even among the languages with definiteness marking, many do not mark indefiniteness obligatorily (cf. Hungarian). Thus one may safely conclude that definiteness and indefiniteness markings are not universally in the key-operator role assigned to them in the GQT approach. (iv) In many languages, the whole subject NP (as well as other complement NPs) can be omitted if the context allows its retrieval, without any other surface trace than a verb that requires a respective complement. Clearly, what can be omitted is definite or indefinite NPs, but not quantificational NPs proper.[50]

Only in the case of explicit quantification proper, the subject NP plays the role Montague thought of in Montague (1973): GQT is, hence, based on a clear instance of overgeneralization.

The approach taken here explains the different logical and cognitive roles of quantifiers proper and definite NPs. For one, it explains the

[49] See DRT approaches as well as Löbner (1987b) and (1990, ch. 3) for arguments against the application of GQT to indefinites.

[50] I am not talking of pro-drop languages but of languages like Japanese, where a sentence like *tabeta*, i.e., a plain verb in the past tense without person marking can be used to express "I/you/she/we/you/they. . . . has/have eaten it".

different behaviour with respect to negation. Quantifiers proper *are* second order predicates and this is the reason why they can be negated themselves. Definites are not. Furthermore, the other syntactic and semantic differences mentioned in Subsection 2.7 should find an explanation on this basis. In addition, focusing on the first argument of $\mathbf{d}(\mathbf{a}, \mathbf{p})$ enables us to consider particular quantification as a *first-order* phenomenon, namely as the application of a derivation of $\mathbf{p}$ (formally $\lambda x\, \mathbf{d}(x, \mathbf{p})$), to the definite argument $\mathbf{a}$. Under this perspective, the syntactic and the logical structure can, to an appropriate degree, be reconciled: Even for quantificational subject NPs, the logical subject and predicate coincide, to a certain degree, with the syntactic subject and predicate, respectively, in that, still, the syntactic subject defines the logical argument of the predication and the syntactic predicate is the basis for the logical predicate.

3.8. *Particular Quantification and Summative Macropredication*

We argued that summative macropredication is different from particular universal quantification. The former yields a polarity contrast of the type "$\forall$ vs. $\forall\neg$", while the latter yields a complementary contrast of the type "$\forall$ vs. $\neg\forall$". Hence, they lead to identical conditions for truth, but different conditions for falsity. Essentially three independent arguments were used:

(i) The negation of a summative macropredication, e.g., a distributive predication with a definite plural NP argument, is itself a summative macropredication, i.e., it is true iff the predication is false of all relevant parts of the NP denotation.
(ii) Summative macropredications can be modified by means of adverbial quantification, which, in turn, is functionally equivalent to the corresponding types of nominal quantification.
(iii) Even if we *took* a definite plural NP as a quantifier, this quantifier would yield a principal ultrafilter in technical terms. Principal ultrafilters, however, are logically indiscernible from individual terms. Adopting the quantifier analysis would hence yield an unnecessarily, and therefore implausibly, complex semantic representation.

The second argument provides a third syntactic argument against a quantificational analysis of summative predication: Quantification is an operation that cannot be applied twice to the same operands. If a sentence with a plural definite subject NP and a distributive VP predicate, such as

(84)a. the books are written in Dutch

contained a quantifier at any level of syntactic or semantic representation, the quantifier would fill the respective logical position and render it unavailable for further adverbial quantification. The only way to postulate a quantificational analysis for sentences of the type of (84a) would consist in stipulating a "hidden" quantifier, say "!", with the required truth-and-falsity conditions in a L(GQ) representation like:

(84)b. **!(book)(is-written-in-Dutch)**

If PAQ were applied to the same sentence, the quantifier **!** would have to be replaced by the appropriate specific quantifier specified by the quantificational adverb. Obviously, this choice of analysis suffers from two serious violations of compositionality: first in introducing semantic material that lacks any corresponding surface material in (84a), and second, in overwriting information when the adverbial quantifier in (84b) is processed. Obviously, an analysis along the lines presented here is to be preferred for methodological reasons. Note, that the discrepancy of number between surface form and semantic representation in (84a) and (84b) is a further drawback of this type of analysis.

As to the third argument, it could be argued that, nevertheless, the definition of Σ involves universal quantification. What, after all, is the essential difference between Σ and $\forall$?

The crucial difference I see is that $\forall$ and all other "real" quantifiers, i.e., those that do not fulfil the homomorphism criterion, demand cognitively more complex operations than Σ or summative predicates in general. All quantifiers proper require for the construction of the polarity contrast at the same time the consideration of both negative and positive parts of the argument (i.e., the domain of quantification). $\forall \mathbf{n}$ is false of $\mathbf{p}$ if there are negative parts, i.e., parts for which $\mathbf{p}$ is false, along with, at least potentially, positive parts. $\exists \mathbf{n}$ is true of $\mathbf{p}$ if there are positive parts, along with, at least potentially, negative parts. In general, we have to consider a possibly heterogeneous total of parts and determine the portion of negative or positive parts among them. This procedure is more complex than the underlying procedure for Σ. Here, we have to just generate a multitude of equal cases. A summative macropredication $\Sigma \mathbf{p}$ still deals with a unit in some sense, i.e., a uniform multitude, while real quantifiers deal with a potentially heterogeneous multitude of cases.

The greater simplicity of Σ is reflected in grammar. Σ is grammaticalized as plural in many languages, while quantification proper invariantly requires special lexical means.[51] Nominal quantification clearly has a marked status in natural languages. In many languages, explicit nominal quantification is hard to obtain and, if so, only for a limited range of cases; quantificational constructions, if possible at all, are syntactically complex and manifold. The greater cognitive simplicity of Σ is also carried out by the data on language acquisition: children learn the plural significantly earlier than nominal quantification.

If this view is accepted we may dare to postulate the following universal which would have implications reaching beyond the problems discussed so far. (A further field of application is the generic constructions considered in Section 4).

(P) **Universal**
A natural language predication is only quantificational if there is an explicit quantificational device at the syntactic surface.

If the cognitive analysis of quantification suggested above is correct, there would be a further, pragmatic, argument for the non-quantificational analysis of predications without overt quantifiers: Since quantification requires a cognitive operation that is more complex than non-quantificational predications and since human interpretation is inevitably oriented at the principle of least cognitive effort, we should expect that this kind of operation is not performed unless one is forced to by an explicit surface trigger.

3.9. *The System of Types of Particular Predication*

In this subsection, I will try to sum up the findings of Sections 2 and 3 by composing a picture of the system of processes available for constructing the simple and quantificational types of particular predication. Let us begin with the predications with mass noun arguments. Level-0 predications may be integrative or summative. Summative predications can be subject to PAQ and to PNQ-m. PAQ yields an integrative predication at level 0,

[51] Those favouring an analysis of indefinites as existential quantifiers might argue that in this case existential quantification is grammaticalized. In Löbner (1990) and Löbner (1987b), I have argued that this is not the case. The apparent existential-quantification force of indefinites can be regarded as an epiphenomenon of referentiality. If indefinites are semantically represented as free variables, they acquire a value in the universe of discourse if they are taken to refer, or by referential anchoring, to put it that way. Being assigned a value is equivalent to existential quantification. ($\exists x$ s is true iff there is a value for x such that s is true.)

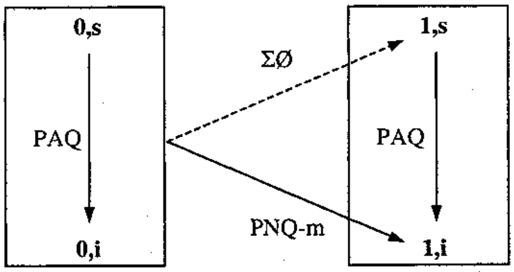

Diagram 1. Particular predication with mass noun arguments: morpho-syntactic possibilities.

while PNQ-m raises the level by 1. PAQ is also available at level 1. It is truth-conditionally redundant if **p** is summative at level 0, but not if it is integrative, as in (45d) discussed above:

[45]d. the spinach is partly served with sesame seeds

We therefore postulate the general availability of Σ**p** readings (e.g., multiple-portion readings) for predications with mass noun arguments. Diagram 1 displays the resulting picture.

The diagram is to be read as follows. Numbers indicate the level of predication, *s* and *i* are short for *summative* and *integrative*. Arrows denote morpho-syntactic modifications of the predication. Broken-line arrows indicate covert modifications. The arrows are labelled with the respective operations or types of operations. $\Sigma\emptyset$ stands for Σ without grammatical marking. The boxes unify the knots within them: every operation operating on a box may operate on each type within the box. The construction of a particular predication based on a mass noun argument can involve up to three modifications. The diagram depicts the *morpho-syntactic* possibilities of modification, rather than the underlying semantic structures. Applied to the semantic level, the PNQ-m arrow would have to connect the node 1, s to the node 1, i (cf. Diagram 3 below).

Examples for each possible type of predication with a mass noun argument

(85) *elementary predications*

a. 0,s		the spinach is bitter
b. 0,i		the spinach is cheap
one additional step		
c. $(0,s + \Sigma\emptyset)_{1,s}$	**r**	the spinach is bitter (*portions*)
d. $(0,i + \Sigma\emptyset)_{1,s}$		the spinach is cheap (*portions*)
e. $(0,s + \mathrm{PAQ})_{0,i}$		the spinach is partly bitter
f. $(0,s/i + \text{PNQ-m})_{1,i}$		some spinach is bitter/cheap

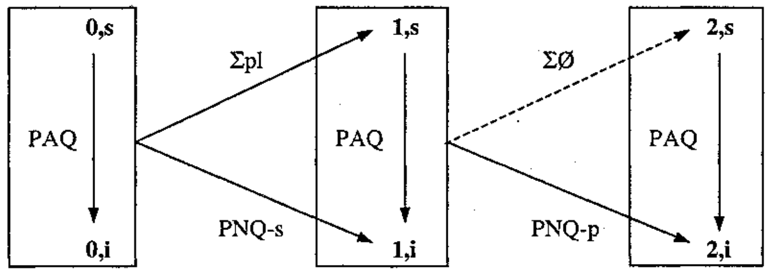

Diagram 2. Particular predication with count noun arguments: morpho-syntactic possibilities.

(85) *two additional steps*

g. $((0,s/i + \Sigma\emptyset)_{1,s} + PAQ)_{1,i}$
the spinach is partly bitter/cheap

h. $((0,s + PAQ)_{0,i} + \Sigma\emptyset)_{1,s}$
the spinach is partly bitter (*portions*)

i. $((0,s + PAQ)_{0,i} + PNQ\text{-}m)_{1,i}$
some spinach is partly bitter

three additional steps

j. $(((0,s + PAQ)_{0,i} + \Sigma\emptyset)_{1,s} + PAQ)_{1,i}$
the spinach is partly entirely bitter

"**r**" marks truth-functionally redundant readings that are equivalent to simpler ones.

The overall picture is more complex for predications with count noun arguments if we integrate both PNQ-s and PNQ-p (cf. Diagram 2). Σpl is summative macropredication with overt plural marking on the argument NP. The diagram captures the regularities for non-collective count nouns. An analogous diagram with each level raised by 1 would hold for collective count nouns. Not all combinations in the diagram are actually possible. PNQ-s is a terminal step. It excludes the further application of PNQ-p because the position of the quantificational determiner is already occupied. As for the further application of Σ∅, it appears impossible to achieve a reading for, say, *each student is bored* in which one would refer to several groups of students within which each member is bored.[52] Apparently, the

[52] I do get a reading for sentences like

(i) partly, each student is bored

if I assume that *students* contains an implicit possessor argument like *classes*. The sentence would then mean: "of the classes (contextually given), partly, each student is bored". This kind of interpretation crucially depends on the possibility to take the head noun of the nominal quantifier as a relational concept. The construction is different from the type of constructions covered by the system. Note that the entire part *each student is bored* is singular form of the head noun blocks a $\Sigma\Sigma$ reading. PAQ after PNQ is impossible for logical reasons: two quantifications over the same domain within the same construction are impossible. A second restriction on the system is that PNQ-p appears impossible after application of PAQ at level 1, for reasons I do not know:

(86) many students are partly bored

cannot take the reading that a substantial number of groups of students are partly bored. Apart from these restrictions, up to five additional steps are theoretically possible in the construction of the complex type of predication:

Examples for each possible type of predication with a count noun argument

(87) *elementary predications*

a. $0,s$ — the cow is black
b. $0,i$ — the cow is mad
c. $1,i$ — the students met

one additional step

d. $(0,s/i + \Sigma pl)_{1,s}$ — the cows are black/mad
e. $(0,s + PAQ)_{0,i}$ — the cow is partly black
f. $(0,s/i + PNQ\text{-}s)_{1,i}$ — each cow is black/mad
g. $(1,i + \Sigma\emptyset)_{2,s}$ — the students met (*groups*)
h. $(1,i + PNQ\text{-}p)_{2,i}$ — many students met

two additional steps

i. $((0,s/i + \Sigma pl)_{1,s} + \Sigma\emptyset)_{2,s}$
r the cows are black/mad
j. $((0,s/i + \Sigma pl)_{1,s} + PNQ\text{-}p)_{2,i}$
many cows are black/mad
k. $((0,s + PAQ)_{0,i} + \Sigma pl)_{1,s}$
the cows are partly black
l. $((0,s + PAQ)_{0,i} + PNQ\text{-}s)_{1,i}$
each cow is partly black
m. $((1,i + \Sigma\emptyset)_{2,s} + PAQ)_{2,i}$ — the students partly met

three additional steps

n. $(((0,s/i + \Sigma pl)_{1,s} + \Sigma\emptyset)_{2,s} + PAQ)_{2,i}$
the cows are partly black/mad

---

thetic, relative to the adverbial quantification, a fact that is reflected in the position of the quantificational adverb.

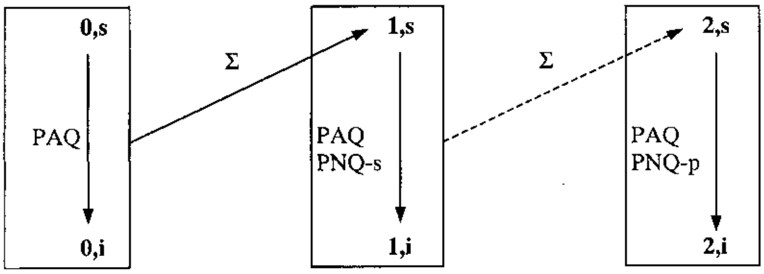

Diagram 3. Particular predication with count noun arguments: semantic processes.

(87) o. $(((0,s + PAQ)_{0,i} + \Sigma pl)_{1,s} + \Sigma\emptyset)_{2,s}$
r the cows are partly black

p. $(((0,s + PAQ)_{0,i} + \Sigma pl)_{1,s} + PAQ)_{1,i}$
the cows are partly entirely black

four additional steps

q. $((((0,s + PAQ)_{0,i} + \Sigma pl)_{1,s} + \Sigma\emptyset)_{2,s} + PAQ)_{2,i}$
the cows are partly all black

r. $((((0,s + PAQ)_{0,i} + \Sigma pl)_{1,s} + PAQ)_{1,i} + \Sigma\emptyset)_{2,s}$
r the cows are partly entirely black

five additional steps

s. $(((((0,s + PAQ)_{0,i} + \Sigma pl)_{1,s} + PAQ)_{1,i} + \Sigma\emptyset)_{2,s} + PAQ)_{2,i}$
the cows are partly all entirely black

The system is closed in that it does not allow free iteration. Level 3 cannot be reached within this system. If the head noun of the argument is a collective noun, i.e., lexically level 1, all levels in the system are raised by 1. (88) would be a real level-3 predication not reducible to level 2, in one of its readings:

(88) many crews met

If the meetings are inter-group meetings rather than intra-group meetings, the predicate is an integrative predicate at level 2 (groups of crews). PNQn requires a partition of the set of groups of crews into at least two different groups of groups of crews (those meeting and those not meeting).

Let me complete the picture given here by a diagram that illustrates the *semantic* processes involved in the construction of complex predication types at the semantic level, making explicit that PNQ is always based on Σ at the same level (Diagram 3).

The outlines of a theory of particular predication developed here do not cover all possible processes. One further process, among others, would be the token/type shift. For instance, (89a) has a type reading besides the token reading, in which the singular count noun is taken to refer to, say, the whole edition of the book:

(89)a. the book is published as a paperback

The token/type shift renders another instance of summative predication. The sentence is true/false iff the predication is true/false of each token. Thus, again, the negation is formed by VP negation, and both (89a) and (89b) exhibit truth-value gaps due to PI:

(89)b. the book is not published as a paperback

Consequently, token/type shifted singular definite NPs are of type 1,s and enter the same system of processes as collective nouns. The token/type shift is only possible prior to Σpl and nominal quantification. Apparently this shift is a lexical shift producing some kind of collective noun. Equally, the mass/portion and the mass/sort shift available for certain mass nouns are lexical shifts.

3.10. *The Problem of Hidden Operations*

I argued, and will again argue in the next section, that the assumption of hidden operators constitutes a deviation from the principle of compositionality and should therefore be avoided for methodological reasons. I must, hence, be careful when assuming processes partaking in the construction of complex types of predication. A problematic part of the systems, in this regard, is $\Sigma\emptyset$. The $\Sigma\emptyset$ operation occurs independently only in the construction of "plural", i.e., level-1, readings for mass nouns and "double plural", i.e., level-2 readings of count nouns. In both cases, the step is harmless. Σ is normally grammatically expressed by the number form of the argument noun. In the two cases mentioned, however, the expression of Σ is grammatically impossible, since the plural of mass nouns and a double plural of count nouns is not available. Hence, it can be explained why there cannot be a surface trace of the operation, except for special constructions such as (90) where the operation leaves a trace in the PP.

(90) the students gathered in their classroom*s*

I further argued that $\Sigma\emptyset$ is involved, as a semantic step, in PNQ (Diagram 3). This decision, too, is well motivated. First, it can be argued that this step is part of the semantics of the PNQ determiners – for which I offered good reasons. Second, again, the expression of Σ by the number of the head noun is blocked since the function of number in these cases is to determine the level of the single cases constituting the domain of quantification.

Typologically, there is broad evidence that the operation Σ need not surface. Many languages don't have plural. But we would certainly want to assign sentences in such languages both singular and plural readings. Furthermore, Σ is usually not expressed for the referential event argument of verbs. A sentence like *she knocked* may refer to a single knock as well as, in a plural reading as it were, to a cluster of knocks. This is even true for English which, as a rule, marks Σ on nominal arguments.

4. Generics

4.1. *Types of Characterizing Sentences*

This section deals with several types of constructions that, if related properly, are semantically equivalent:[53]

(91) a. a farmer beats her donkeys
b. farmers beat their donkeys
c. if a farmer owns a donkey, she beats it
d. wer einen Esel hat, schlägt ihn
(German, lit.: who has a donkey beats it)

I am interested in these types of sentences not in their quality as "donkey-sentences" but just as generics of a certain kind. In the sense of Krifka et al. (1995: 3), these sentences are *characterizing sentences* (henceforth CSs) as opposed to "particular sentences". When I use the term "generic" in the following, I refer exclusively to genericity of this kind.

Let me call sentences like those in (91) 'simple generics'; CSs with explicit quantifiers will be called 'quantificational generics'. Like simple particular predications, simple generics can be modified with adverbial quantification. We already mentioned that there are two sets of quantificational adverbs for generics, both completely different from the set of PAQ expressions. One consists of adverbials of temporal quantification: *always, mostly, often, sometimes, seldom, rarely, never*. The other consists of modal adverbs of possibility/necessity, normality or probability: *necessarily, normally, usually, possibly, inevitably* and the like. Let me refer to these expressions as GAQ (generic adverbial quantification) expressions. In what follows, I will concentrate on the first set.

(92) a. a farmer always beats her donkeys

[53] Cf., e.g., Rooth (1995).

(92)b. farmers often beat their donkeys
c. if a farmer owns a donkey, she seldom beats it
d. wer einen Esel hat, schlägt ihn nie (never)

The sentences in (92) are ambiguous. If the temporal quantifier is taken in its temporal meaning, they are simple generics and (92a), e.g., would be roughly interpreted as "if you pick out a farmer, she will beat her donkey all the time". (An analogous reading is available if we replace *always* by *usually* or *normally*.) For the GAQ reading relevant here, the quantificational adverbs are taken as quantifying over abstract cases of, say, farmers who own a donkey.[54] In this reading, (92a) would mean that, *whenever* you pick out a farmer, she will beat her donkey. Note that the same kind of adverbs can be used in the same sentence in both meanings:

(93) farmers always beat their donkeys often[55]

In GAQ reading, temporal quantifiers possess direct equivalents in form of nominal quantifiers (GNQ for generic nominal quantification). Again, number matters. We will discuss the difference between singular and plural generics in Subsection 4.4. Suffice it here to state the following correspondences:

(94)a.	every farmer VP	a farmer always VP
	many a farmer VP	a farmer often VP
	(*no analogue*)	a farmer sometimes VP
	no farmer VP	a farmer never VP
b.	all farmers VP	farmers always VP
	most farmers VP	farmers mostly VP
	many farmers VP	farmers often VP
	some farmers VP	farmers sometimes VP
	few farmers VP	farmers seldom/rarely VP
	no farmers VP	farmers never VP

[54] I will not enter the discussion about what *exactly* constitutes a relevant 'case' in these kinds of construction, e.g., farmers who own one or more donkeys or farmer-donkey pairs. The question is independent of the argumentation developed here.
[55] The difference of the position of the adverb may affect the preference of the readings. Adverbs preceding the VP have a tendency to be taken as GAQ expressions, whereas adverbs in post-VP position tend to be taken as temporal quantifiers. There may, however, only one position be available, as is the case with the German headless relative example (91d).

(94)c.	all food VP	food always VP
	much food VP	food often VP
	little food VP	food seldom/rarely VP
	no food VP	food never VP

The data, hence, exhibit a very similar structure as in the case of summative particular predication: certain predications can be modified both by adverbial and by nominal quantification, both operations being functionally equivalent. There is one important difference, however; while PAQ is only available if the underlying predicate is summative, GAQ is possible for both summative and integrative VPs.

Whereas the set of AQ devices for generic quantification is disjoint from the set of PAQ expressions, the sets of NQ expressions are almost identical. Some NQ expressions are only available for particular quantification: *each*, *both*, *either*, *neither*, singular *some* and the numerals in quantificational use, i.e., with an implicit or explicit partitive reading;[56] *all* requires the addition of the definite article in its particular use, while it is only possible without the article if it is used generically. The fact that the sets of adverbial quantifiers for generic and referential quantification are disjoint allows the distinction between generic and referential *nominal* quantification. For instance, *every apple is sour* is a case of PNQ iff it is interpreted as *the apples are all sour*, but an instance of GNQ iff it is read in the sense of *apples are always sour*.

So much for the basic data. Essentially two different types of semantic analyses have been proposed for simple generic sentences like (91a, b). In Carlson (1977) and Carlson (1980), Carlson argues for a non-quantificational analysis of bare plural NPs, both in generic and existential (particular) readings, claiming that bare plural NPs in either case refer to some "kind". Carlson's main argument against a quantificational analysis of generic bare plural NPs – an argument that carries over to all other types of CSs – is the notorious vagueness of the kind of generality expressed. If, e.g., the generic reading were equated with a plain universal quantification, all sorts of special cases that obviously do not invalidate the general statement would have to be conceded as exceptions. Other arguments brought forward by Carlson were relativized later, see, e.g., the discussion in Rooth (1995: 281ff.).

The other line of analysis is, and always has been, a quantificational analysis. If *The Generic Book* (Carlson and Pelletier, eds., 1995) is to be

[56] Note that the use of these quantifiers in generic sentences such as *each spider is poisonous*, where quantification is about kinds of spiders represents a different kind of genericity than the one discussed here.

taken as representing the present state of the art with respect to the semantic analysis of CSs, it must be stated that apparently the quantificational analysis is the one that prevailed. Carlson's main argument is taken into account by various sorts of restrictions imposed on some variant of universal quantification. For example, the domain of quantification specified by the generic indefinite is taken as a domain of possible, rather than actual, cases and/or of relevant, prototypical or stereotypical cases.

In accordance with universal (P) postulated above ("quantification is always explicit"), I will argue for a non-quantificational analysis of all CSs without overt quantifiers. The arguments will be essentially the same as in the case of particular summative predications. The discussion departs from the distinction between simple and quantificational generics (Subsection 4.2), mentions briefly clausal generics such as donkey sentences (Subsection 4.3) and discusses the role of grammatical number in nominal generics (Subsection 4.4). Along with the argumentation, I will develop an analysis of the types of predication involved in the case of CSs with generic indefinites. An informal explanation will be offered for the way the generality of CSs comes about in absence of overt quantifiers (Subsection 4.5). The explanation is based on the *absence* of reference by generic indefinites and is, therefore, of a different type than Carlson's. In connection with the hypothesis, the logical type of generic NPs is discussed in Subsection 4.6. I'll propose a treatment of generic operators as free-choice operators in Subsection 4.7. The section is concluded with a brief remark about the connection between the particular and the generic use of nominal quantifiers.

4.2. *Simple Generics vs. Generic Quantification*

Let us, again, start the discussion with the question what constitutes the proper negation of CSs such as (95a):[57]

(95)a. an umbrella is called "brother of the flying fox"

According to the standard view, simple sentences such as (95a), i.e., CSs with generic indefinites but no overt nominal or adverbial quantifiers, are instances of (appropriately restricted)[58] universal quantification. Hence,

[57] This question is, apparently, neglected in almost all the semantic literature on generics. It is not, for example, discussed throughout the whole *Generic Book*. The only work I know of which addresses the question is Fodor (1970). She arrives at the same result as I will below.

[58] For example, in this case *is called* should be taken as restricted to a certain language. (95a) is true for Tok Pisin.

they should be false if there are some (relevant) counterexamples to the general claim: some (sorts of?) umbrellas that are not called "brother of the flying fox". What the standard analysis does not account for is the fact that sentences such as these have negations, formed by simple VP negation, and that the negations are generic in the same way as the positive sentences are:

(95)b. an umbrella is not called "brother of the flying fox"

Again, there is no other candidate for negation, as the only constituent with potential scope over the VP is the subject NP, which, however, cannot be negated. An apparent candidate for subject negation, the determiner *no*, is admittedly possible in these cases:

(95)c. no umbrella is called "brother of the flying fox"

However, although this sentence is true iff (95a) is false, it is obviously false if (95d) is true:

(95)d. some umbrellas are called "brother of the flying fox"

Hence, (95c) is clearly not the negation of (95a), but the negation of (95d).[59]

Obviously, analogous considerations hold for CSs with generic bare plural or bare mass indefinites: The negations of (96a) and (97a) are (96b) and (97b) respectively:

(96)a. logicians die in misery
b. logicians do not die in misery

(97)a. sushi is delicious
b. sushi is not delicious

This leads to the following result:

(Q) **Result**
The negation of a simple characterizing sentence with a generic indefinite subject is formed by VP negation.

We observe that the negation of a characterizing sentence is, again, a

[59] Due to the difference in number to be discussed below, (95c) and (95d) do not form exact negations of each other. The negation of (95d) is *no umbrellas are called "brother of the flying fox"*. Because of the unacceptability of singular *some* in CSs, (95c) lacks a proper syntactic partner which it is the negation of. (95d) is however a polarity counterpart of (95c) because (95c) has the same truth conditions as its plural variant.

CS and that it exhibits exactly the same kind of generality. Hence, the result of negation is an all-or-nothing contrast as in the case of summative macropredication. This does not mean, however, that generic predication of this kind presents another case of summative macropredication. The underlying process is different and will be discussed in Subsection 4.5. Correspondingly, the truth-value gaps of simple characterizing sentences are not due to PI.

The fact that negation of a simple CS yields an all-or-nothing contrast provides an argument against analyses in terms of universal quantification that is much stronger than the exceptions argument. The strategy of imposing some kind of restriction on the alleged universal quantification expressed with CSs cannot meet this argument: universal quantification, however restricted,[60] will yield the wrong type of polarity contrast. Many present analyses of CSs agree in assuming a genericity operator in the semantic representations of CSs. The genericity operator, written as "GEN" in Carlson and Pelletier (1995) is unanimously given a semantics in terms of some variant of universal quantification.[61]

The inadequacy of any account of genericity in terms of universal quantification shows up in the following problem, which is immediately related to the problem of intrasentential negation. Consider a question-answer pair such as

(98)a. Is sushi delicious? – No.

We would certainly want to be able to analyze sentential *no* in general as the negation of the proposition of the question, i.e., as an equivalent of the negation of the corresponding declarative sentence. 'No'. in (98a) must be equivalent to

(98)b. Sushi is not delicious.

Thus, the only plausible semantic representation of sentential *no* in this function appears to be something like "$\neg$**p**", where **p** is a free variable for a proposition provided by the context. Now, if we represent the meaning of *sushi is delicious* roughly (omitting all variables) by

(98)c. GEN(sushi; is delicious)

[60] There is only one kind of restriction that would work: the restriction of the domain of quantification to one single case. This, however, would obviously exclude any kind of generality.

[61] See Krifka et al. (1995: 43 ff.) for a discussion of alternative definitions of GEN, and Krifka et al. (1995), Kratzer (1995), Krifka (1995), Asher and Morreau (1995), ter Meulen (1995), Link (1995) for different elaborations.

we would have to represent the meaning of sentential *no* in (98a) *ad hoc* by (98d) – in disagreement with the general interpretation '$\neg$p', which would result in (98e):

(98)d. GEN(sushi; $\neg$ is delicious)
e. $\neg$GEN(sushi; is delicious)

This is certainly an unwelcome consequence. Independently of the question whether a hidden genericity operator is admissible or not, the negation argument developed here is an argument against the *kind* of operator used in the analyses mentioned. To *this* problem a solution will be offered in Subsection 4.7.

I am not moving far astray from present theoretical common sense if I suppose that CSs are predications about hypothetical cases characterized by the descriptive content of the generic indefinite. In the case of simple generics, the totality of hypothetical cases has to be homogeneous in terms of the predication expressed by the VP. As with particular summative predication, this presupposition does not hold in the presence of explicit quantifiers. In accordance with definition (E) of negation in general, sentences with GAQ or GNQ expressions are negated by negation of the quantificational expression, either by adding *not* or by substitution:

(99)a.	every farmer VP	not every farmer VP
b.	(*no syntactic counterpart*)	no farmer VP

(100)a.	all farmers VP	not all farmers VP
b.	many farmers VP	not many farmers VP
c.	some farmers VP	no farmers VP
d.	few farmers VP	(*no syntactic counterpart*)
e.	no farmers VP	some farmers VP

And analogously for adverbial quantification:

(101)a.	a farmer/farmers always VP	a farmer/farmers not always VP
b.	a farmer/farmers sometimes VP	a farmer/farmers never VP

The resulting polarity contrast is complementary in the classical sense: no truth-value gaps arise due to this form of predication. Thus, like particular quantification, generic quantification can be considered as an integrative predication about the totality of cases constituting the domain of quantification. The exact correspondences between simple and quantified CSs and the semantic effect of grammatical number will be addressed in Subsection 4.4.

The possibility of adding an adverbial quantifier to simple CSs and the equivalence of GAQ and GNQ provides another argument against a quantificational analysis of simple generic predications, the same kind of argument as used above in the case of plural definites in particular predication.

4.3. *Generic Clauses*

Generic Conditionals. The considerations about generic indefinites immediately carry over to certain equivalent constructions, among them generic conditionals such as the famous donkey sentences:

(102)a. if a farmer owns a donkey, she beats it

The presence of a free individual variable in both the main and the conditional clause is not crucial. Other conditionals are of the same type, e.g.,

(102)b. if I have a headache, I take aspirin
c. if they want to apologize, they say "sayonara"[62]

All of these sentences can be taken as statements about (categories of) hypothetical cases that can be treated as parameterized abstract situations in the sense of Barwise and Perry (1983). (102b) and (102a) deal with situations with one or two individual type parameters, respectively, plus a situational parameter, while the only parameter of (102c) is of the latter type.

The negation of these types of sentences is invariably expressed by VP negation in the main clause:

(103)a. if a farmer owns a donkey, she doesn't beat it
b. if I have a headache, I don't take aspirin
c. if they want to apologize, they don't say "sayonara"

Heim, in her 1982 dissertation (p. 168ff), analyzed donkey conditionals as quantificational and assumed an "invisible" necessity operator in order to make the analysis compositional in a very weak sense.[63] Again, however, simple generics of the clausal type can be modified by adding an

[62] Yes, I know the sentence is false!
[63] For a more recent analysis along this line see, e.g., Kratzer (1995).

adverbial quantifier. And again, the quantified versions yield a complementary contrast, while the simple versions don't.

Headless Relatives and Similar Clauses. If you walk along a street in any German town you might get trapped by the automatic, self-fulfilling self-offence

(104) Wer das liest, ist doof.

written in a more or less orthographically correct spelling by the yet clumsy hand of some anonymously rejoicing first-grader. The sentence is of the headless relative type I want to discuss here. It splendidly illustrates the hypothetical mode of speaking that also underlies the other types of generic sentences discussed above: it just applies to whoever happens to meet the general description given in the relative clause. It is equivalent to generic conditional constructions such as

(105) if someone reads this he is stupid.

In English, there are similar constructions with the pronoun *what* in its "whatever" reading:

(106) what he says is stupid

Despite the use of an otherwise interrogative pronoun, these sentences are relative clauses. Of the same type are generic readings of adverbial clauses such as in (107) (completeness not intended):

(107) a. where there is money, there is envy
b. when I have a headache, I take aspirin
c. as soon as I take aspirin, I start feeling sick
d. before I go to bed, I check the stove

It may pass without any comment that the negation of these types of sentences is, again, expressed by VP negation in the main clause. For some reason or other, which I do not want to go into here, the adverbial clause constructions require a rearrangement of clause order for the proper scope reading of negation. The negations of the examples mentioned here are

(108)[of 104]	wer das liest, ist nicht doof
[of 106]	what he says is not stupid
[of 107a]	there is not envy where there is money
[of 107b]	I don't take aspirin when I have a headache
[of 107c]	I don't start feeling sick as soon as I take aspirin

[of 107d] I don't check the stove before I go to bed

(R) **Result**
The negation of simple generic conditionals and headless relatives is formed by VP negation in the main clause.

Again, the predication is homogeneous, while explicit quantification by GAQ leads to a complementary contrast without truth-value gaps.

4.4. *Nominal Generics and Grammatical Number*

Let me conclude the discussion of the data with an analysis of the types of predication at the level of the hypothetical cases CSs are about. At first glance, there appears to be no difference within the following pairs of sentences:

(109)a.	a cat eats meat	cats eat meat
b.	every cat eats meat	all cats eat meat
c.	?some cat eats meat	some cats eat meat
d.	no cat eats meat	no cats eat meat

However, the difference in number comes to fruition if the predicate is collective: This is only possible with plural subjects (110a) or collective nouns (110c).

(110)a. (all/some/no) logicians meet in cheap pizzerias
b. *every/some/no/a logician meets in cheap pizzerias
c. every/no/a string quartet consists of four violas

The sentences show that *prior* to the generalization triggered by CSs the same rules of predication apply to the construction of the single case as apply to the operations of the prequantificational cycle of particular predications. The single case may consist in an integrative or summative predication at level 0 or 1. In the case of mass or collective singular nouns, summative predication may be rendered an integrative predication by PAQ at the single case level, consider e.g.,

(111)a. a cow is always partly black (CS reading)
b. all cows are partly black (CS reading)

If a predication can be applied either at level 0 or at level 1, i.e., either to atomic individuals or to groups, the resulting CS is ambiguous:

(112) books are heavy

If *heavy* is applied at level 0, the predication *are heavy* is taken in a distributive reading, (112) then expressing that single books are heavy. In a second reading, the predicate can be collectively applied at group level 1. (112) then conveys the idea that, given some total of books, e.g., a box or a shelf full of books, they will be heavy as a whole.[64]

Result (R) carries over to generic indefinites with cardinality or quantity attributes such as numerals or *many/much*, *few/little* and *no* in examples like the following, which are to be carefully distinguished from quantificational generics.

(113) a. four eyes see more than two
b. many hands make light work
c. two sentences that are polarity counterparts of each other share the same presuppositions
d. too much sugar causes cavities
e. no news is good news

In these cases, the cardinality or quantity attribute defines the size of the groups or quantities to which the predication applies. In general, the hypothetical case a CS is about is directly expressed by the generic NP: if the NP is of the form *a N*, the single case consists in a single "N", if it is a bare plural, it consists in a group of "Ns" of arbitrary size, if it is a bare mass noun, it consists in a quantity of "N", and if it is of the form *cardinal* + *N*, it consists in a group of "Ns" of the size specified by the cardinal.

Essentially the same holds in the case of quantificational CSs. For adverbially quantified generics, the cases quantified about are directly defined by the generic NP. Thus, (114a) is a quantification about cases consisting of a single farmer, while (114b) is about cases consisting of groups of farmers of unspecified size:

(114) a. a farmer never beats her husband
b. farmers never beat their husbands

For nominal quantification in CSs, grammatical number matters the same way it does for PNQ. If the quantificational NP is singular, the quantification is about possible referents of the singular head noun, if it is plural

[64] These two readings parallel two readings of the particular sentence *the books are heavy*, i.e., the single-book and the, e.g., box-of-books reading. The particular sentence has a third reading in which the totality of books referred to is heavy as a whole (the classical collective reading). A parallel reading is not available for the CS *books are heavy*: it can never mean that (hard to express) all books in general, taken together, are heavy. This might provide one more argument against any referential analysis of generic bare plurals.

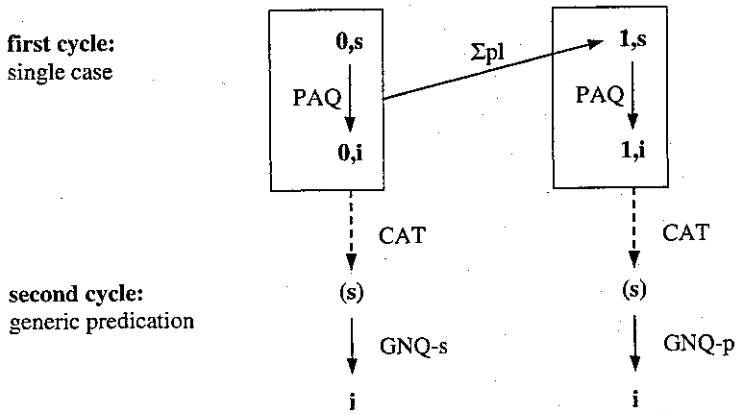

Diagram 4. Generic predication with or without nominal quantification.

it is about groups. Hence, we observe collective predicates with plural quantification, but not with singular quantification (cf. 110a, b above).

The predications expressed by CSs are built up in *two cycles*; in the first cycle, the single hypothetical case is constructed, in a second cycle, following generalization from the single case to the abstract totality, or category, of hypothetical cases, either homogeneous predication or generic quantification is applied.

I will restrict the discussion of the cycles to the case of CSs with generic count nouns. Let me start with CSs without generic adverbial quantifiers. Apparently, the first cycle in these cases cannot be the full cycle in Diagram 3 because GNQ can only be applied if the prenominal quantifier position is not already occupied by a PNQ expression. It also appears to be the case that level 2 cannot be reached at the single case level. Consider the particular sentences (87g) and (87m) above: they have level-2 (groups of groups) readings. But it is questionable if (115) has a corresponding reading ("take any groups of groups of students, the subgroups of students will meet in fast food restaurants"):

[87] g. the students met
m. the students partly met

(115) students meet in fast food restaurants

Rather, (115) will be taken as a generic statement about just groups of students.

We therefore assume that the single case cycle cannot take us beyond level 1, at least in absence of GAQ. The resulting system is shown in Diagram 4. "CAT" represents the transition from the abstract single case

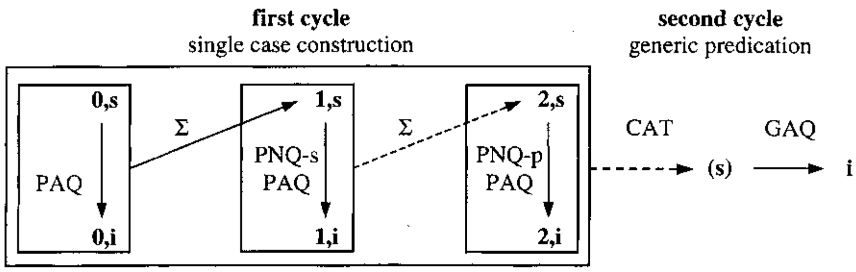

Diagram 5. Types of generic predications with adverbial generic quantification,

to the category of abstract cases the CS is about. "(s)" stands for the quasi-summative quality of simple generic predication.

The picture evolving for adverbial generic quantification is more complex. Apparently, GAQ admits for more complex types in the first cycle. The following sentences appear to be at least to some degree acceptable:

(116)a. always, students partly work in groups
b. always, some students work in groups
c. never are all the students lazy
d. never do all the students work in groups

All these sentences require a level-2 analysis at the single case level. The kinds of situations we think of here are such that *students* refers to the students of, say, different classes. Underlying the adverbial quantification would thus be a hidden class variable. This is possible because adverbial quantifiers may relate to occasions in a very broad sense. Cases like those in (116) may be restricted to head nouns in the generic NP that are inherently relational. Note that the nominal quantifiers in (116) are quantifiers at the single case level, hence PNQ devices rather than generic quantifiers. If the analysis is correct, the resulting picture is as shown in Diagram 5.

The restrictions valid for particular predication apply here, too: NQ cannot be applied twice. The diagram may contain more types than are actually possible.

4.5. *Genericity*

As stated above, the majority of present analyses of CSs assume a generic operator GEN in the semantic representations of CSs. At first glance, the step symbolized by "CAT" in my diagrams could be taken as another operator of the kind. Such a solution is, however, not intended here, since I consider any assumption of "hidden" operators in the semantic representation of linguistic expressions a methodologically problematic step in view of the basic and vital assumption of compositionality. The linguistic input for semantic interpretation consists of the surface form of a sentence. Hence, there must be some sort of trigger for any component of the semantic representation. The proponents of the hidden-operator analyses do not explain how this operator enters the semantic representation. The method is particularly questionable if the *presence* of a GEN operator is employed as an explanation for certain data, as in the following citation from Krifka et al. (1995: 36):

> [. . .] we claim that it is the presence of a generic operator (or of explicit quantificational adverbs) which *causes* the *when*-clause to be "unspecific".

(The citation is taken from a passage arguing against an attempt in Declerck (1986, 1988) to explain how the generic reading of *when*-clauses comes about.) The authors of the citation must accept the question of what it is they mean by the "presence" of an operator that is *absent* at the surface form. Its "presence" at the level of semantic representation is just a stipulation and should be treated and talked about as such. Let me quote a passage from Declerck (1991: 80) who makes essentially the same general point:

> Linguists that have been concerned with the semantics of generic sentences have often posited some kind of generic element in its semantic structure, such as a generic quantifier, or a generic operator, or a generic tense [*note with references omitted*]. This may be a legitimate step if one wants to make clear what distinguishes the meaning of a generic sentence from that of a non-generic one, but it obviously does not help us to solve the question of how we can tell if a sentence is to be interpreted generically. (It would not do to say that it is the generic quantifier or operator that determines a generic interpretation, since this information is not accessible to the hearer prior to the interpretation of the sentence: the generic element in question does not appear overtly in surface structure.)

I fully agree with Declerck here, but the line of explanation I want to propose is different from his. While Declerck (1991) offers an explanation in terms of a combination of surface data, semantic constraints and conversational maxims, the explanation I want to suggest instead rests on assumptions about the underlying cognitive processes.

Common to the generic constructions discussed here (there may be more of the kind) is what I called a certain mode of language use. This mode is characterized as a predication about hypothetical cases involving at least one parameter that is not referentially anchored[65] in the situation of utterance. Generic talk is talk on the level of categories rather than

[65] In the sense of Barwise and Perry (1983).

individuals referred to, talk about the category of donkey-owners, graffiti readers, of my activities in certain situations and so on. However, it is not *explicit* talk about categories, as no categories are mentioned as such (and therefore I do not agree with Carlson's *reference*-to-kinds analysis). Let me illustrate what I mean by referential anchoring with a simple example.

(117)a. dogs bark
b. dogs are chasing Joan

(117b) is a sentence about Joan, a report about some event taking place during the present time. Both tense (plus the progressive form) and the reference to Joan anchor the event to particular components of the world. Since the event itself is anchored, its agent is part of reality as well: the referent of the indefinite NP can be anchored. No such possibility exists in the case of (117a). The sentence is somehow anchored by tense, but the non-progressive form of the event verb *bark* in its present tense does not allow its referential anchoring to any particular event. Hence, its agent role cannot be anchored either.

Thus, the category level quality of such statements is brought about by the fact that the generic NP, generic conditional or generic relative provides no more information than just an explicit categorization of an unanchorable parameter. Being left with this information alone, without the possibility of connecting any other information that we might have about any real, i.e., particular, values of parameters in case they were anchored, we have to take the predication as relevant on the basis of the explicit categorization alone. It is the lack of anchoring that makes these statements general.

The next question in this connection would be whether it can be predicted on the basis of the surface structure of a sentence if an indefinite NP can be referentially anchored. One crucial condition for unanchored indefinites would be that the indefinite is categorical and not receiving a partitive interpretation. Diesing (1992) has argued that generic indefinites are in a different syntactic position (VP-external). This would account for the differences in intonation between, say, (118a) and (118b):

(118)a. dogs bark
b. dogs are barking

Since bare indefinites and indefinites with the indefinite article are not capable of partitive readings, this would explain why indefinites of that kind in certain syntactic positions give rise to generic interpretations under appropriate circumstances. I am certainly not able to fully determine the conditions that enable a generic interpretation. But I assume that the availability of an unanchored reading of the indefinite is crucial.

(S) **Hypothesis**
Generic predication is predication about referentially unanchored cases.

It is an open question whether the matter of referential anchoring is to be dealt with at the level of semantic representation or rather if it is to be applied in a second step of interpretation to a referentially unspecified semantic representation. In any event, there must be a level of processing at which we are able to determine the possible applications of the semantic information: are we to apply it as partial and particular information about the real world or are we to take it as a general information about our system of categories?

If this line of analysis is correct, we obtain at the same time an explanation of the truth-value gaps resulting from simple generic predication. While the truth-value gaps of summative predication are due to PI, which in turn is the result of talking about multitudes of equal cases, the truth-value gaps of generic quantification are due to a predication in terms of abstract cases. If I state a predication in terms of an abstract case specified by the generic NP or clause, I attribute the truth of the predication to the sort of case specified. Hence it carries over to the whole category. It is important to note in this connection that indefinites inevitably provide *sortal* information about possible referents, i.e., they always define their referents as objects with certain characteristics they exhibit for themselves.[66]

In the case of CSs with bare plurals there is even a double source of generalization, which may be the reason why this kind of CSs are felt to be the "better" generics. If I say "dogs bark", I utter a predication in terms of abstract cases consisting in groups of dogs. Nothing particular is said about these dogs. So, you are allowed to choose whatever group of dogs you want: these dogs will bark. Since the single case predication is summative, all dogs within the group are alike in terms of barking. Hence, if there is any homogeneously barking group of dogs this group will overlap with other groups. These groups, again, must be homogeneous.

[66] See Löbner (1985) for the distinction of sortal vs. relational and functional nouns and concepts. It would be interesting to investigate the ways in which relational, and in particular, functional nouns can enter CSs. But I will refrain from a discussion in order not to complicate the discussion any further.

Hence it follows by induction that all dogs must be alike in terms of barking. This overlap effect is not available if we use a singular count indefinite instead. The generality of such statements rests on the arbitrariness of the single case alone.

The generality of generic sentences is thus due to a different process than summative macropredication. It applies at a higher, posterior level of meaning processing. If forced to name the crucial presupposition leading to the truth-value gaps of simple generic predication, I would attribute them to a "presupposition of applicability by category".

4.6. *The Logical Type of Generic NPs*

It was argued in Subsection 2.7 that plural definites in particular predications should be semantically represented as individual terms (type e) since their logical properties are those of individual terms. Simple generics, apparently, have the same logical properties as definites, in fulfilling all homomorphism criteria. We have shown by now that for simple generics predicate negation and sentence negation coincide. Likewise, predicate conjunction and sentence conjunction are equivalent. To give just one example, we would consider (119a) and (119b) equivalent.[67]

(119)a. owls have sharp eyes and owls hunt at night
b. owls have sharp eyes and hunt at night

Wouldn't it follow from this line of argumentation that simple generic NPs should be considered individual terms? What, then, would the individuals denoted by these terms be? Certainly something like the "kinds" of Carlson's, whose analysis I rejected above?

The answer is: no. In both, particular summative macropredication and simple generic predication, a predication is applied to multiple cases of the same kind. In the case of particular summative macropredication, the single case is defined by the descriptive content of the head noun in its singular form, while the multiplicity of cases is expressed by the plural form. With simple generic predication, the single case is always described by the head noun in its given grammatical form: it is a case of one individual if the generic NP is singular, and a case of a group of individuals

[67] The equivalence is to be understood with a caveat concerning condition (59d) of conjunctivity (sentence conjunction entails predicate conjunction). For instance, if one conjunct implicitly applies only to female exemplars among the cases defined by the generic NP and the other only to male exemplars, predication conjunction would yield an awkward result. This problem can be handled in adding the condition that the implicit restrictions of both conjuncts have to be identical.

if the head noun is plural. Let D be the domain of cases the predication P is about. We then observed, both for particular summative macropredications and for simple generics, a presupposition that could roughly be formulated as follows:

(120)a. $\forall x(x \in D \rightarrow P(x)) \vee \forall x(x \in D \rightarrow \neg P(x))$

In the case of particular summative macropredication, I have used this fact as an argument for regarding the predication $\forall x(x \in D \rightarrow P(x))$ as resulting in a predication ΣP about D itself, taking D as an individual. We are entitled to do so (in terms of the surface data) because D as a whole is indeed denoted by the *plural* form of the head noun. (For particular singular nominal quantification I argued for a predication about D on the basis of the existence of equivalent formulations in terms of explicitly partitive constructions or adverbial quantification which both would contain explicitly a plural form denoting D.)

This kind of justification for assuming the existence of a complex individual D actually *referred* to is not available for generic indefinites in CSs. Obviously, the generic NPs semantically characterize the single abstract case rather than a multitude of cases, i.e., D as a whole. We can, however, come closer to an explanation of the specific character of CSs with generic NPs if we consider the following logically equivalent[68] form of condition (120a):

(120)b. $\exists x(x \in D \wedge P(x)) \leftrightarrow \forall x(x \in D \rightarrow P(x))$

The non-trivial part of (120b), the entailment from left to right says: if there is any case in D for which P is true, then P is true of all cases in D, and consequently, if there is any case in D for which P is false, then P is false of all cases in D. In other terms, any element of D is *representative* of D as a whole as far as the predication P is concerned. This aspect can be made more explicit in yet another equivalent[69] formulation of (120):

(120)c. $\forall x(x \in D \rightarrow P(x)) \leftrightarrow (x \in D \rightarrow P(x))$

where x in the formula on the right side is a *free* variable with arbitrary value.[70] This means that quantification, either universal or existential, is

[68] Proof: $\forall xA \vee \forall x \neg A$ iff $\neg\forall xA \leftrightarrow \forall x \neg A$ iff $\neg\forall x \neg A \leftrightarrow \forall xA$ iff $\exists xA \leftrightarrow \forall xA$.

[69] Proof: The left side entails the right side by the law of Universal Instantiation; the right side entails $\exists x(x \in D \wedge P(x))$ since D cannot be empty, from which the left side follows by (120b). Conversely, (120b) follows from (120c): Suppose $\exists x(x \in D \wedge P(x))$ were true; then $(x \in D \wedge P(x))$ is true for some (value of) x; this entails $(x \in D \rightarrow P(x))$, from which the right side of (120b) follows by (120c).

[70] You could put (120c) in the form $\forall y((y \in D \rightarrow P(y)) \leftrightarrow \forall x(x \in D \rightarrow P(x)))$ if you prefer.

equivalent to *free choice* within the domain D if (120) is presupposed. Thus, if anything, a "generic operator" GEN should be given the semantics of a free choice quantifier.

It is generally observed in the literature about CSs that such sentences express some sort of regularity, a rule based on some sort of constraint or necessity. For instance, *dogs bark* would be considered true due to the genetically determined behaviour of the species of dogs. If we analyze CSs as predications in terms of single cases that allow free choice among the whole category, we obtain an explanation for this phenomenon. Free choice is only possible if, *on some grounds*, a single case represents the whole category. Even if we do not know the exact nature of the constraint that guarantees the equivalence of all cases, we will nevertheless assume some such constraint that allows the generic, i.e., free choice, mode of speaking.

The possibility of free choice does not, however, trigger an *actual* choice. This would be a matter of referential anchoring, for which, as I have suggested, there is no trigger present in the surface structure of the sentence. In a certain sense, CSs are "about" the totality D of the cases defined by the generic NP, but they are about the total category *in terms of the single, representative case*. This kind of indirect aboutness, as it were, does not involve (or trigger) reference to any particular objects.

4.7. *The Proper Semantics of Genericity Operators*

The logical analysis of generics developed here makes it possible to formulate an adequate semantics of the genericity operator GEN – for those who are not convinced by my methodological objections to its employment. GEN can be given the semantics of a free-choice operator. On the basis of presupposition (120), which renders existential and universal quantification equivalent, we can introduce a two-place operator $\exists\forall$, "for some and all" that expresses indifferently "positive quantification" under these circumstances.[71]

(121) **the free-choice operator $\exists\forall$**
for any set D and predicate P (with D a subset of D(P)):
$$\exists\forall x(x \in D: P(x)) =_{def} \begin{cases} \exists x(x \in D \wedge P(x)) \text{ } \textit{if} \text{ } \exists x(x \in D \wedge P(x)) \leftrightarrow \forall x(x \in D \rightarrow P(x)) \\ \text{undefined otherwise} \end{cases}$$

The colon is not identifiable with any truth-conditional connective, but

[71] For a discussion of the operator see Löbner (1987a, 1989, 1990).

rather part of the whole notation. The operator is not a quantifier proper, since it fulfils the four homomorphism conditions defined in (59) above (as is, really, easily shown). In particular, we obtain the equivalence of predicate and sentence negation:

(122) $\neg\exists\forall x(x \in D\text{: } P(x)) \Leftrightarrow \exists\forall x(x \in D\text{: } \neg P(x))$

Hence, *if* we represent the meaning of a simple generic with head noun N (including its grammatical number) essentially[72] as

(123)a. $\exists\forall x(x \in N\text{: } VP(x))$

we can solve the problem mentioned in connection with Example (98) above (Subsection 4.2): in a question-answer pair consisting of a question with propositional content (123a) and a negative answer *No.* we could analyze the content of the answer as

(123)b. $\neg\exists\forall x(x \in N\text{: } VP(x))$

because that would be logically equivalent with the desired meaning

(123)c. $\exists\forall x(x \in N\text{: } \neg VP(x))$

(Note that the presuppositions of simple generics carry over to questions in terms of simple generics, and from the questions to non-metalinguistic yes or no answers.)

4.8. *Particular and Generic Nominal Quantification*

A last question remains in this connection: if we argue that simple generic predication and generic quantification do not involve reference to an individual D consisting of the totality of cases the predication is about, we arrive at different logical types for nominal quantifiers that can be used for both particular and generic quantification such as *every*. While I have argued for particular quantification that the logical type of *every N* should be $\langle e, \langle\langle e, t\rangle, t\rangle\rangle$, we must assume that it is still the classical type $\langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$ for generic quantification. This is certainly an unwelcome result. I suggest the following solution: We may assume that the more complex type is the underlying one. In a *particular* sentence, the set of all cases D, the domain of quantification, is defined extensionally in terms of the actual referential extension of the head noun. This in turn enables us to *conceive* of particular quantification as a predication about the do-

[72] Of course, all the considerations discussed in the literature as to the appropriate restrictions on the overall domain of cases have to be applied here, too.

main D as a complex individual and replace the complex type by the simpler type $\langle e, \langle\langle e, t\rangle, t\rangle\rangle$. Maybe this replacement need not necessarily be performed in the semantic representation. Nevertheless, the mere logical possibility of the replacement elucidates the function of quantification in the system of types of particular predication and explains the obvious equivalences between implicitly and explicitly partitive constructions on the one hand and nominal and adverbial quantification on the other.

Vendler (1967) discussed in detail the semantic differences between, among others, *each* and *every*. The difference could at least partly be captured in assuming that the logical type of *each* (as well as of *both*, *either*, and *neither*) is lexically defined as $\langle e, \langle\langle e, t\rangle, t\rangle\rangle$, where the first argument of type e has to be of level 1 or higher. The lexical type of *every* and *all*, however, would be $\langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$ with an option to be reduced to the simpler type in the particular mode of use.

5. Pragmatic and Cognitive Aspects of Polarization

As is well known, different forms of stating that a certain predication P is true of all cases in some set D differ in the resulting rigidity of truth-conditions. The following series of sentences exhibit a decreasing degree of commitment to the condition that literally each, in this case, child has to fulfil the predication:

(124)a. each child is watching TV
b. every child is watching TV
c. all the children are watching TV
d. the children are watching TV

While (124a) and (124b) appear to admit not a single exception, we somehow feel that we need not be as accurate in the latter case as in the former. For example, (124b) would probably allow more easily for contextually conditioned exceptions. (124c) is clearly less rigid than (124a) and (124b), and (124d) appears to be rather loose. We would perhaps not really mind a few exceptions as long as the group of children is big enough. The same kind of scale is represented by the following series of generic sentences:

(125)a. every child is creative
b. all children are creative
c. a child is creative
d. children are creative

On the basis of the semantic analysis proposed here, these pragmatic phenomena can be explained and represent, therefore, additional evidence for our major distinctions.

Cook-Gumperz and Gumperz[73] introduced the distinction between *contextualization* and context, drawing attention to the fact that context is not just given, but actively produced and processed by interactants. Similarly, we should distinguish between polarity and *polarization*. In talking about the "world" in terms of a sentence S with its implicit, systematically defined polarity counterpart, we offer two contrary possibilities for the categorization of facts and in asserting S or not-S we put the world one way rather than the other. This is a radically simple step for organizing the content of what is communicated: divide all possible contents into two possibilities.

While the real world, or to be precise, our perception of the real world, is enormously complex, we *talk* about the world in our natural languages in comparatively simple ways. Any talk about the world is a gross simplification of matters. The categories encoded in lexical items of natural language are rather simple, or abstract for that matter. This mode of simplification reflects the trade-off between accuracy and practicability of verbal communication captured by Grice's Maxim of Quantity. If the categories were to be more specific, the lexicon would have to be much bigger and the processing of a single sentence would be much more complex. Thus, simplification is vital for communication. And polarization is probably the most radical simplification strategy built into natural language as a means of communication.

In constructing predications, we produce different types of polarity contrast, thus polarizing differently. The two basic types of predication, summative and integrative predication, can be seen as economic in different ways. If we use an integrative predication, we disregard the parts, or structure, of the argument in treating it as an integral (and thus undifferentiated) whole. The economy of this strategy becomes apparent if we consider verbs like *touch*. A statement such as

(126) she touched the banisters

is highly economic in expressing some event of making contact, but not specifying the particular parts of the toucher and the touched object.

Polarization in terms of summative predication offers a different kind of communicational economy. The resulting polarization is particularly gross, due to the vast truth-value gap between truth and falsity. This vast gap between, say, "the children are tired" and "the children are not

[73] See Cook-Gumperz and Gumperz (1976) and Gumperz (1982).

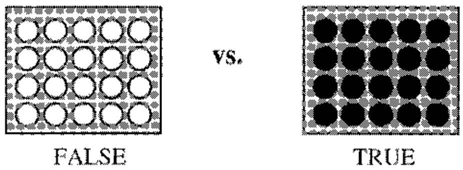

Fig. 1. The polarization pattern of summative macropredication.

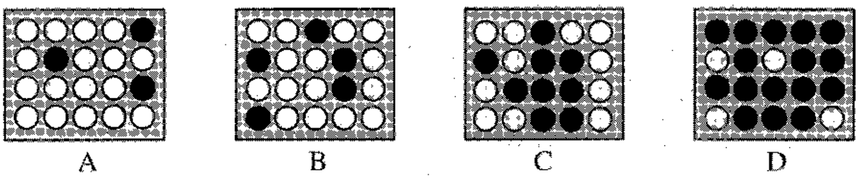

Fig. 2. Mixed cases.

tired", allows for a generous practical handling of truth-conditions. A summative predication statement will pass as true as long as the actual conditions are close enough to what is literally said, or far enough from what would call for the contrary statement. In face of the general trade-off between communicational and cognitive economy and factual accuracy, these kinds of statements are very often considered an acceptable compromise even in the presence of a moderate amount of counterevidence. Only higher requirements of accuracy would justify the cognitively more complex tool of quantification, which would narrow down the distance between what is true and what is false. For statements in terms of summative predications, there may, thus, be a considerable discrepancy between what "can be said" and what is literally true. Any investigation of truth-conditions has to take this effect into account.

If we assert, for example, (124d), *the children are watching TV*, we offer an alternative of the type illustrated in Figure 1.

The rectangles represent the domain D of contextually relevant cases with its boundary, each case being symbolized by a circle. A white circle represents a case of not-P, a black circle a case of P. Obviously, the two patterns offered do not match with heterogeneous possibilities as shown in Figure 2.

However, given one of the constellations in Figure 2, one might nevertheless choose to talk about it in terms of the alternative in Figure 1. In many situations it might be sufficiently accurate to put a case like A as an instance of the left ("false") pattern in Figure 1 and a case like D as an instance of the right ("true") pattern. Reality would then be considered *close enough* to the literal truth conditions. In other situations, the deviation might be rated significant, in which case one would be reluctant to choose a representation of any of the cases in Figure 2 in terms of the patterns in Figure 1. When interpreting an utterance in form of a summative predication, we will take into account this trade-off and allow for a certain amount of exceptions from the literal "pure"-type information. Only cases like B and, more so, C which exhibit a rough balance of positive and negative cases are definitely bad candidates for a predication of the type in Figure 1.[74]

This partly explains why summative predications and simple generics practically allow for a considerable amount of exceptions. Slightly metaphorically speaking, the broad truth-value gaps between what is expressed by such a sentence S and its polarity counterpart allow for an actual extension of the pure cases as long as the extension does not come close to where the opposite case might be extended to: there is *room* for exceptions. In addition there may be a top-down effect of the resulting pattern of equal cases down to the single cases. In the case of (124), what does it mean to "be watching TV"? To what extent is the person really occupied with doing so? Does she really concentrate on the screen or is she just in a room with the TV set on? Apparently the outcome of the application of the predicate to a particular case is a matter of degree.[75] Thus, an actual pattern in reality could look like the one in Figure 3a. Treating such a situation as a homogeneous situation would level out the differences represented in Figure 3a by varying shades of hatching, yielding the pattern in Figure 3b, again a good candidate for truth. Thus, polarization by summative predication has a polarizing and homogenizing effect both at the singular-case and at the total-pattern level.

The general effects of summative predication are also relevant for intermediate levels of predication. Simple generics with bare plurals and nomi-

[74] I did not take into account any matters of contextually induced bias. If there is a bias towards one of the poles in Figure 1, comparatively few exceptions might already count as an instance of the opposite case. This would explain why we are ready to accept exaggerations like *the voters stayed at home* in case only an uncommonly low percentage of the electorate took part in an election, even if in fact the majority of the voters actually participated. Also, positive cases as such might be marked, or more salient, as opposed to negative cases, whence a certain number of positive cases would have more weight than the same number of negative cases. Finally, the cases within D might have a different weight due to contextual conditions.

[75] This statement is not to be understood as a plea for an application of Fuzzy Logic to the analysis of natural language. Truth on a scale with a boundary between true and false which can be adjusted to the needs of communication in a given context is one thing – definitely assigning truth-values on a scale between 0 and 1 is another. I do not think that a Fuzzy Logic approach could claim any relevance in terms of the actual cognitive processing of natural language sentences in general.

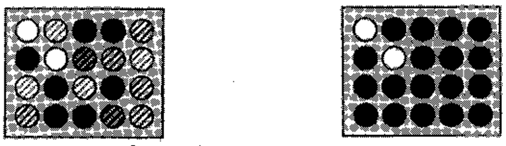

Fig. 3. (a) Degrees of truth. (b) Homogenized pattern.

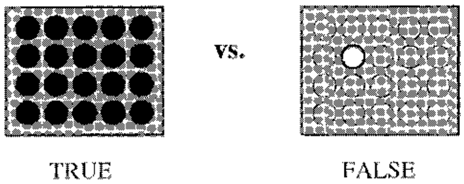

Fig. 4. Polarization pattern of universal quantification.

nal plural quantification involve an intermediate level of subgroup formation. The subgroups themselves can be subject to a pragmatically motivated process of homogenization. Thus we can expect that within the subgroups themselves a certain amount of exceptions are pragmatically acceptable. For that reason, bare plural generics are less rigid (or more general) than generics in terms of singular indefinites, and *all*-quantification with distributive predicates is less rigid than quantification in terms of *every* or *each*.

Let us now compare quantificational predication to summative macropredication. If we utter *every child is watching TV*, we offer a polar alternative of the type illustrated in Figure 4. The shaded circles in the right box may have either truth value. What matters is that the negative polar alternative is given as soon as at least one case is negative. Obviously, this pattern of polarization allows for not a single exception. Still, it is a simple kind of quantification that might be preferred to others, more accurate ones, if the actual situation is close enough. What strategies are available of making the facts match the interpretation in case of a very limited number of potential exceptions? For one, there is the strategy already mentioned of loosening the truth requirements for the single cases. If the truth of the predicate can be made a matter of degree, we could gain more positive cases. This accounts for a certain loss of rigidity. In addition, we could try to narrow down the domain of quantification itself by excluding less relevant cases. This strategy is certainly relevant for any type of macro- or generic predication.[76] It is directly reflected in the

[76] Cf. the discussion of exceptions to generic sentences in terms of relevance or stereotypes.

possibility of correcting statements in terms of exceptions, either directly or in subsequent corrective clauses:

(127) a. all the children except Paul and Joan are watching TV
b. all the children are watching TV, only Paul is playing cards with Joan.

We may assume that the strategy of implicit domain restriction can be more easily applied if the domain of quantification is defined in terms of a category of cases rather than extensionally in terms of a complex individual, i.e., a group or set of cases, referred to. If our considerations about the difference in logical type between *all* and *every* on the one hand, and the necessarily extensional *each* on the other (cf. Subsection 4.7 above) are correct, this would account for the difference in rigidity between quantification in terms of *each* and in terms of *every/all*, respectively.

All this carries over to similar types of sentences, in particular to other kinds of characterizing sentences, including the clausal generics mentioned above, and habituals. In absence of explicit quantifiers, the resulting polarity contrast is of the type depicted in Figure 1, leaving room for a broad acceptability of exceptions. The addition of a quantifier eliminates this source and possibility of inaccuracy and commits the speaker to the literal truth conditions in a much more rigid way.

Let us conclude the section with a brief look at the role that presuppositions play in the process of polarization. Their role is fundamental. In defining the conditions under which a statement can be judged, or put, for that matter, as either true or false, they serve to carry out the first and decisive cut in the world. In using linguistic expressions and constructions that carry certain presuppositions, we categorize the possible cases we apply our predication to. This cuts out a tiny section of the world, declaring the rest of it irrelevant. In the case of the types of sentences considered here exclusively, namely categorical statements, presuppositions first of all provide the "logical subject" of the sentences. This defines a first frame for the polarity contrast. In a second step, presuppositions such as PI and the corresponding presupposition for simple generics may narrow down that frame to homogeneous cases. Thus, the use of presuppositional expressions and constructions is a second vital device of coping with the complexities of the world we are talking about with comparatively simple linguistic means.

In the beginning of the section, I have drawn a parallel between the pairs of concepts *context* vs. *contextualization* and *polarity* vs. *polarization*. There is more to the parallel than just analogy. The use of presuppositional expressions can itself be considered part of the contextualization of the sentence, i.e., part of the semantic contextualization. If we consider the linguistic means of polarization and predication as a whole, we can put it this way: These means contextualize the polarity frames we use when talking about the world.

6. Conclusion

6.1. *Summary of Results*

One of our starting points was the question of the adequate treatment of distributive plural definites such as in

(128)a. the readers are exhausted by now

The key to our analysis of such sentences as instances of summative macropredication was the observation that what obviously constitutes the negations of such sentences must be assigned the same type of interpretation as their positive counterparts:

(128)b. the readers are not exhausted by now

The fact that (128a) is obviously true if the predication applies to every singular case led to the consequence that simple syntactic negation produces an all-or-nothing, rather than a complementary, contrast in cases like these. A closer look at the source of this type of polarity contrast revealed that there are even predications with singular non-collective arguments exhibiting this kind of polarity contrast: those with summative level-0 predicates such as colour adjectives. This, in turn, led to the distinction between summative and integrative predication as general types, and to the postulation of the Presupposition of Indivisibility. Looking for clear criteria for the distinction of summative and integrative predication, we found that only summative predication allows for adverbial quantification in terms of parts or portions and that quantification renders the predication integrative. The obvious equivalence of adverbial and nominal quantification then led to the insight that the function of quantification in general is to fill the truth-value gaps left uncovered by summative predication. Finally, by investigating the correspondences of adverbial and nominal quantification and their semantic and syntactic relationships to simple predications, we were able to establish a closed and strongly constrained system of the possible types of particular predication and quantification in English.

A second group of cases with an all-or-nothing polarity contrast is provided by characterizing generic sentences. Again it was the inclusion of negation that led to the proper analysis of the type of predication we find in simple CSs. In contrast to particular sentences with distributive plural arguments or collective nouns, characterizing sentences, in particular such with a singular generic indefinite, do not offer any trait of the multiplication of cases apparently implied by the generic interpretation of such sentences. The question then arises: what is the source of the specific kind of generality to be observed here? The solution suggested is partly motivated by the type of polarity contrast found with these sentences: it is tantamount to the contrast resulting from a free-choice predication in terms of the generic condition. I therefore assumed that the source of genericity is the lack of referential anchoring of the variable(s) introduced by the generic term and the resulting possibility to apply the predication to arbitrary concrete cases.

Both analyses, of particular definites and of generic indefinites, together with their respective types of quantification, offer distinctly new accounts of two complex ranges of phenomena. In particular, the GQT approach to definites and quantificational accounts of simple characterizing sentences are strongly questioned. In both cases, the approaches predict a wrong kind of polarity contrast and fail to account for the possibility of additional adverbial quantification and for the semantic differences and/or relations between the allegedly implicitly quantifying simple sentences and their explicitly quantifying counterparts. The analysis offered here not only tries to clarify the logical aspects of predication but also, hopefully, contributes to an understanding of the underlying cognitive processes. For that purpose, I emphasized the procedural aspect in talking of predication, quantification, negation and polarization as cognitive acts.

A side effect of the investigation was a certain emphasis on the matter of semantic presuppositions. Apparently, the type of polarity contrast depends on the type of predication. Hence it immediately corresponds to characteristic presuppositions such as PI or the presuppositions resulting from the shift of domain triggered by macropredication.

(T) **Conclusion**
The type of polarity contrast immediately corresponds to the type of predication. The presuppositions characteristic for the type of predication define the frame of polarity opposites.

(U) **Corollary**
The type of predication is constant under negation.

Since so much of the argumentation hinges on the notion of negation, it was necessary to base the discussion on a sound, i.e., non-circular, definition of falsity and negation. The result, definition (E), is interesting in its own rights since a definition of falsity based on syntactic negation – apparently the only non-circular kind of definition possible – opens the door for investigating the semantics of natural language polarity. If we had defined falsity semantically, as is done in classical binary logic, polarity contrast would have been complementary by definition.

6.2. *Limitations and Further Perspectives*

There are two obvious gaps in the theory of predication developed here: the analysis of what Krifka et al. (1995) call "kind predications", including sentences with generic definites, and the whole complex of indefinites in particular sentences. I don't have anything to say about the former. As to the latter, much of what I said about predication carries over to indefinites, e.g., the fundamental distinction between summative an integrative predication and the construction of macropredication. What remains to be cleared is the details of syntactic negation and its relevance for semantic interpretation. Diesing (1992) and subsequent work offer a basis for the investigation of special forms of negations such as in

(129) a. I have no time left
b. ich habe keine Zeit mehr (German)

A further question of fundamental interest is whether it will be possible to provide a uniform semantic representation of indefinites that accounts for both, their weak and their strong uses, as well as for their particular *and* their generic uses.

A promising perspective opened by the approach taken here appears to be the application of the summative/integrative predication and the concept of macropredication to questions of verbal aspect. Obviously, the former is immediately related to questions of aspectual composition such as those analyzed in several works by Krifka.

Whatever conclusions the reader may have drawn from the considerations offered here, I hope that I have succeeded in showing that the matter of polarity in natural language is a rewarding and complex subject for empirical semantic investigation. If the lines of reasoning are at least partly correct, they offer the basis for different, and possibly more systematic, accounts of several basic phenomena.

The actual cognitive constructions of polarity contrast in natural languages proved rather gross in many cases of elementary sentence types such as simple particular summative predications and simple characterizing predications with their characteristic broad truth-value gaps. Unsatisfactory though these types of polarity contrast may appear to the eye of a logician, they fulfil an important communicative function. They exemplify a basic trait of communication by natural language: its general tendency towards heavy simplification. Polarization is not simply there in the world waiting to just be encoded properly, but is to be constructed by setting up an appropriate cognitive scheme of opposition. In the case of those predications with broad truth-value gaps, the opposition is constructed by interposing a vast no man's (and woman's) land between the areas of truth and falsity. This cognitive strategy, then, allows for a very convenient degree of practicability due to the loosening of the commitment to the respective truth conditions. After all, that is what is to be expected of a successful means of communication in and about a world of unlimited complexity to the human mind.

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