Zero Semantics — The syntactic encoding of quantificational meaning

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We will discuss some aspects of the interface of the computational component and the semantic component of language. We propose an interpretative theory, i.e. a grammar in which the semantic component does not only assign primitive meaning to terminal symbols (lexemes) but also to structures. We argue that the interpretation of terminal nodes constitutes lexical semantics; the interpretation of structures constitutes quantificational semantics.

1.1. Zero-semantics and universal quantification

In Dutch, there exists a curious effect that the lexical meaning of a word can be de-activated in function of the syntactic context. This may happen despite the fact that the word can have a meaning in the lexicon. We will call this phenomenon ‘Zero Semantics’ (ZS).

We will give three examples of ZS in Dutch: loss of lexical meaning (1a-b), nonsense-word formation in negative polarity contexts (1c), and the rise of universal quantification under dummy coordination (1d-e).

(1) a Er was geen kip en de stad
   there was no chicken in the town
   ‘there was nobody in town’
 b Jan doet geen vliegen kwad
   John does not hurt a fly
   ‘John does not hurt anybody’
 c Ik begrijp er geen snars van
   ‘I do not understand a SNARS (=anything) of it’
 d Jan heeft kind noch kraai
   John has child nor crow
   ‘John has nobody at all’
 e Het schip verging met man en muis
   the ship went down with man and mouse
   ‘the ship sank with everyone (on it)’

1 An earlier version was presented in two classes on ‘Bare Coordination’, April 26-May 3, 1994, University of Amsterdam.
What the underlined words have in common is that they do not receive a lexical interpretation. Strictly lexically, (1a) should be true in a situation in which there are a lot of people but no chickens. Nevertheless, there is a reading of (1a), for which Dutch speakers cannot use (1a) in this situation. In this reading (1a) is true if there is nobody at all. This consideration indicates that words in ZS are those words that do not contribute a lexical meaning to the semantics on the propositional level. Instead of a lexical meaning, the word contributes a quantificational meaning. These words obviously can retain their meaning in a connotative way.

We will consider the case (1e) in more detail since it clarifies the rise of quantification at the cost of lexical meaning most clearly. These constructions are in zero-semantics. Moreover, there is an interesting semantic effect: the lexically dummy construction receives a universal quantificational interpretation, as is indicated in the translation of (1e).

Notice first that normally bare singulars are completely impossible in Dutch with count nouns as in (2).

(2) a *Het schip verging met man
   The ship sank with man

Curiously, the occurrence of bare-singular count nouns in (1e) is not just a possibility but these nouns must be bare singulars. Only then do they exhibit zero-semantics. If plurals are inserted, this possibility disappears, as in (3). The noun has Full lexical Semantics (FS).

(3) a Er liepen geen kippen in de stad
    there walked no chickens in town (plural; full semantics only)
 b Jan doet geen vliegen kwaad
    John does no bad to flies (plural; full semantics only)
 c Jan heeft kinderen noch kraaien
    John has neither children nor crows (plural; full semantics only)

Apparently, plural formation blocks ZS. Why is this the case? What is the interaction of plural formation and the assignment of lexical semantics? A way to look at it is to assume that plural formation is not so much a semantic process but rather a purely morphosyntactic process with interpretative effects. The interpretative impact of plural formation is that it protects a lexeme from being interpreted quantificationally. Conversely, if we are dealing with bare nouns, these nouns must be interpreted quantificationally.

It may be objected that expressions like (1) are idiosyncratic. This is partly true. However, if one attributed these effects to the lexicalization of the expression only, one would not explain 1. why such bare-singular constructions are well-formed at all, 2. why such idiosyncratic lexical expressions are limited to bare singulars, 3. why this type of quantificational construction is productive in the case of duplication, as is illustrated in (4a). A quantification is present without a word that can be held lexically responsible for it.
(4) a Ik vroeg het deur aan deur
   I asked it door at door
   ‘I asked it at every door’
b In de rosse buurt zit raam aan raam een meisje (wide scope reading)
in the red-light district sits window at window a girl
c In de rosse buurt zit een meisje raam aan raam (narrow scope reading)

Hence, attributing these effects exclusively to the lexicon misses the point. Moreover, there is evidence that the construction is really quantificational: the emerging quantification observes the usual scope effects of quantificational expressions in Dutch (4b-c). In (4b), raam aan raam has scope over een meisje. In (4c), on the other hand, the existential een meisje has scope over the universal quantification construed by raam aan raam. This gives rise to a semantically marked reading (a girl would be moving from window to window).

We must conclude that the lexicon cannot exclusively be held responsible for the collective universal quantification present in (1e). If syntax is involved, however, it does not come as a surprise that the coordinative construction is widely attested, cross-linguistically and within Dutch, as illustrated in (5).

(5) a Zij waren van huis en haard verdreven
    they were from house and stove driven
    ‘they were dispelled from all their possessions/everything they had’
b Zij hebben ons met man en macht geholpen
    they have us with man and power helped
    ‘they helped us with everything they had’
c Zij hebben zich met hand en tand verzet
    they have themselves with hand and tooth resisted
    ‘they resisted with everything (they had)’
d Ik heb het met huid en haar opgegeten
    I have it with skin and hair up-eaten
    ‘I ate it with all parts/entirely’
e Hij klaagde steen en been
    he complained stone and bone
    ‘he complained extremely/with all his forces’

All these constructions represent collective universal quantification. We capture this in the following generalization in (6).

(6) Interpretation of coordinative bare singulars
Let $\gamma$ be a coordinative construction $[N_1P_{sg} \& N_2P_{sg}]$ with $N_1P$ and $N_2P$ are bare singulars, then $\gamma$ is in zero-semantics ([ZS & ZS]) and is interpreted as a collective universal quantification (‘everyone’, ‘everything’, ‘entirely’, ‘extremely’).

A similar generalization can be made for the $[N_1P_p N_1P^0]$ constructions of (4). Consider some additional duplicative constructions in (7).
(7) a We stonden bumper aan bumper
   we stood bumper to bumper
   ‘Our bumpers touched each other/we stood with one bumper at the other’

b De kinderen liepen hand in hand
   the children walked hand in hand

The construction is productive. Remarkably, the \([N_1 P \ p N_2 P]\) structures in (7) receive a quantificational interpretation as well, in this case a *distributive universal quantification* (sometimes realized as a reciprocal interpretation, dependent on the context). Notice that in a sense the construction in (7) contains a dummy noun as well: one of the nouns is a full copy of the other. The second noun does not contribute to the meaning at the propositional level and is, hence, in zero-semantics. So let us capture the interpretation of these sentences in an observational generalization (8).

(8) *Interpretation of duplicated bare singular NP \(p\) NP constructions*
Let \(\delta\) be a construction \([N_1 P_{sg} \ p N_2 P_{sg}]\) with \(N_1 P\) a bare singular and one NP a full copy of the other noun, \((\{FS p ZS\})\), then \(\delta\) is interpreted as a *distributive* universal quantification with \(N_1 P\) as the restrictive set.

It is difficult to see how the co-occurrence of zero-semantics and the rise of quantification in bare singulars can be accounted for by a purely lexical approach.

1.2. Zero-semantics as a syntactic phenomenon: The explanation of each/all

In table (9), we list the quantificational properties of the two analytic constructions \([N \ and \ N]\) (cf. 6) and \([N \ p \ N]\) (cf. 8). The first construction evokes collective-*V* quantification, the second one evokes distributive-*V* quantification.

(9) *Properties of two analytic constructions that evoke universal quantification*  
\(N \ & \ N\)

<table>
<thead>
<tr>
<th>(N \ and \ N) (e.g. <em>man en muis</em>)</th>
<th>(N \ p \ N) (e.g. <em>hand in hand</em>)</th>
</tr>
</thead>
</table>
| • Non-distributive reading  
  (‘all’/‘whole’)                     | • Distributive reading  
  (‘each’, reciprocal, iterative, …) |
| • Both nouns in zero-semantics  
  (ZS and ZS)                       | • One noun in zero-semantics  
  (FS p ZS)                         |
Let us now look at corresponding lexical quantificational items, e.g. *alle* ‘all’ (collective) and *elk* ‘each’ (distributive).

(10)  

<table>
<thead>
<tr>
<th>Type</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>collective</td>
<td>all + plural</td>
</tr>
<tr>
<td>distributive</td>
<td>each + Ø</td>
</tr>
</tbody>
</table>

Suppose now that *all*, *each*, and the plural morpheme do not have a lexical semantics, but are lexemes in zero-semantics. Of course, they have a semantic impact that we call collective and distributive universal quantification. However, these concepts can be cast in configurational terms. The patterns in (11a-b) then fully coincide with the patterns: \( ZS + ZS \) represents in a collective reading, \( ZS + FS \) as in (11c) represents a distributive reading.

(11)  

\[
\begin{align*}
\text{a} & \quad \text{alle mannen: } [\text{all}]_{ZS} + [\text{PL}_{ZS}, [\text{man}]_{FS}] \\
\text{b} & \quad \text{iedereen: } [\text{ieder}]_{ZS} + [\text{een}]_{ZS} \\
\text{c} & \quad \text{iedere man: } [\text{ieder}_{ZS}] + [\text{man}_{FS}] 
\end{align*}
\]

In the same way, the collective nature of *iedereen* ‘everyone’ (two elements in \( ZS \)) in opposition to the distributive *iedere man* ‘every man’ (11b) falls out quite naturally. In other words, so-called lexical quantificational elements behave fully parallel to the analytic constructions that we have studied. We may take this as evidence that 1. the analytic constructions are really quantificational and 2. that the syntax of the analytic and synthetic type of quantification is similar. It pleads for assigning a truly syntactic structure to the *man en muis* construction.

1.3. Other syntactic effects of ZS

1.3.1. Antecedent for ‘each other’. In the previous discussion, we used the words collective and distributive several times in an intuitive way. One of the ways to make them more precise is by considering the interaction of distributives/collectives and the reciprocal. Dutch *elkaar* can only take collective antecedents. Curiously, there is a correlation between the acceptability of the reciprocal anaphor *elkaar* ‘each other’ and the pattern of ZS within the antecedent. Consider the table in (12). We indicate in two columns the grammaticality of the anaphoric relation with a particular subject and the pattern of ZS in the particular constituent at hand. The table in (12) suggests that the licensing factor for the reciprocal is not the semantic plurality of the antecedent (cf. 12ab), nor is it the morphological plurality of the antecedent (cf. 12c-d). Instead, zero-semantics seems to rule the licensing of reciprocity: if both conjuncts of the underlying coordination within the subject are in zero-semantics, reciprocity is licit. If there is only one element in ZS, it cannot function as the antecedent for the reciprocal. That is to say, the factor that licenses reciprocity is a double ZS-pattern within the antecedent. The oppositions (12d-e) and (12f-g) are especially indicative. This is a confirmation of the earlier result of (6)/(8): the ZS pattern of a noun correlates with the semantic notion of collectivity/distributivity.
Moreover, if ZS rules the opposition distributive/collective, the plural semantics of the so-called ‘plural’ morpheme does not need stipulation. As indicated in (13), ‘plurals’ and ‘singulars’ have a different pattern of ZS.

(12) | Construction | Reciprocity | Interpretative Pattern |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>a</td>
<td>alle kinder-en hielpen elkaar</td>
<td>yes</td>
</tr>
<tr>
<td>b</td>
<td>*elk kind hielp elkaar</td>
<td>no</td>
</tr>
<tr>
<td>c</td>
<td>niemand vertrouwt elkaar in dit land</td>
<td>yes</td>
</tr>
<tr>
<td>d</td>
<td>*iedere pianist hielp elkaar</td>
<td>no</td>
</tr>
<tr>
<td>e</td>
<td>iedere-en hielp elkaar</td>
<td>yes</td>
</tr>
<tr>
<td>f</td>
<td>*geen hond (maar een kat) doodde elkaar</td>
<td>no</td>
</tr>
<tr>
<td>g</td>
<td>geen hónd vertrouwt elkaar in dit land</td>
<td>yes</td>
</tr>
</tbody>
</table>

Moreover, if ZS rules the opposition distributive/collective, the plural semantics of the so-called ‘plural’ morpheme does not need stipulation. As indicated in (13), ‘plurals’ and ‘singulars’ have a different pattern of ZS.

(13) | collective | distributive |
<table>
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<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[de]<em>{ZS} + [PL</em>{ZS} [ man_{FS} ]]</td>
<td>de_{ZS} + man_{FS}</td>
</tr>
</tbody>
</table>

De mannen ‘the men’ displays [ZS & ZS] and can therefore be the antecedent for the reciprocal; de man ‘the man’ displays [ZS & ZS] and cannot function as antecedent.

2. Discussion

Let us summarize the results achieved. We have seen that semantic assignment is dependent on the syntactic configuration, for instance plurality. Second, we saw that semantics can get lost. Instead, a quantificational reading arises. This quantificational meaning arises without the presence of a lexeme that can be held lexically responsible for it.

It must now be clear that the phenomena discussed deal with the interface of syntax and semantics. Let us see whether existing semantic theories can account for such effects.

2.1. A comparison with Montague grammar

The first formal outline of a modular theory of Grammar dealing with the syntax-semantics interface was drawn up by Montague (1973) and many others. They take as a starting point the hypothesis that the basic semantic insertion occurs at the terminal nodes of syntax. Higher-level nodes acquire a semantics in virtue of their being composed out of terminal nodes. The semantics of non-terminal nodes
is assigned by a ‘calculus of meaning’ based on the Composition Principle. The Composition Principle states that the semantics of a complex is a function of the semantics of its parts. The semantic composition function is supposed to be homomorphic with the syntactic function. Such a theory allows for a phrasing of the theory of grammar in terms of 1. a syntactic component, 2. the lexicon which provides the semantic insertion at the word-level, and 3. a semantic calculus which calculates the semantics of the higher levels, including the propositional level. Let us refer to the theory that terminal nodes are the exclusive source of meaning as the Zero-Level Assignment Hypothesis, as in (14).

(14) Zero-Level Assignment Hypothesis (ZLAH)
Lexical insertion coincides with primitive semantic insertion and occurs at the terminal syntactic level

As this theory captures all meaning in terms of the meaning of the terminal symbols, it excludes the existence of meaning that transcends the meaning assigned on the basis of the composition principle. Structure itself is not an independent source of meaning. As we have seen, bare coordinative structures give rise to a universal quantification, despite the fact that no word is present that can be held lexically responsible for it. At the same time, the lexical meaning of, for instance, *muis* in (1e) is not present at the propositional level. A theory based on (14) disallows that meaning ‘gets lost’.

Given the Zero-Level Assignment Hypothesis, these effects can be accommodated by assuming that such syntactically complex structures, like *man en muis*, act as if they were terminal nodes, i.e. the syntactic function is not visible to the semantic module in these cases. Instead of meaning ‘man and mouse’, the string means ‘everyone’. This approach correctly accounts for the idiosyncratic nature of such strings, i.e. of its ‘lexical’ or ‘frozen’ character.

However, we have seen that there is a remarkable formal similarity between, on the one hand, the construal of quantificational elements like *all* and *each* with plural or singular count nouns and, on the other hand, the structure of quantificational expressions like *man en muis* and *deur aan deur*.

A further disadvantage of the Zero-Level Assignment Hypothesis is that it does not provide any restrictions on what such ‘frozen strings’ or ‘listemes’ can mean. The very possibility of listemes with randomly complex semantics potentially undermines a restrictive theory of meaning. Moreover, and more importantly, this approach fails to provide an insight into the regularity of certain patterns in ‘lexicalized phrases’.

One might argue that the strings *man en muis* and *deur aan deur* are lexical because they violate the syntactic prohibition on bare singulars. However, it is disputable why lexicalized strings should not comply with all syntactic principles. As was argued by Halle & Marantz (1993), morphological complexes must observe all syntactic principles. Hale & Keyser (1992) have argued that structure
and type of verbs (which they assume are complex objects) are determined by syntactic principles. This means that syntactic principles have validity within the realm of complex, lexicalized objects. Most revealing in this respect is the defec-tivity/suppletion of the participle of the verb BE. As we argued in Postma (1993), the suppletive nature of BE is determined by syntactic principles (Principle B). Syntactic principles force the verb BE to be instantiated by different roots, e.g. Dutch \textit{zijn} and \textit{geweest}. These roots must of course be stated in the lexicon. Put differently, syntactic principles force the verb BE to be more lexicalized than other, regular verbs. We conclude that lexicalization of a construction does not free it from being subject to the principles of syntactic well-formedness — on the contrary.

If these considerations are on the right track, the bareness of the coordinative structures cannot be attributed to their lexicalization. The fact that no quantificational elements are necessary in these structures should be due to the fact that the lexemes \textit{man/muis} can be used quantificationally themselves, i.e. as quantificational elements, rather than as lexical elements.

We thus need a theory that determines when lexemes are used lexically and when quantificationally. In other words, in order to capture ZS with sufficient generalization, we need an interpretative theory that links lexical and quantificational semantics.

2.2. Interpretative theories of quantification

Let us first review some basic ideas of existing interpretative theories. As was argued by Kamp (1981) and Heim (1982), indefinites do not have a quantificational force of their own. Dependent on the context, indefinites get an interpretation under existential or a universal quantification.

\begin{align*}
\text{(15)} \\
\text{a} & \quad \text{(Always ) if a farmer owns a donkey he beats it} \\
\text{b} & \quad (\forall x,y) [(\text{farmer } x \& \text{ donkey } y \& x \text{ owns } y) \rightarrow x \text{ beats } y] \\
\text{c} & \quad \text{(Suddenly,) a donkey entered the room} \\
\text{d} & \quad \exists x [\text{donkey}(x) \land x \text{ entered the room}]
\end{align*}

From (15a) and its logical representation (15b), we see that the indefinite constituent \textit{a donkey} is interpreted under universal quantification ("bound by a universal quantifier"). In other contexts, like in (15c), the indefinite is interpreted existentially, as illustrated in the logical representation (15d). To account for this multi-purpose character of indefinites, Heim argues that indefinites are not inherently determined in their semantics, but receive an interpretation: they can receive an existential interpretation but they can also receive an arbitrary or a universal reading. To explain this, Heim does not take indefinites to be operators themselves, but open variables which may be bound by a universal operator heading the string or by an implicit existential operator.
Diesing (1992) identifies the syntactic environment in which the indefinite is interpreted under existential quantification. Based on data from Dutch, German and Turkish Diesing claims that VP is the domain of existential closure. This means that whenever an indefinite resides within VP, it receives an existential interpretation. If it moves out of this domain, the indefinite receives the specific indefinite/partitive reading. Syntax-driven interpretation was also reported with *wh-*words, e.g. Dutch *wat* ‘what’ in (16) (Postma 1994, Bennis 1995). *w*-words can not only give rise to an interrogative reading, but also to an indefinite reading.

(16) a Wat zag ik
What saw I
‘What did I see?’

b Ik zag wat
I saw what
‘I saw something’

In (16a), we have a *wh-*word that has moved to specCP. It acquires an interrogative interpretation. In (16b), on the other hand, the *wh-*word remains *in situ* without stress: it acquires the indefinite interpretation. In other words, the Dutch *wh-*word *wat* can mean both ‘what’ and ‘something’. *Wh-*words exhibit a multi-purpose behaviour in that they can be interpreted in various ways: as interrogatives, exclamatives and indefinites. This means that the ‘ambiguity’ of quantificational elements is not a property of indefinites only.

The two typical ingredients of these interpretative explanations are: 1. the shift of meaning is a consequence of Move $\alpha$ (e.g. quantifier raising, Diesing 1992:62-63) and 2. there are syntactic domains on which interpretation is defined. We will use these two ingredients to design an interpretative theory of zero-semantics.

3. Two Basic Hypotheses

3.1. First Hypothesis: Zero-semantics as a result of Move $\alpha$

Recall first the Saussurian idea that a linguistic ‘sign’ consists of a conceptual part, ‘signifié’, and a formal part, ‘signifiant’ (Saussure 1922:99). If a ‘signifiant’ is inserted in a syntactic structure, its ‘signifié’ or meaning is inserted as well. This is represented under (17a). It is this assumption that is challenged by zero-semantics. Syntax influences lexical assignment, and hence the assignment of the

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2 Strictly speaking, Diesing’s domain approach to interpretation allows for two ways of voiding Existential Closure. Coindexing the variable with a position outside the VP-domain (e.g. stative verbs) OR movement of a variable outside the VP-domain (partitive/existential alternation of quantifiers such as ‘two’).
meaning must be visible to the syntax. One way to capture this visibility is to assume that not only the signifiant but also the ‘signifié’ must be assigned to a syntactic position. So instead of (17a), let us assume the configuration in (17b), in which the ‘signifiant’ predicates over an abstract object that we call an ‘interpretable slot’, indicated as PRO, the ‘signifié’.

\[(17) \begin{array}{ll}
\text{a} & \text{Traditional Representation} \\
\text{b} & \text{Interpretative Representation of a Word}
\end{array}\]

If the interpretable slot PRO is in its canonical position for interpretation (specXP in (17b)), lexical meaning is assigned. However, since this PRO is the filler of a syntactic position, it can, in principle, move. If the interpretable slot moves out of the domain of ‘lexical closure’ to a domain of quantificational interpretation (DP), lexical meaning remains absent. If this happens, PRO must be interpreted in another way (Full Interpretation, Chomsky 1988). It will then be interpreted under quantification. If so, the transformation Move $\alpha$ can be taken as the mechanism responsible for a word’s lapsing into ZS. This hypothesis is given in (18).

\[(18) \begin{array}{c}
signifié \rightarrow PRO \\
\end{array}\]

Depending on the domain in which PRO lands, and what pattern it forms with other interpretable slots, the interpretative module will decide what quantification will arise. In this way, one may consider words in ZS as the variables for the quantificational module.

Notice that if zero-semantics is dependent on syntactic movement, it should be subject to all syntactic constraints on movement that have been formulated by syntactic theory.
3.2. Second Hypothesis: 'inherent' quantification is a morphosyntactic configuration

The configurational assignment of the Saussurian 'signifié' enables us to give a configurational account of universal quantification in general. We hypothesize that universal quantification is a result of a particular morphosyntactic pattern. We then require that the same configuration will turn out to be the source of universal quantification in syntactic structures, e.g. in donkey-sentences, in free-relatives with a universal reading, in some antecedent contained deletion contexts, etc. Moreover, precisely the same morphosyntactic pattern must be at stake in those cases where we encounter a seemingly 'inherent' or 'lexical' universal quantification.

(19) Second Hypothesis of the Interpretative Theory
Each type of quantification has its own underlying morphosyntactic pattern

This hypothesis states that lexical quantificational semantics does not exist. In the lexicon, lexemes can only have lexical meaning, i.e. meaning that is related to knowledge of the world. As far as formal semantics is concerned, lexemes have only morphosyntactic properties. The semantic impact of morphemes is determined by their morphosyntactic properties.

4. Arguments for Movement

The first hypothesis of the interpretative theory given in (18) captures ZS as movement of the interpretable slot outside the domain of lexical closure. In this way, we are able to describe ZS as a synchronic, syntactic phenomenon. Moreover, the complementarity of lexical semantics and quantificational semantics gets a natural explanation. We will now provide further evidence that movement is involved.

4.1. Opacity induced by the plural morpheme

In the discussion of (3), we concluded that plural nouns cannot lapse into zero-semantics. An additional example of this effect is given under (20).

(20) a Er wilde geen hond naast mij zitten
There wanted no dog next me sit
‘Nobody wanted to sit next to me’
\(\text{\textasciitilde}\text{Zero-semantics/\textasciitilde}\text{Full semantics}\)

b Er wilden geen honden naast mij zitten
There wanted no dogs next me sit
\(\text{\textasciitilde}\text{Zero-semantics/\textasciitilde}\text{Full semantics}\)
We explained this that the plural morpheme lapses into ZS instead on the noun. This explanation presupposes that a noun cannot lapse into ZS if it is embedded under another morpheme. This can be explained by the movement analysis by taking the plural morpheme as an opacity-inducing factor for movement of the interpretable slot in *hond*.

4.2. Nonmodification by adjectives

Similarly, nouns that are adjectivally modified cannot lapse into ZS, as exemplified in (21).

(21) *met oude man en muis *met man en oude muis

This cannot be attributed to the lexicalized character of these constructions. In the first place, a lexical account would not explain why there are no adjectivally modified bare coordinates in the lexicon. Secondly, and more importantly why a similar restriction holds for the productive prepositional construction in (22).

(22) a *Ik vroeg het groene deur aan groene deur
   ‘I asked it green door to green door
   b *Zij liepen warme hand in warme hand
   They walked warm hand in warm hand

The non-modifiability must have a syntactic reason. In (23a), we have a special disjunctive construction in which *man* is in zero-semantics. It is in ZS as it is interpreted under its feature [+human] only, without the lexical meaning [male]. These constructions are not modifiable by an adjective either, as indicated in (23b). A parallel phenomenon in English is given in (24). I owe the latter observation to Samir Khalaily.

(23) a Het gezelschap stond met een [man of acht] bij me op de stoep
   The group stood with a [(old) man or acht] in front of my door
   b *Het gezelschap stond met een [oude man of acht] bij me op de stoep
      A group consisting of some eight (old) people was in front of my door
(24) a Man is mortal
   b *Rich man is distinguishable

Under a movement analysis of ZS, we can explain this, by considering the adjective as an opacity factor for moving the interpretable slot out of the noun.
4.3. Coordination Constraint

A third argument for explaining zero-semantics in terms of movement is that the pattern of ZS is in concordance with the coordination constraint. Extraction out of a coordination must be parallel, both in number of extractions and in location of extraction, as exemplified in (25).

(25) a *Who did you see [ec] and [ec] kissed Mary
b Who [ec] did what and [ec] kissed Mary
c *Who did you see and I kissed Mary

As we saw, the conjunctive coordination construction can make both members lapse into ZS, whereas one of the members can remain in FS in the prepositional construction. Under the movement analysis of ZS, the double ZS in bare coordinates is explained on a par with (25).

4.4. The trigger for movement

Let us finally discuss the trigger for movement. We will first give the structures of the constructions: the collective man-en-muis and the distributive deur aan deur, respectively.

Assuming an asymmetric configuration of coordination (e.g. Ross 1967:90, Sag et al. 1985; Gazdar et al. 1985, Munn 1992:18, and, from a theoretical perspective, Kayne 1994), we obtain the following syntactic representation (26) without the DP super-structure.

(26) Representation of *man en muis "man and mouse" 'everyone'

DP
   └── D'
       └── D⁰ &P

       | └── NP &'
           |   │ ├── PROₙ man_ZS &⁰ NP
           |   │ └── PROₙ muis_ZS

(27) Representation of *alle huizen < huizen en al, 'all houses'

DP
   └── D'
       └── D⁰ &P

       | └── NumP &'
           |   │ ├── PROₙ Num &⁰ NumP
           |   │ └── PRO₁ huiz-PS
The interpretable slots in *man* and *muis* are interpreted in ordinary cases by the lexicon (i.e. by lexical closure at NP). However, such bare coordinates in full semantics cannot be grammatical arguments, as they are without quantification. So at least one interpretable slots must move out of the domain of lexical closure.\(^3\) Since the structure is coordinative, also the slot in the other branch must move in order to comply with the coordination constraint. Hence the structure has both coordinates in ZS. As we know, such coordinative constructions give rise to collective universal quantification. A similar underlying construction can be assumed for the synthetic construction *alle mannen*. This construction also contains two elements in ZS.

Bare singular constructions of the prepositional type, on the other hand, will allow for *PRO*-extraction from one of the nouns. As a result, one *PRO* can remain within the domain of lexical closure. The construction attributes a lexical meaning to the propositional level. Distributive universal quantification elements selects a singular noun, e.g. *elke man* 'each man'. The reason that this type of quantification does not need plural formation is straightforward under the assumption that of the distributive structure underlies it, as in (29).

\(\text{(28) Representation of *hand in hand* (distributive quantification)}\)

\[
\begin{array}{c}
\text{DP} \\
\text{D'} \\
\text{D^0 PP} \\
\text{NP} \\
\text{P'} \\
\text{PRO_k hand_{ZS}} \\
\end{array}
\]

\(\text{(29) Representation *elke man* 'each man' (distributive universal quant.)}\)

\[
\begin{array}{c}
\text{DP} \\
\text{D'} \\
\text{D^0 PP} \\
\text{NP} \\
\text{P'} \\
\text{PRO_k man_{FS}} \\
\text{p^0 NP} \\
\text{PRO_k elk_{ZS}} \\
\end{array}
\]

This formulation violates Greed. Constructions must be well-formed with respect to morphosyntax, phonology and semantics. To the extent that these requirements are independent, an interface requirement may violate Greed, as Greed is a syntax-internal condition. The construction tends to comply with Greed though. If we take the shared initial/final rhyme in the dvandva-construction as a phonological reflex that the two PRO's within the nouns share an a-index, as indicated in (26), we may consider the lexicalization as a way to make movement compelled by Greed, as two positions can only have a formal relation if one c-commands the other.
If we take \textit{elke man} as a morphologized form of the analytic construction, the singular noun in \textit{elke man} would be explained immediately: as the \textit{hand in hand} construction shows, one member remains in FS, and hence no plural morphology is needed in \textit{elke man} to prevent the noun \textit{man} from lapsing into zero-semantics. The similarity between the analytic ‘hand-in-hand’ strategy (14) and the synthetic \textit{each} strategy, as well as between the analytic \textit{man-en-muis construction} and the synthetic \textit{all} construction is then complete.

In other words, we assume that a predicate’s acquisition of extension as well as intension, proceeds by the mediation of a syntactic slot, either specDP (extensional meaning) or its own specifier (intensional meaning). The mechanism is entirely parallel: an interpretable slot is used. Depending on what domain it resides in, it will be used lexically or quantificationally.

5. \textit{Implications for the design of Grammar}

How can we implement the result of a complementary distribution of lexical and quantificational interpretation? One way to see this is taking both lexical meaning and quantification to be a result of one interpretative strategy. We then can model our theory of grammar in the following way, as shown in (30).

(30) \emph{Model of the C-I interface of Grammar}

The language faculty consists of two modules, a structure building morphosyntactic component and an interpreting component. The interpreting component consists of two sub-modules, a quantificational sub-module and a lexical sub-module. These sub-modules are parallel, i.e. if a sub-string $S$ enters one module for interpretation, it does not enter the other. The lexical module interprets strings ‘lexically’, i.e. it assigns a meaning to it governed by knowledge of the world (\textit{a posteriori} module). The quantificational module interprets strings quantificationally, i.e. it assigns a formal semantics that is not governed by knowledge of the world (\textit{a priori} module).
6. The proposal

We thus propose and define an interpretative theory of grammar: a grammar in which primitive semantic insertion is not linked to lexical insertion. Apart from the zero-level, complex trees can be interpreted in a primitive way, provided that they fulfil specific requirements on interpretability. Zero-level interpretation is lexical interpretation. Higher-level interpretation is quantificational interpretation. The quantificational value is tied to particular syntactic patterns rather than to the nature of the terminal strings lexicalizing the pattern.

References

Saussure, F. de (1916). Cours de Linguistique Générale, Lausanne.