NUMERALS AND QUANTIFIERS IN $\bar{X}$-SYNTAX AND THEIR SEMANTIC INTERPRETATION*

by

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0. INTRODUCTION

This paper purports to contribute to the solution of a problem that can be described in two ways. The first is: 'Can we provide Montague-grammar with a syntax satisfying well-established needs of linguists?'. The second is: 'Can we provide Chomsky-grammar with a semantics satisfying well-recognized wishes of logical semanticists?'. Part of the problem is that one can simply deny that there is a problem at all, given the divergent goals of the respective enterprises. Nevertheless, several attempts have been made to bridge the gap (e.g. PARTEE 1975; COOPER & PARSONS 1976). The aim of my paper is to "categorialize" the generative $\bar{X}$-syntax such that it can provide a suitable basis for PTQ-semantics, maintaining its descriptive and explanatory force for linguistic purposes.

1. SOME DESCRIPTIVE MATERIAL

I shall begin with some descriptive material from the internal Noun Phrase structure. It will give an impression of what linguists - given their task to describe natural languages - regard as valuable generalizations. Linguists of all kinds agree upon the need to order the material given in (1).

(1) a. some trees - the trees - nice trees - some nice trees - the nice trees - *the some trees - *some the trees.

b. these children - three children - these three children - *three these children.

If the basic aim of syntax is "to characterize the various syntactical categories ..." (MONTAGUE 1974, p.233), then we may assume that certain

syntactic principles can hold irrespective of the appropriate semantics carried by syntactic structure. To bend one's thoughts directly toward the point in question: linguists consider the notion 'contrastive distribution' as a purely syntactic notion; two members of the same syntactic category never occur in the same syntactic position simultaneously, unless one has to do either with co-ordination or subordination of some kind. That is, in a sentence such as *This girl his sister is ill* we force the second NP into an appositional position.[1]

A second trait of linguists is their interest in the behaviour of NP's in sentences such as (2).

(2) a. There is a child in the house.
b. *There is the child in the house.

Certain principles, though very complicated and not very well understood, block the presence of definite NP's in (2b) given the existential nature of *there* (cf. GUÉRON 1976; CHOMSKY 1977; MILSARK 1977).

There is a third descriptive area that I shall touch upon before going into the syntactic tools under analysis. Linguists are interested in the internal structure of NP's such as (3),

(3) My numerous second three nice little red wooden boxes

discussed in ROOSE (1956), DE GROOT (1949), VENDLER (1968), and CLARK & CLARK (1977), among others. The question is whether NP's do or do not have fixed positions for the elements preceding *boxes* in (3).

The descriptive material given here, is taken from English and Dutch ((3) is in fact a translation from a Dutch example). Both languages show a close correspondence with regard to the material given in (1) - (3). For convenience I shall present English examples as long as there exists a parallelism between Dutch and English. In the next section I shall discuss Jackendoff's proposal concerning the specifier structure of NP's with an eye to (1) - (3).

2. THE UNIFORM THREE LEVEL HYPOTHESIS (U3LH)

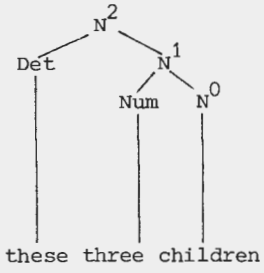
Chomsky's introduction of $\bar{X}$-syntax into phrase structure grammar solved the problem of how to account for nodes occurring as 'head of a phrase' (LYONS 1968, p.331; CHOMSKY 1970). The rewrite rules of $\bar{X}$-syntax are

constrained such that they all fit into the form (4),

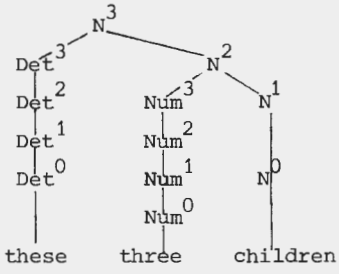
(4) $X^{i+1} \rightarrow \ldots X^{i} \ldots$

where X^{i} is the head of X^{i+1}, and where the lowest node, say X^{0}, is the head of the whole X-phrase. Values for X are lexical categories such as N(oun), A(djective), V(erb), P(reposition), etc. A lexical category is introduced into phrase structure as X^{0}, inducing higher values of *i*. The path from X^{0} up to and including the highest X-node is called the X-projection line. Scheme (4) allows of the trees (5) and (6),

(5)



(6)



where 'Det" stands for 'determiner' and 'Num' for 'numeral'.

As phrase structure rules work from top to bottom, generative rewrite systems are forced to stipulate how much structure they allow above the X^{0}-level. JACKENDOFF (1977) is very explicit about this. He says that each lexical category defines a set of supercategories (X^{1}, X^{2}, and so on) to be related to each other by rewrite rules of the form (7),

(7) $X^{n} \rightarrow X^{n-1} \ldots$

where $n \leq 3$. The canonical form of (7) is (8),

(8) $X^{n} \rightarrow (C_{1}) \ldots (C_{j}) - X^{n-1} - (C_{j+1}) \ldots (C_{k})$

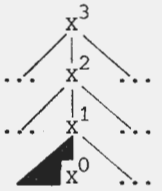
where (i) $1 \leq n \leq 3$; (ii) the values for X are N, V, A, P, Adv(erb), M(odal), Q(uantifier), Art(icle), Deg(ree) and Prt(= particle); and (iii) for all C_{i}, either C_{i} is a grammatical formative such as *Past, Possessive*, etc., or $C_{i} = Y^{3}$, for some lexical category Y (1977:36). The brackets in (8) indicate that all C_{i} are optional. Note that (8) excludes (5) as a possible structure for *these three children*, whereas (6) is allowed.

It is not necessary to go very deeply into the motivation for $\bar{X}$-syntax

here. It suffices to mention three advantages of this approach. The first is that one can generalize with respect to parallel structural configurations across different phrasal types: *John's refusal of the offer* and *John refused the offer* are the relevant well-known examples. The second is that one can cross-classify among lexical categories, e.g. *refusal* as a noun and *refuse* as a verb have certain lexical-structural properties in common. Finally, one can generalize in terms of rules: in both *the city's destruction by the enemy* and *the city was destroyed by the enemy* passivization takes place. $\bar{X}$-syntax can account for this in terms of corresponding domains (CHOMSKY 1970; JACKENDOFF 1977; HALITSKY 1975; HORNSTEIN 1977).

What do $\bar{X}$-phrase structures contribute to semantic interpretation? As to this question Jackendoff is, in certain respects at least, quite specific. Consider his classification of complements as shown in (9).

(9)



X^2 ... : non-restrictive modification

X^1 ... : restrictive modification

X^0 ... : arguments for X^0

X^1-complements, i.e. sister nodes of X^0, are at the level of interpretation arguments for the predicate X^0, if the value for X is V or N.[2] X^2-complements are restrictive modifiers. For example, in *John saw his three children yesterday* the time adverbial is a V^2-modifier to be taken as a function mapping the V^1-predicate into a V^2-predicate of the same number of arguments, thus "restricting the extension of the sentence" by adding extra truth conditions (1977: 61). On the N-projection line restrictive clauses are dominated by N^2. That is, in *the trees that I like* is *trees that I like* an N^2 having *trees* as its head and the restrictive complement *that I like* as its complement. I restrict myself here to N and V as values for X in (9).

$\bar{X}$-syntax provides again for a generalization over values for X in the case of (9): the internal structure of NP's is claimed to be similar to (or at least parallel to) the internal structure of V^3. The general idea is also clear. The grammatical system, the syntax, provides for schemes that direct semantic interpretation. I shall call this property of Jackendoff's syntax 'rigidity of structure on behalf of semantic interpretation'. That is, a grammar having this property can assign fixed positions to certain categories in terms of syntactic schemata available to speakers of a given language.

ROOSE (1956) claims that the first position in an NP such as (3) is semantically connected with deixis, the second position with relative quantification, the third with ordinality, the fourth with cardinality, etc. CLARK & CLARK (1977) discuss Vendler's analysis on the same matter. From the cognitive point of view, the crucial point is, I believe, whether we have to do with a cognitively determined ordering of reality settling down in syntactic structure which, in turn, determines semantic interpretation, an alternative being that cultural factors play a decisive role. At any rate, Jackendoff's scheme (9) can certainly be related to the discussion about rigidity of phrase structure: it is a mould. The area to the left of the X-projection line in (9) constitutes the specifier structure of X^3. Jackendoff stipulates that the X^1-specifier be empty; in (9) this stipulation is translated into black space. Consequently, Jackendoff has two specifier positions in X-phrases.[3]

I shall now focus on the specifier structure of Noun Phrases by analysing the way Jackendoff treats the material given in (1). He distinguishes three classes to begin with. They are given in (10).

(10) a. DEMONSTRATIVES: demonstrative pronouns, interrogative pronouns, *the*, (possibly) *a*, and (the singular) *some*.

b. QUANTIFIERS : *each, every, any, all, no, many, few, much, little*, and other uses of *some, several*, etc.;

c. NUMERALS : cardinals, *a dozen, a little*, etc.

This tripartition is based on the semantic roles played by these specifiers. The question is, of course, how (10) relates to (9).

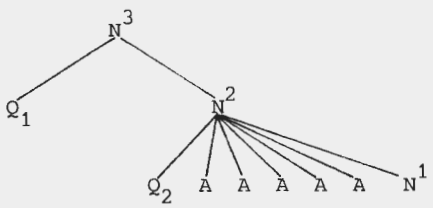
Expressions such as **Fred's all dwarfs, *some the trees, *the no dwarfs* are not well-formed in English, whereas *Fred's several attempts at writing, those few meetings we had*, etc. are well-formed. To solve this problem Jackendoff uses the normal linguistic practice of putting the possessive *Fred's*, the quantifiers *all* and *no*, and the demonstratives *the* and *no* in the same category. Thus their contrastive distribution prohibits the ill-formed examples from being generated. As a result one obtains two syntactic subcategories of the category QUANTIFIER, namely Q_1 (*each, all, no, every*, etc.) and Q_2 (*many, few, several*, etc.). In other words, the tripartition in (10) is resolved into a syntactic bipartition corresponding with the two specifier positions in (9), as shown in (11).

(11) X^3-specifiers: DEMONSTRATIVES, POSSESSIVES, Q_1
X^2-specifiers: Q_2, NUMERALS.

Note that Q_2 and NUM are also mutually exclusive: phrases like **several three trees, *four few trees,* etc. are correctly ruled out by (11).

The Achilles' heel of this analysis can be demonstrated with the help of diagram (12).

(12)



Ignoring the occurrences of A in (12) for the moment, it can easily be seen that any combination of Q_1 and Q_2 leading to undesirable results cannot be blocked on the basis of contrastive distribution. Indeed, the fact that Jackendoff is committed by his three level hypothesis to assume just two specifier positions in NP's leads to an appeal to *ad hoc* constraints. To block **all several men, *some few men,* etc., Jackendoff proposes the so-called Specifier Constraint. It reads as follows (1977: 104):

(13) An NP-specifier may contain at most one demonstrative, one quantifier, and one numeral.

I do not like (13) at all. It amounts to an observational statement saying that $Q_1 + Q_2$-combinations are to be blocked. Furthermore, it is redundant in that it forbids **the these children,* which is already excluded by the purely syntactic principle of contrastive distribution. I would say that Jackendoff is lured on to an arbitrary semantic constraint because his U3LH leads him to occupy two fixed positions for his specifier structure, thereby depriving him of the possibility to strictly use a pre-eminently syntactic instrument: contrastive distribution.

Should we conjecture what semantic theory underlies (9) - (13), then I think that Jackendoff connects the X^3-specifier position with deixis of some sort. That is, real deixis in the form of specific reference made by demonstratives and possessives versus possible or claimed reference in the case of Q_1-quantifiers such as *all, every,* and so on. If I say *All trees are well-formed,* I claim that I can say for each individual in the assumed

universe *this one is well-formed* and *this one is well-formed*, and so on. The X^2-specifier position could be said to be connected with quantity of some sort, indicated either by measurement or by giving the cardinality of some set.

I am not sure whether this is indeed the semantic background for (11). I simply present this conjecture which seems to relate structures such as (12) to the discussion about phrases like (3), in order to give more flesh to the heel which we are considering at present.

At this point it should be said that the U3LH, though widely assumed in recent theoretical-descriptive work, has come under heavy fire. KEAN (1978) and WILLIAMS (1978) devastated the fundament for Jackendoff's claim that rules of grammar are to be formulated in terms of syntactic features.[4] I ignore this side of the matter here because these features do not play a crucial role in what I have to say against the U3LH as proposed by Jackendoff.

As far as the number of levels and the uniformity are concerned, STURM (1979) has raised some objections which I shall discuss now in some detail. Sturm's criticism is levelled against the two following properties of Jackendoff's U3LH-grammar. In the first place Jackendoff's distinction between the ten lexical categories mentioned in (8ii), each having its three-levelled projection line, generates an enormous amount of superfluous structure. For example, M^2 and M^1 never branch. The same applies to Deg^3 and Deg^1, to mention just a few categories. In the second place certain parts of phrase structure are crammed due to the fact that Jackendoff restricts himself to three levels. I shall illustrate this point now in relation to the V^1-complement and the N^2-specifier structure.

As to the complements of V, Jackendoff allows for at least five sister node positions in V^1, KOSTER (1978) for seven. Though not all these positions will be filled simultaneously, the whole approach leads to some trouble as I have shown in VERKUYL (1979): due to the fact that the Direct Object (DO) and Indirect Object (IO) are sisters of V, Koster is not able to consistently protect his structurally defined Locality Principle in terms of structurally defined auxiliary hypotheses. His only way out would be to promote the IO to a higher structural position, i.e. to a position asymmetrically c-commanding the DO, but this would require that the value for *n* in (8i) be (at least) 4.[5]

STURM (1979) rightly observes that Jackendoff is not consequent in his treatment of V-complementation. The difference between *John hit the*

nail softly of course and **John hit the nail of course softly* (Jackendoff's judgment) is explained by saying that the "geometry of the sentence predicts that" V^3-complements (in this case, *of course*) must follow V^2-complements (in this case *softly*). However, this sort of restrictions also occurs within V^1 without its leading to a structural difference of V^i-levels. For example, the difference between *I gave my money to my friend* and **?I gave to my friend the money* should also lead, on exactly the same grounds, to the geometrical prediction that the IO occurs on a higher level than the DO. However, Jackendoff fences his V^1-domain against geometrical structure.

As to the N^2-specifier structure, one can easily see in diagram (12) that this is also packed. Adjectives are generated as daughters of N^2: all the elements between *my* and *boxes* in (3) are sisters of N^1. To save the U3LH Jackendoff has to squeeze the adjectives into the N^2-specifier position. Note that this is a deferring strategy: to interpret N^2-structures such as in (12) requires that a syntax of some sort be given as an interpretive basis. In other words, why does Jackendoff build a syntax for DEM/POS/Q_1 and Q_2/NUM in the base component and not for the adjectives?[6]

We can summarize the second point under consideration by observing that Jackendoff's decision to stack up a lot of constituents as sisters of V and N^1 just amounts to saying that we need an auxiliary syntax for semantic interpretation, because the U3LH does not allow further branching having used up the branchings of scheme (9).

3. THE MINIMAL LEVEL HYPOTHESIS (MLH)

In reaction to the U3LH, STURM (1979) advocates the Minimal Level Hypothesis characterized by a parsimonious tenet: build as much structure as you need. In this respect Sturm strikingly links up with very interesting work from the Dutch structuralist A.W. de Groot, whose book *Structurele syntaxis* (Structural Syntax) written in the forties, can be seen as very much related to the categorial syntactic systems developed in the sixties and seventies (VERKUYL 1980).

De Groot's leading thesis in *Structurele syntaxis* with respect to phrasal structure is that phrasal elements are either co-ordinated or sub-ordinated elements. That is, for every phrase $[_P$ X Y], (a) P is a co-ordinative construction, or (b) P is a sub-ordinative construction with either

X or Y as the head of P. Suppose that the five A's in (12) are not co-ordinated elements, then the string ...A A A A A N^1... would necessarily have the structure ...$[_{N^6}$ A $[_{N^5}$ A $[_{N^4}$ A $[_{N^3}$ A $[_{N^2}$ A $N^1]]]]]$..., where each N^i occurs as the head of N^{i+1} (see also VAN DER LUBBE 1965).

STURM (1979) is not very explicit about the formal mechanism he wants to use. The basic idea is a syntactic approach from bottom-to-top, so it seems. Sturm wavers between tree formation rules in the sense of McCAWLEY (1968) and rules of the type demonstrated in (14).

(14) $X^i \rightarrow \{X^{i-1}\ C\}$, where (a) no maximum for X^i
(b) there is always a lexical category X^0
(c) C is just one constituent occurring either to the left or to the right of its head
(d) C is either a lexical category or a grammatical formative.

It will be clear that (14) roughly expresses what would lead to a variable binary branching categorial syntax if we reformulate (14) as in (15), given the conditions (a) - (d).

(15) a. If $\alpha \in P_{Xi}$ and $\gamma \in P_C$ (where C abbreviates X^{i+1}/X^i), then

$$F_{lc}(\alpha,\gamma) = [_{Xi+1}\ [_C\gamma][_{Xi}\ \alpha]]$$

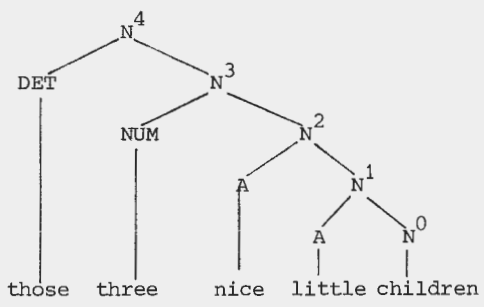
b. If $\alpha \in P_{Xi}$ and $\gamma \in P_C$ (where C abbreviates $X^i\backslash X^{i+1}$), then

$$F_{rc}(\alpha,\gamma) = [_{Xi+1}\ [_{Xi}\ \alpha][_C\gamma]]$$

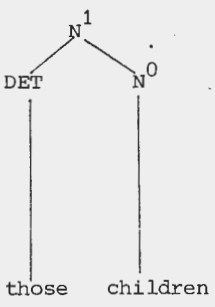
(cf. BARTSCH & VENNEMANN 1972; DAHL 1977; BACH 1979 among others).

$\bar{X}$-structures generated with the help of (15) are shown in (16).

(16a)



(16b)



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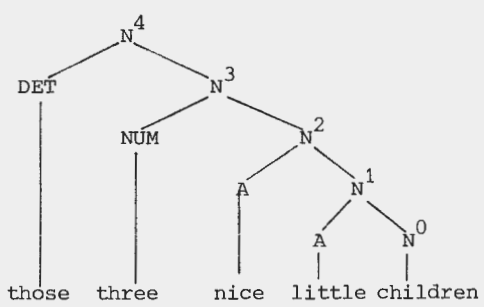
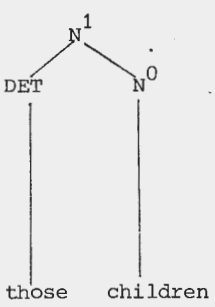


(16b)



Translating the representations of structuralists like De Groot and Van der Lubbe into tree diagrams would give us structures such as (16). Transformational linguists cannot be very much disturbed either (Cf. CULICOVER 1977; HALITSKY 1975; HORNSTEIN 1977.) Thus there appears to be some reason to pursue the investigation of the MLH along the lines of De Groot - that is, in a formalized version in terms of (15). Note that the $\bar{X}$-syntax is to be taken as explicitly defining the notion 'head of a phrase' (= X^0). As the head of a phrase is the most deeply embedded element on a projection line, the bottom-to-top approach inherent to (15) seems to be a rather natural mechanism for generating phrases like (16a) and (16b).

Now, there are two approaches to the strengthening of the MLH. The first would argue, for instance, that syntactically spoken a structure like (16a) is to be preferred to (12). Gapping (either taken as a syntactic rule or taken as an interpretive rule) would require that $A+N^i$ be a constituent at each level on the projection line in view of (Dutch) examples such as (17)

(17) Ik houd van grote *snelle Franse auto's* en mijn broer van kleine.
lit: I love big *fast French cars* and my brother small.

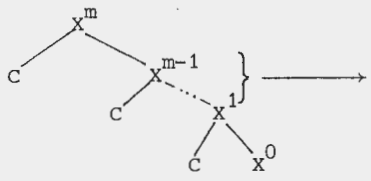
Ik houd van grote snelle *Franse auto's* en hij van grote dure.
lit: I love big fast *French cars* and he big posh.

Figure (16a) satisfies this requirement as opposed to structures such as (12). The corresponding English phenomenon is sometimes analyzed in terms of the so-called *One-substitution*: the pronoun *one* substitutes for the italicized phrases in (17) replacing constituents (cf. CULICOVER 1977: 183-6).

In the remainder of this paper I shall, however, follow a different approach by discussing some features of the MLH with one eye on its usefulness for linguistic analysis and the other eye on its possible contribution to existing binary categorial systems such as in Montague's PTQ and related work.

The first point to be stressed is the flexibility of the system. Since there is no fixed upperbound, we have to assume an X^m-node whose numerical value is variable relative to the structure dominated by this node. In (16a) m=4, in (16b) m=2. The top node X^m can be called 'X maximal'. It must be observed that X^m, though variable as to its projection level, is also fixed in the sense that we always have an X^m. On the other hand, we always know for sure that phrase structure is built up from X^0, the anchorage of the projection. The general idea can most easily be captured by (18).

(18)



: fixed point, but variable as to value for m
: variable part
: fixed

STURM (1979) rightly points out that 'X maximal' can be used in the lexical specification without any difficulty at all: it is not necessary to know the numerical value for m; it is sufficient to know that we have to do with the highest node on a projection line. Hence it is possible to characterize the article *the* as in (19a), i.e. as taking the N^{m-1} to form an N^m.

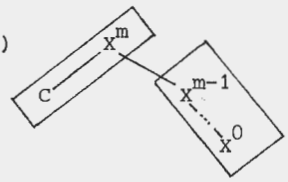
(19a) *the*, +DET, [+ ——N^{m-1}] (19b) ...,[+ ——X^i] $(0 \leq i \leq m-1)$.

As to the variable part of (18) we could exploit the structural similarity of adjectives and adverbials. Both categories can be treated as instances of a category having the subcategorization frame (19b). In the case of adjectives the value for X is N, otherwise X is V or A (possibly other categories as well). In this way one can capture a well-known generalization in the formalism.

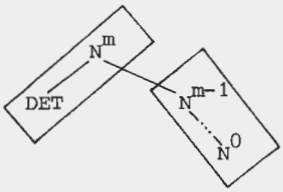
In the present treatment of $\bar{X}$-syntax the notion of projection line is more important than in the Jackendoff version, where structural parallelism is the crucial feature. We can illustrate the difference with the help of (19b): in the MLH adjectives and adverbials both take nodes in the variable part of the projection line, whereas the U3LH cannot account for the parallelism in terms of common behaviour with respect to the same level.[7]

The second point to be raised is the status of the partly fixed top position in (18). Can we use it for a uniquely determined semantic operation, at least in languages such as English and Dutch? Put more generally, it would be nice if the situation were so as illustrated in (20).

(20a)



(20b)



In other words, the constituent C immediately dominated by X^m could be taken as a function operating on X^{m-1} to yield X^m, where X^m and X^{m-1} crucially differ as to their categorial status (and correspondingly to their intensional type), whereas transitions from X^0 up to X^{m-1} keep the categorial

status of X^0 constant.[8] Note that in (16b) N^0 would be N^{m-1}. As far as I can see (20a) would also apply to verb phrases and prepositional phrases. For example, Aux could be analyzed as an element changing the V-projection line into a construct of a crucially different nature.

Whatever the generality of (20a) may be, its basic idea seems to apply to (20b). I shall try to show that by following two lines. The first is plotted out in the Chomskyan framework, the second in the Montague framework. My wish is to connect these lines with the help of the MLH.

To begin with, I refer to Chomsky's lecture 'Questions on Form and Interpretation' in which he argues against a one-to-one correspondence between syntax and semantics suggested by Barbara Partee's analysis of restrictive modification. Chomsky argues that the definite article should be taken as a universal quantifier. In a sentence like *The book we ordered arrived* Chomsky considers the definite article as an element determining that all members of a unit class arrived. In *The books we ordered arrived* the article *the* "determines that all members of a class of cardinality greater than or equal to 2 arrived". Thus, he continues, "[± def] corresponds to universal-versus-existential quantification" (CHOMSKY 1977, pp.50-51).

Though I think that Chomsky's argument against Partee is in itself not very convincing, his interpretation of [± def] is very interesting.[9] In MILSARK (1977) we find an extensive analysis of this feature based on that interpretation. I shall discuss it in some detail with the sole purpose of reaching the conclusion that all specifiers treated so far are to be located in the DET-position of (20b). Consider again the sentences in (2).

(2) a. There is a child in the house.
b. *There is the child in the house.

The opposition between definite and indefinite NP's in sentences like (2) is a much discussed topic. In the sixties the so-called *There-insertion* transformation was proposed to account for the relation between (2a) and the sentence *A child was in the house*. The transformation was constrained so as to exclude (2b) by requiring that the NP to be moved to the position after the copula be [-def]. However, quantifiers like *all, every, each,* etc. cannot occur in sentences such as (2) either, whereas *several, many,* etc. can (Cf. KRAAK & KLOOSTER 1968; MILSARK 1977; GUÉRON 1976, among others):

(21) *There were all children in the house.
*There appeared both elephants in the circus.
*There was every child in the house.
There were several (many, few) children in the house.

Milsark - following or preceding Chomsky, I am not certain which is the case - proposed that [+def] be interpreted as 'universal quantification', whereas [-def] should be taken as 'existential quantification', thus extending the coverage of both features so as to include the Q-quantifiers. Consequently, the ill-formedness of the sentences in (21) is accounted for by the feature [+def]. GUÉRON (1976) noticed that Extraposition from NP also interacts with this feature as shown by the opposition between **Those three books have just come out by Christie* (blocked by [+def]) and *Several books have just come out by Christie* (not blocked on account of the absence of [+def]).

Though it is very clear that a lot of factors are involved complicating the issue considerably, the clear-cut distinction between two classes of NP-specifiers on the basis of the features [+def] and [-def] appears to solve a lot of descriptive problems when applied to the internal noun phrase structure.[10] So let me give the resulting bipartition and see how it takes effect.

(22)

+def	-def
the DEMONSTRATIVES POSSESSIVES, etc. *each, all, every, any*, etc.	*a* *some* *few, several, many*, etc. *two, three, four*, etc.

Let us assume that (22) is an organized list of all members of one and the same syntactic category DET, which takes an N^{m-1} to yield an N^{m}. Then DET has two subcategories, say [+def] and [-def], just as the category NP has as its subcategories proper names, pronouns and full NP's, mutually excluding each other.

On the basis of this assumption a lot of the ill-formed constructions in (1) are automatically blocked. **Some the trees, *few three children, *three these children, *the some trees,* etc. are now excluded on exactly the same ground on which **He the man is walking* is excluded, namely on the

basis of contrastive distribution. Due to the restriction that all members of (22) can only occur in one syntactic position, namely the DET-position, these facts follow. As a natural consequence the Specifier Constraint (13) turns out to be superfluous: **all several children*, **any much wine*, **some many trees*, etc. are ruled out on syntactic grounds. Hence the analysis leading to (22) should be preferred to Jackendoff's analysis leading to (11) and (13).

In following this line I have pushed aside several stumbling-blocks on my way to the conjunction where the Montague-line comes in. So my strategy will be to assure that the two lines meet, to be positive about that circumstance, and to show that the advantages outweigh the problems that arise. As a result I shall modify (22) in Section 5 from a different angle.

Condensing the Chomskyan line followed from (20b) up to (22) to its essence one can say that it brings out the 'only one DET-position hypothesis', which says that the top of an N-projection line is characterized by the unique operation at the N^{m-1}-level changing a common noun constituent N^{i} $(0 \leq i \leq m-1)$ into a noun phrase N^{m}. Before going more deeply into some of the predictions of this hypothesis, I shall first discuss the Montague approach to determiners in Section 4.

4. DETERMINERS IN THE PTQ-FRAMEWORK

In Montague's PTQ DET would be taken as an abbreviatory notation for the category T/CN, i.e. as a derived category which takes a common noun (CN) to form a term (T). We do not find DET in the lexicon. Montague introduces specifiers such as *the*, *all*, *every*, etc. syncategorematically. For example, the article *the* is introduced by the syntactic rule (23).

(23) If $\zeta \in P_{CN}$, then $F_1(\zeta) \in P_T$, where $F_1(\zeta) =$ *the* ζ.

In other words, if ζ is a common noun, then the F_1-operation gives the NP *the* ζ. BENNETT (1975) extended the material presented in PTQ considerably by stating syntactic rules for all the determiners mentioned in (22). By his treatment of the plural he is forced to split up (23) into one rule accounting for *the* occurring with a singular CN and rules accounting for *the* taking a plural CN. Altogether Bennett needs about seventy F-rules to account for less than twenty specifiers.

Corresponding to (23) a translation rule is supposed to operate as

shown in (24).

(24) If $\zeta \in P_{CN}$, and ζ translates into ζ', then *the* ζ translates into

$$\lambda P \exists y[\forall x[\zeta'(x) \leftrightarrow x = y] \wedge P\{y\}]$$

where P is the predicate symbol whose place will be occupied by the intransitive verb phrase taken by the term *the* ζ to form a sentence. Again about seventy rules are necessary to account for the specifiers.

The normal reaction of linguists to this sort of treatment is a feeling of repugnance for the use of so many rules, the overall impression being that the system of syncategorematic rules cannot account for the many syntactic correspondences among determiners.[11] However, this feeling should not become a licence for doing away with Montague grammar, since it is easy to modify the organization of the PTQ-framework such that (23) and (24) fit into the linguistic standard mode of organizing a grammar (cf. COOPER & PARSONS 1976, and HAUSSER 1976). Rather than having syncategorematic rules such as (23) and (24), one could apply a rule operating on members of the category DET (i.e. T/CN) and on CN-expressions, as shown in (25). Applied to (16) γ would be N^3 in the case of (16a), and N^0 in the case of (16b).

(25) If $\delta \in P_{T/CN}$ and $\gamma \in P_{CN}$, then $F_{conc}(\delta,\gamma) \in P_T$,

where $F_{conc}(\delta,\gamma) = \delta\gamma$.

Correspondingly, the rule for the translation would be (26).

(26) If $\delta \in P_{T/CN}$ and $\gamma \in P_{CN}$, γ translates into γ',

then $F_{conc}(\delta,\gamma)$ translates into $\delta'(\hat{}\gamma')$.

As a result the lexical entry for *the* - assuming the correctness of the translation in (24) - would read as (27).

(27) *the*,DET,...,<<s,<<s,e>, t>>, <<s, <<s,e>, t>>,t>>

$$\lambda Q \lambda P \exists y[\forall x[Q\{x\} \leftrightarrow x = y] \wedge P\{y\}]$$

where DET abbreviates (t/IV)/(t//e), i.e. T/CN. Accordingly, *every* would receive an entry such as (28).

(28) *every*,DET,...,<<s,<<s,e>,t>>,<<s,<<s,e>,t>>,t>>

$\lambda Q \lambda P \forall x[Q\{x\} \rightarrow P\{x\}]$

given Montague's analysis of *every*.

Summarizing, one can observe that the 'only one DET-position hypothesis' can easily be accounted for in the PTQ-framework by casting rules such as (23) and (24) into a different mould. In the next section I shall discuss some of the predictions of this hypothesis with the help of the framework presupposed by (25) - (28).

5. DETERMINERS, ADJECTIVES AND NUMERALS

In Section 3 I have argued that the MLH-approach of $\bar{X}$-syntax leads to a restrictive and very natural hypothesis about the determiner of an NP: the 'only one DET-position hypothesis' (OODH). In Section 4 I have tried to make clear that the OODH perfectly fits into the PTQ-framework, given a slight conceptual reorganization of the grammar. In the present section I shall confront the OODH with two apparently problematic areas in the specifier structure of NP's. The first one is pre-determiner position, the second is the status of numerals.

It is a fact of English and Dutch that determiners can be preceded by modifying elements. Moreover, some members of (22) occur as specifiers together, one preceding the other. The relevant material is given in (29).

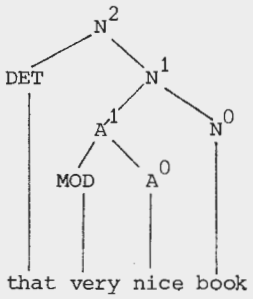
(29) a. almost every child
b. almost all the children
c. all the/my children
d. *the/my all children
e. nearly all children
f. so very many interesting problems

Extending the range of the descriptive domain, I shall first focus on the internal structure of the italicized constituents in (30) before going further into the problems raised by (29).

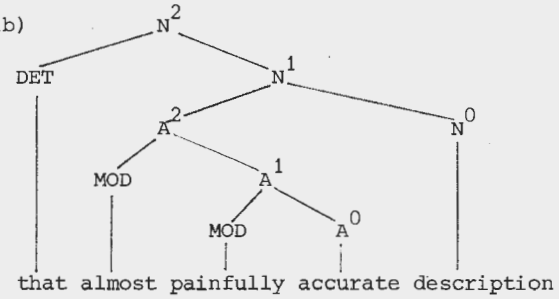
(30) a. that *very nice* book
b. that *so particularly* nice book
c. that *almost painfully accurate* description

The MLH-hypothesis states that (30a) be analyzed as (31a) and (30c) as (31b).

(31a)



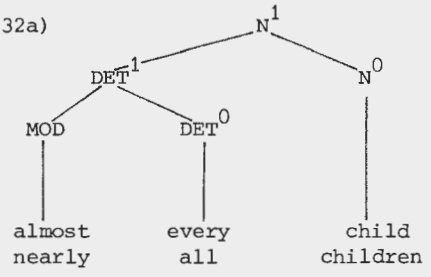
(31b)



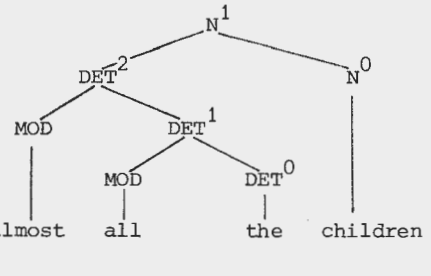
The (adverbial) modifiers are represented here by the label MOD, whose exact $\bar{X}$-status I shall ignore here. The modifiers *almost, nearly, so* and *very* clearly belong to MOD: they can all take adjectives.

Focussing now on (29a) one can say that the OODH forces us into the position of analyzing *almost every* as consisting of a C modifying an X^i, given the MLH-rules (15). The data in (30) strongly suggest that it is *every* rather than *almost* that counts as the head of the construction. In other words, we must accept DET as a possible value for X in the $\bar{X}$-syntax. Following Chomsky, the MLH-approach very reluctantly allows of X-categories as contrasted with the U3LH.[12] This strategic attitude seems to pay off. Consider the diagrams in (32).

(32a)



(32b)



Comparing the DET-structures of (32) with the A-structures of (31) we can observe that there is a structural parallelism. That is, the DET-projection line and the A-projection line seem to share certain properties with respect to their modifiers. So we must ask ourselves whether DET and A have properties in common. An attractive answer is that they have, from the historical point of view. The Old-English predecessors of *every, each,* etc. are often considered adjectives in the traditional literature.

I do not say that determiners *are* adjectives. I merely say that they share certain structural properties. Given the fact that DET is an

improductive category, whereas A is productive, one could maintain that DET is a "frozen" adjective, that is, originally an adjective, but having acquired more and more specific properties distinguishing it from real adjectives. DET is frozen in the sense that its property of taking modifiers dates back from the period in which it was an adjective. English and Dutch show the same development in this respect. One might say that both languages have developed such that the N^{m-1} modifier got its specific function of forming a CN into a term (cf. LIGHTFOOT 1979, pp.167-186). An interesting problem arising from this analysis is that constituents such as *almost* and *nearly* in (31b) belong to the category CN/CN, whereas they belong to DET/DET in the case of (32). The question is how semantics accounts for categorial transitions.

Summarizing - and aware of some speculative elements in the above paragraphs - I would say that the OODH entails a DET-projection line, which means that DET is a value for X. Synchronically we capture the structural parallelism with respect to the A-projection line. Observing that the range of modification of DET as well as the number of members of the category DET are very much restricted, we turn back to history. Diachronically seen DET belonged to A. Thus the MLH-approach accounts for the present situation in which DET differs from A in certain respects as well as for the correspondences that remain. The U3LH-approach cannot give such an account on the basis of predictions commanded by (8).

There is an apparent problem with (29b) that we cannot leave out of consideration. In the diagram (32b) *all* occurs as the modifier of *the*. So a distinction is made between a DET *all* and a MOD *all*. Comparing the corresponding Dutch data with the examples in (2), we can easily observe that this distinction comes out in Dutch at the morphological level, as shown in (33).

(33) a. al de kinderen
all the children

b. * alle de kinderen

c. *al kinderen

d. alle kinderen
all children

Example (33b) shows that *alle* cannot modify the definite article as contrasted with *al* in (33a). Dutch makes a distinction between the determiner *alle* occurring in (33d) and the modifier *al*. Note that the modifier does not occur in an indefinite NP as shown in (33c). Again the historical

development of the language under analysis can be taken into account. *Alle* results from a fusion of *al* and the definite article. In this sense, *alle kinderen* and *al de kinderen* are to be considered variants. It seems justified to say that they are variants, from the synchronic point of view: there is hardly any semantic difference between the two phrases.

The Dutch data suggest that the English *all* belongs to two different syntactic categories: all_1 occurring in (29b/d/e) must be considered a determiner, whereas all_2 in (29c) is to be taken as a modifier.

The second problematic area with respect to the predictions made by the OODH is shown in (34) and (35).

(34) a. I saw these three children
b. I saw three children
c. *I saw three these children.

(35) a. I heard about these few attempts to escape
b. I heard about few attempts to escape
c. *I heard about few these attempts.

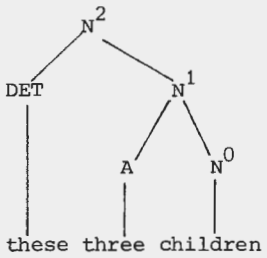
Recall that the U3LH excludes the c-sentences by requiring that *three* and *few* be rewritten on a lower level of phrase structure than *these*. That is, in the lexicon *three* and *few* are syntactically characterized such that they can be inserted only in the N^2-specifier positions, *three* as a Noun and *few* as a Q_2. JACKENDOFF (1977, pp.128-134) defends the position that *three* is a Noun with the argument that numerals cannot be preceded by degree specifiers such as *so, too, how,* etc. Furthermore there are constructions such as *a beautiful two weeks, a dusty four miles,* etc., suggesting that numerals behave like nouns with respect to the specifiers they can occur with. As a result *three children* is to be derived from a structure corresponding to *a six of weeks* generated by the base component. Two local transformational rules are necessary to delete the *a* and the *of*; both are obligatory.

Apart from the weakness of the two arguments cited above (e.g. the determiner *all* can be modified by *nearly*, as contrasted with the derminer *some*; nevertheless, Jackendoff puts *all* and *some* in the same category) and of the other arguments given by Jackendoff, the underlying structure seems highly unnatural in view of constructions such as *approximately twenty books, nearly forty children,* etc. To derive *these almost twenty hits* from *these almost a twenty of hits* appears to me artificial and ill-motivated.

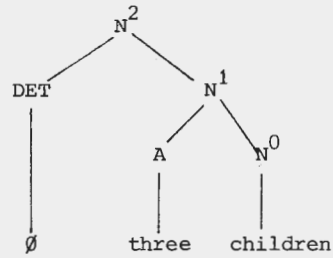
Though the MLH certainly allows an analysis where *three* can be taken as a Noun, I would like to explore the position where numerals are analyzed as taking an N^i to form an N^{i+1}, because I think that such an analysis might contribute to the solution raised in connection with phrases such as (3). That is, by following this line of argumentation I hope to be able to account for the difference between *three nice books* and **nice three books*; more generally, for the principles determining the order of specifiers and adjectival constituents with respect to each other in the pre-nominal position.

Assuming that *these* in (34a) is a DET, *three* must occur at a lower level of phrase structure. Let us provisionally label *three* as an adjective, thus expelling numerals from (22). BARTSCH (1973) defends this position by assuming that numerals belong to the category of plural adjectives. BENNETT (1975, p.132) observes that phrases like *the few gods, the many gods,* and *the twelve gods* "function much like[...] occurrences of adjectives", without being specific about their syntax. As said Bennett introduces these specifiers syncategorematically, which means that *the twelve* is introduces as a whole. The MLH-syntax would represent (34a) as in (38a).[13]

(38a)



(38b)



What does a sentence like (34a) *I saw these three children* mean? A set-theoretical basis for an answer to that question seems appropriate. The N^1 can be said to refer to those subsets of the power set *child* that contain three members. (This power set, being the set of all subsets, contains subsets consisting of one member, two members, three members, and so on.) The determiner *these* can be analysed as identifying a particular three-membered set in the set referred to by N^1. Type-logical differences can be applied to guarantee the right combinations, as I shall show below. Going a little bit further into the nature of *these* one can say that this determiner introduces a certain group deictically. I shall symbolize this sort of introduction as $\Theta A[...A...]$, where A refers to a set, and where we can say that (39) holds. ($\exists!A$ meaning 'there is a unique A):

(39) $\Theta A[\alpha(A)] \leftrightarrow \exists!A$ such that A is deictically or contextually or anaphorically given and α is true of A.

The indefinite determiner Ø would have an existential quantifier in the position where the definite determiner has the Θ-quantifier: the NP *three children* can be analyzed as introducing the existence of a certain subset in the power set *child*.

The above semantic analysis of the two phrases under consideration closely ties up with work done by BARTSCH (1973) and BENNETT (1975). However, there appear to be three problems with the Bartsch-Bennett position that result from trying to reorganize the current PTQ-framework in terms of the MLH-$\bar{X}$-syntax as in Section 4. Firstly, singular determiners have plural counterparts introduced by different rules. In a Bennett-approach which allows more than seventy syncategorematic rules to describe the specifiers under analysis, this is not felt as an objection. However, in the MLH-approach where we want to have lexical entries it is. We do not want to have an entry for the singular *the* and several entries for the plural *the* if this can be avoided. The same applies to the other specifiers. Secondly, the Bartsch-Bennett position makes it necessary to distinguish between plural and singular predicates and also between plural and singular adjectives. Thirdly, the distributive and collective readings of sentences like (34a) and (34b) cannot be accounted for in a proper way. My intention is to propose a solution to the first two problems thus providing a basis for the solution of the third problem.

Both Bartsch and Bennett introduce PLUR as operators on a singular noun, though in a slightly different way. I believe that this is the root of many troubles, among which the duplication of so many rules. I shall assume that PLUR and SING are both operators of the same level providing for the cardinality of the set to which the N^0 refers. Moreover, I shall assume that PLUR and SING are numerals. In other words, in (38a) PLUR does not appear at all: it is the numeral *three* that provides for the plurality of the noun phrase. Only if numerals like *one, two, three,* etc. are absent, can SING and PLUR occur in the syntactic structure of NP's. I shall show that these assumptions lead to a more satisfactory analysis of the NP-structure than in the literature mentioned here.

A first sight my position would entail that PLUR and SING are to be

taken as adjectives, just like numerals. If, for expository purposes, we leave out intensions, this would mean that they belong to the category CN/CN; that is, they would have to be considered as functions operating on properties (of individuals) to yield properties (of individuals). In other words, they would belong to the category <<e,t>,<e,t>>. Given our analysis of the plural NP's in (38) this will not do, because PLUR should be taken as a function from properties (of individuals) to properties of properties, that is, as belonging to <<e,t>,<<e,t>,t>>. Therefore, I shall propose the following three entries for SING, PLUR and *three* respectively.[14]

(40) a. SING, +NUM, ..., <<e,t>, <<e,t>,t>>

$$\lambda Q \lambda P[\forall x[P(x) \rightarrow Q(x)] \wedge \#(P) = 1]$$

b. PLUR, +NUM, ..., <<e,t>, <<e,t>,t>>

$$\lambda Q \lambda P[\forall x[P(x) \rightarrow Q(x)] \wedge \#(P) \geq 2]$$

c. *three*, +NUM, ..., <<e,t>, <<e,t>,t>>

$$\lambda Q \lambda P[\forall x[P(x) \rightarrow Q(x)] \wedge \#(P) = 3].$$

The symbol # is to be taken as an operator yielding the cardinality of the set referred to by P.

One of the consequences of this proposal is that we have to analyse a phrase like *nice apples* in *I bought nice apples* as [Ø[PLUR[*nice*[*apple'*]]]], and *nice apple* in *I bought a nice apple* as [a[SING[*nice*[*apple'*]]]], where *apple'* represents the form of the N^0 being neutral between the plural and the singular form.

I shall now first demonstrate the proposal in some detail with the help of the derivations of (38a) and (38b) before discussing some of its other consequences. In (41) the different types of the elements in (38) are given. NUM replaces the label A.

(41)

N^0 :	<e,t>	- CN
NUM:	<<e,t>, <<e,t>,t>>	- (t/CN)/CN
N^1:	<<e,t>,t>	- t/CN
DET:	<<<e,t>,t>, <<<e,t>,t>,t>>	- T/(t/CN)
N^2 :	<<<e,t>,t>,t>	- T

The complete derivation from bottom to top of the noun phrase *these three*

children in (34a) on the basis of its syntactic structure (38a) - given the replacement of A by NUM as indicated in (41) - is shown in (42).

(42) N^0 : *child'* $\rightsquigarrow$ child'

N^1 : *three child'* $\rightsquigarrow$ $\lambda Q\lambda P[\forall x[P(x) \rightarrow Q(x)] \wedge \#(P) = 3]$ (child')

$\Leftrightarrow$ $\lambda P[\forall x[P(x) \rightarrow \text{child}'(x)] \wedge \#(P) = 3]$

DET: *these* $\rightsquigarrow$ $\lambda Q\lambda P\Theta A[Q(A) \wedge P(A)]$

N^2 : *these three children*

$\rightsquigarrow$ $\lambda P\Theta A[\lambda P[\forall x[P(x) \rightarrow \text{child}'(x)] \wedge \#(P) = 3](A) \wedge P(A)]$

$\Leftrightarrow$ $\lambda P\Theta A[[\forall x[A(x) \rightarrow \text{child}'(x)] \wedge \#(A) = 3] \wedge P(A)]$.

Note that DET correctly introduces predicates of predicates. Assuming that the plural *the* does not differ *semantically* from the singular *the*, I shall assign *this* the same semantic representation as *these* in (42). Consequently, *this child* will be represented as in (43).

(43) $\lambda P\Theta A[[\forall x[A(x) \rightarrow \text{child}'(x)] \wedge \#(A) = 1] \wedge P(A)]$.

I think that (43) is a precise formalization of Chomsky's suggestion to analyze definite specifiers such as *the* and *these* in terms of universal quantification over a set containing just one member in the case of singular NP's.

Turning now to (38b) we can give the bottom-to-top derivation of the NP *three children* in (34b):

(44) N^0 : as in (42)

N^1 : as in (42)

DET: $\emptyset \rightsquigarrow \lambda Q\lambda P\exists A[Q(A) \wedge P(A)]$

N^2 : *three children* $\rightsquigarrow$ $\lambda P\exists A[\lambda P[\forall x[P(x) \rightarrow \text{child}'(x)] \wedge \#(P)=3](A) \wedge P(A)]$

$\Leftrightarrow$ $\lambda P\exists A[[\forall x[A(x) \rightarrow \text{child}'(x)] \wedge \#(A) = 3] \wedge P(A)]$.

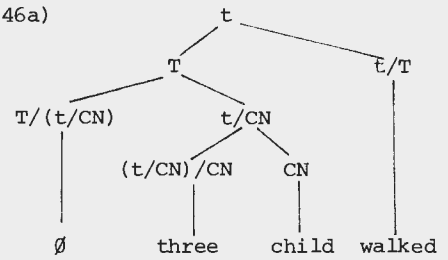
The derivations (42) and (44) show that it is possible to combine Montague-grammar with Chomsky-syntax. Note that (38a) and (38b) are not analysis trees in the PTQ-sense. They are phrase structural configurations. The combinatorial mechanism involved in (42) and (44) is in conformity with Frege's principle.

The same applies to the mechanism involved in the derivation of sentences such as (45):

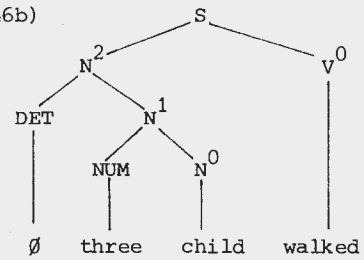
(45) Three children walked.

It will be understood that the standard treatment of *walk* (I ignore tense here) must be adapted to the present analysis of NP's. That is, *walk* must be considered to belong to the type <<e,t>,t> rather than to the type <e,t>. I shall now give the complete derivation of (45) to show that no problems arise. The categorial tree of (45) is given in (46); in (46a) in Montague's notation, in (46b) in Chomsky's notation.

(46a)



(46b)



The semantic derivation corresponding to (46) is given in (47), where I start giving the N^2-representation ending (44).

(47) N^2: $\lambda P \exists A[[\forall x[A(x) \rightarrow child'(x)] \wedge \#(A)=3] \wedge P(A)]$

V^0: $\lambda P \forall x[P(x) \rightarrow walk'(x)]$

S : $\lambda P \exists A[[\forall x[A(x) \rightarrow child'(x)] \wedge \#(A)=3] \wedge P(A)]$ $(\lambda P \forall x[P(x) \rightarrow walk'(x)])$

$\Leftrightarrow \exists A[[\forall x[A(x) \rightarrow child'(x)] \wedge \#(A)=3] \wedge \lambda P \forall x[P(x) \rightarrow walk'(x)](A)]$

$\leftrightarrow \exists A[[\forall x[A(x) \rightarrow child'(x)] \wedge \#(A)=3] \wedge \forall x[A(x) \rightarrow walk'(x)]]$.

To complete this sketch of the consequences of my proposal (40) I shall give the entries for *a(n)*, *some* and *every* without much comment.

(48) *a(n)*, DET, ..., <<<e,t>,t>, <<<e,t>,t>,t>>

$\lambda Q \lambda P \exists A[Q(A) \wedge P(A)]$

some, DET, ..., <<<e,t>,t>, <<<e,t>,t>,t>>

$\lambda Q \lambda P \exists A[Q(A) \wedge P(A)]$

every, DET, ..., <<<e,t>,t>, <<<e,t>,t>,t>>

$\lambda Q \lambda P \forall A[Q(A) \rightarrow P(A)]$.

As a consequence of the present analysis the difference between *a(n)* and *some* can be accounted for in a natural way: the entry for *a(n)* and *every* must be extended to include the information that *a(n)* can only c-command

the SING-node, whereas *some* can take both SING and PLUR as in *I saw some man at the door* and *I saw some men at the door*, respectively.

I shall now discuss some of the consequences of the above proposal. First of all, my statements with respect to (18) - (20) must be slightly modified. The path from N^0 up to and including N^{m-1} is less homogeneous than presented there: values for N^i can differ in their categorial status. At this point we enter a very interesting area: the $\bar{X}$-syntax requires that all heads along a projection line share a common element, because this constant puts us in a position to express that X^0 is the head of X^m. For all that we see that certain changes in the categorial status can take place, notably the change from <e,t> into <<e,t>,t> on the N-projection line as a result of the NUM-operation. So there is a certain tension between our wish to have a constant element along the N-projection line and the necessity to allow of categorial changes. I think that this tension can be resolved. After all a generalization is made by the simple fact that the <e,t> occurs at the leftmost element in the representations of N^0, N^1 and N^2 in (41).

Secondly, the present approach accounts for the difference between *three nice books* and **nice three books*. Moreover, it accounts for the ungrammaticality of (49).

(49) *These three four books.

The numerical *three* cannot operate on the <<e,t>,t>-phrase *four books*. Observe that (49) has a grammatical counterpart meaning 'these three or four books'. In this case *three* and *four* are co-ordinated. It is interesting to see that there are some circumstances in which numerals can be lowered along the N-projection line as shown in *those beautiful two weeks, a dusty four miles of road*. However, **those beautiful two trees, *a dusty four churches* are not well-formed unless trees and churches are understood as units of measure.[15]

Thirdly, as contrasted with JACKENDOFF (1977) *few* and *many* can be treated as numerals, along the line from (38) to (44), though with a different semantic representation concerning the cardinality of the set A (cf. BENNETT 1975; KLEIN to appear). Again it is interesting to compare the Dutch data with the corresponding facts of English:

(50) a. weinig kinderen
few children
b. *de weinig kinderen die...
c. ?weinige kinderen
d. de weinige kinderen die...
the few children that...

(51) a. veel kinderen
many children
b. *de veel kinderen die...
c. vele kinderen
d. de vele kinderen die...
the many children that...

There is a clear difference between *veel/weinig* and *vele/weinige*. The latter is a declined form occurring most properly after a determiner. However, *vele kinderen* is well-formed though slightly outmoded. In my idiolect (50c) is worse than (51c). Suppose that *de vele kinderen* in (51d) would be analyzed as *these three children* in (38a). In that case *vele* would be a numeral, showing adjectival features by its declined form. Given the data in (50) and (51) it would be unnatural to put *veel* and *vele* in the same category. Consequently one could argue that *veel* is a determiner rather than a numeral, whereas *vele* is a numeral rather than a determiner. If this argument holds, then one could argue in favour of the view that *three* in *three children* is a determiner as well. As said, I have tried out that line of thought in an earlier version of this paper in an effort to account for set-introduction, cardinality and quantification at the level of DET only. As the present analysis of (38) runs quite smoothly as far as the derivations (42) and (44) are concerned, I have cut off the former line of thought for the time being.

As an immediate consequence of the assumption that *few* and *many* must be treated on a par with *three* a somewhat comical effect arise: the structures of *these three children* and *these few attempts* resemble structure (12): *these* asymmetrically c-commands *three* and *few*. Note, however, that (38a) is not rigid as shown in (16a). By removing numerals (among which *few, many*, etc.) from (22), we do not bring ourselves back to a position where we need the Specifier Constraint (13) to account for the data. The fact that numerals are to be asymmetrically c-commanded by DET, follows from the difference between NUM and DET in (41).

Fourthly, the label A in $\bar{X}$-syntax is to be restricted to "pure adjectives" whatever that may be. KAMP (1972) and BENNETT (1972) among others make it clear that adjectives do not form a homogeneous category. At any

rate, $\bar{X}$-syntax can provide for the categories showing adjectival behaviour.

Finally, the determiners *these, the,* and *all* have exactly the same semantic representation in the present analysis, except for their degree of θ-ship. In *all children* the specific subset A is identified either by context or by deixis. The universal quantifier covers all members of A. The same applies to *these* and *the*.

I conclude here my elucidation of (38) - (48). I am aware of the many intricacies of the specifier structure of NP. However, I believe to have shown that the OODH has consequences that can be dealt with adequately in the framework presented here.[16]

After the above discussion about the two problems of the Bartsch-Bennett approach to plurality that I have tried to solve, the third problem will be briefly discussed. Bennett is aware of the "magnitude of this problem" in the discussion of his second fragment (BENNETT 1975, p.133). To account for the collective reading of (34b) Bennett introduces *three* as in (52).

(52) $\lambda\bar{P}\exists\bar{x}[\underbrace{\text{group}'(\bar{x})}_{A} \wedge \underbrace{\forall y[\bar{x}(y)\rightarrow\zeta'(y)]}_{B} \wedge \underbrace{\overset{3}{\exists}y[\zeta'(y) \wedge \bar{x}(y)]}_{C} \wedge \bar{P}\{\bar{x}\}]$

In the part indicated by A a group is existentially introduced, in B quantification takes place over members of this group and in C the cardinality is given. The $\bar{P}$ and $\bar{x}$ indicate that one has to do with a letter referring to predicates of predicates and groups, respectively.

What does *I saw (these) three children* mean? In both cases one can have four "seeing events": (i) I saw three children together; (ii) I first saw two children together and then a third child; (iii) I saw first one child and then the other two together; and (iv) I saw them one by one.[17] It seems to me that it is the verbal predicate that creates the (felicitous) vagueness of interpretation. The sentence *I see (these) three children* shows that the present tense element has the effect of bringing the collective reading to the fore. This example, which I owe to Martin Stokhof, seems to support the thesis that one should not account for the collective or distributive reading of sentences in terms of representations for noun phrases resulting from (48). In my opinion the collective or distributive readings of sentences are a matter of temporal quantification, i.e. quantification over events, situations or occasions, rather than a matter of noun phrases.

6. CONCLUSION

I have tried to argue that the conceptual gap between Montague grammar and Chomsky-grammar is not so wide as is often assumed. My critical discussion of a particular version of $\bar{X}$-theory led to a variable $\bar{X}$-syntax having a bottom-to-top rule system, the Minimal Level Hypothesis. The 'only one determiner position hypothesis' in the MLH-framework led to certain insights into the syntax and semantics of NP's that seem to corroborate the view that Montague-grammar fits in quite nicely with Chomsky-syntax.

FOOTNOTES

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1. In the presentation of this paper at the colloquium I used the term 'complementary distribution' where I have 'contrastive distribution' in the text of this article. My use of the former term linked up with JACKENDOFF's (1977, p.104). However, this use of a term widely applied in a different sense might cause some misunderstanding. Therefore, I have changed the terminology. The essence of contrastive distribution is of an analytical nature: given a string $c_1\ c_2 \ldots c_n$ whose structure is to be determined, c_i and c_{i+1} in the structure $[_C\ c_i\ c_{i+1}]$ never belong to the same category unless one has to do with co-ordination, or with sub-ordination where c_i or c_{i+1} is the head of the phrase C.
2. More precisely, for the cluster X^0 of sub-predicates if we take into account Jackendoff's thematic system as presented in JACKENDOFF (1976). See also VERKUYL (1976).
3. It can easily be understood why Jackendoff does not allow for an X^1-specifier. X^0 is taken as a function mapping ordered n-tuples of terms into propositions. Given the stipulation that all members of such an

n-tuple (minus the subject-NP) are located in the complement of X^1 as sisters of X^0, there is semantically no room for any X^1-specifier.

4. That is, the claim that transformational rules can cross-classify on the basis of features proposed by Jackendoff.
5. Koster is not able to define the notion 'prominent' in terms of c-command because this structural relation does not distinguish between sister nodes. Hence Koster appeals to a certain functional hierarchy to define his notion 'more prominent than'. He is forced to do so because he accepts the U3LH. The notion 'c-command' is taken here in the sense of REINHART (1978): a node A c-commands a node B if and only if A does not dominate B and the first branching node dominating A also dominates B.
6. This question is in fact one of the leading motives of this paper. In Chomsky's present theory one of the most important questions concerns the relationship between surface structure (called S-structure) and logical form. In the present paper I follow REINHART (1978) by trying to put as much syntax into surface structure as possible (as a matter of strategy), thus restricting the syntax of logical form.
7. Note also that the MLH requires that transformational generalizations be made on the basis of X^m (or X^0) in the Structural Descriptions rather than on the basis of the same numerical value, as was pointed out in KERSTENS & STURM (1978, p.42).
8. In Section 5 this contention will be slightly modified.
9. Chomsky's analysis hinges on the direct association of the feature [+plur] with the plural morpheme in phrase structure. As I shall argue the feature [+plur] should be located higher up in the NP. Morphological rules can introduce the plural morpheme on the basis of the presence of the syntactic feature [+plur] in the noun phrase.
10. A lot of problems remain, however. For instance, there is an interaction between predicates and quantified expressions. According to Milsark the sentence *Coffee tastes well, dolphins are intelligent* can be analysed as having a universally quantified NP. Though I shall not elaborate that point I believe that the analysis given in Section 5 can in principle account for this sort of problems.
11. More generally, such an approach does not aim at defining the notion 'possible rule' and 'possible grammar' in the sense that restrictions are put on the function and form of rules for the sake of explanatory adequacy.
12. Chomsky seems to restrict the values for X to the productive categories

N, V and A. the present argument shades this picture somewhat in the sense that it also allows of heads of a phrase structural configuration on the basis of structural parallelism with N-, A-, or V-projections.

13. At the colloquium I explored the line of analysing *three children* as $[_{N^1}[_{DET}$ three$][_{N^0}$ child -en$]]$. In the present version the representation in (38b) seems appropriate. One needs the DET Ø anyhow to account for indefinite phrases such as *I saw nice children*. See footnote 16.

14. PLUR is represented here as a categorial label. However, it can be taken as a feature as well. It belongs to the category of specified grammatical formatives.

15. Recall that Jackendoff used precisely these phrases to argue that numerals must be taken as nouns. The combination of *weeks* and *two* in *a beautiful two weeks* is an example of what one might call unit-counting. My impression is that in this case the numeral is dominated by N^0, where N^0 is *x - week*, where *x* is an open place for numerals.

16. I mention some problems here. Firstly, I do not know how the present analysis can be related to Hausser's distinction between Presupposing and Assertive Quantifiers (HAUSSER 1976). Secondly, the effect of removing *few, many,* etc. from (22) would be that **all few children* cannot be accounted for any longer. The most obvious way out is to follow the line I took at the colloquium by distinguishing into *few/three* as DET and *few/three* as adjectives (in the modified sense of (41) (cf. KLEIN to appear). In that case the English *all* in **all few children* would modify the DET *few* which is not allowed just as it is not allowed to modify *the* by *nearly*. In Dutch we do not find *al veel kinderen* or *al vele kinderen* as noun phrases, with *al* as a modifier. As said in the text I think that set-introduction, cardinality and quantification are essentially a matter of DET. The general idea is that DET should contain slots where material can be inserted from below by the combinatorial mechanism shown in (42) and (44). I leave this matter open for future research. Note that the problems mentioned here do not affect the main thesis of this paper at all. My purpose was not to solve all descriptive problems that arise with respect to the specifier structure of NP; I wanted to show that a certain approach can lead to fruitful insights. In fact, the basic idea is that by semantic analysis certain things can be said about the syntax of NP's that otherwise would remain at the level of a good guess.

Note finally that the present analysis seems to clarify the notion of

'unspecified quantity of X' as used in VERKUYL (1976).

17. I do not exclude the possibility of having to do here with an epiphenomenon from the linguistic point of view. On the other hand, recent analyses of quantification in sentences all locate the properties 'distributional' and 'collective' in the NP itself. I doubt very much if that is correct.

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