THE LINKING ELEMENT AND SWEDISH COMPLEX NOMINAL COMPOUNDS

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ABSTRACT

JEFFREY KLINE GILBERT: The Linking Element and Swedish Complex Nominal
Compounds
(Under the direction of Randall Hendrick and Katya Pertsova)

This thesis investigates the linking element that sometimes appears in Swedish

compounds made up of three noun stems, also called complex nominal compounds. I

present a comprehensive analysis of Swedish compounding and the nature of the linking

element, and then argue that the appearance of the linking element, typically –s–, in

complex nominal compounds is predictable. This thesis proposes that the linking element

is a marker of a particular syntactic structure, and thereby a particular linear ordering of

the nouns inside a complex compound. Two previous syntactic proposals (Josefsson,

1998; Mukai, 2008) for the linking element and Swedish complex compounds are

discussed, and I argue that these proposals are partly problematic due to their application

of Kayne's (1994) antisymmetry theory of syntax. I discuss Kayne's antisymmetry

theory, with its restrictions to asymmetric c-command, and offer a solution to the

problem found in the previous proposals. I contend that antisymmetry theory can account

for both the subword structure and linearization of Swedish complex nominal compounds

with and without the linking element.

To my parents for their unconditional support of all my interests,
which helped develop my love of language.

TABLE OF CONTENTS

I. INTRODUCTION

In Swedish, there is a type of compounding that involves the combination of three noun stems to form one nominal compound. The product of this compounding is called a "complex" compound since it contains more than two elements. An example of this is *student.film.klubb* in Swedish, and 'student film club' in English. When combining three elements in a compound there are two possible groupings of the elements that lead to two possible readings. Consider the examples below.

(1)   *student.film.klubb*   *student.film.s.klubb*
          student film klubb   student film LINK club
          'film club for students'   'club for student film'

In the glosses for the two compounds above, we see that the two readings are a 'club for student film' and a 'film club for students'. While both of these readings can be represented by the compound 'student film club' in English, note that Swedish has two distinct compounds. The source of the difference between the two Swedish compounds is the element that I have labeled LINK, which is a linking element. This linking element appears predictably in the compounding environment where the left element in a complex compound is itself a compound: [[XX]s[X]], as opposed to [[X][XX]]. There is some discussion, though not much, of this linking element in Swedish complex compounds and its characteristics in the literature, and previous analyses have been problematic in the application of the theories they are based on.

The goal of this thesis is to first offer a comprehensive analysis of what this linking element is, where it appears, and the effect its appearance (and absence) has on Swedish speakers' interpretation of complex nominal compounds. Next, I survey two previous

proposals for the use of the linking element and the internal structure of Swedish complex nominal compounds, Josefsson (1998) and Mukai (2008). These plausible analyses are partly problematic due to their application of Kayne's (1994) antisymmetry theory of syntax, and I discuss antisymmetry theory and present the problems caused by it in the two earlier proposals. In the end, I argue that Kayne's antisymmetry is able to account for the structures of Swedish complex compounds with and without the linking element. I propose a new structure for Swedish complex compounds lacking the linking element that is licit in Kayne's antisymmetry, and which replaces the problematic structures seen in the two previous proposals.

II. SWEDISH COMPOUNDING AND LINKING ELEMENTS

1. Introduction to Swedish compounding

        Compounding in Swedish, as in the other members of the Germanic languages, is highly productive. Nominal compounds, or noun-noun compounds, are common in Swedish and are formed by the concatenation of two or more roots. A root is taken to mean a word in its smallest significant form that does not contain any inflectional markings. An example of a simple nominal compound in Swedish can be seen in (1) below.

(1)   *kaffe* 'coffee'   *vatten* 'water'   *hund* 'dog'
          kopp 'cup'   *flaska* 'bottle'   *mat* 'food'
          kaffe.kopp 'coffee cup'[1] *vatten.flaska* 'water bottle' *hund.mat* 'dog food'

Compounds in Swedish can be determined by their compound prosody which is different from the prosody of simple words and phrases.

(2)   *káffe* 'coffee'
          kópp 'cup'
          káffe.kopp 'coffee cup'

          sjúk 'sick'
          gymnást 'gymnast'
          sjúk.gymnast 'physical therapist'
          sjúk gymnást 'sick gymnast, gymnast who is sick'

          Jag ser en kópp, gymnást, och dátor.
          'I see a cup, gymnast, and computer.'

This difference in word stress is important when determining what constitutes a compound in spoken Swedish since this thesis is concerned only with compounds and not

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[1]Compounds of this type in Swedish are written as one word. I will use a " . " to mark morpheme boundaries. This marker is not found in the written Swedish language (cf. *kaffekopp*).

strings of simple nouns or phrases. In the written language, compounds are typically written as one word, and even though this is an orthographic convention it is helpful in determining compounds since any string containing more than one root that is written together will be a compound. Orthographic conventions aside, a test is needed to determine if a set of nouns will be realized as a set of simple nouns, or as one compound noun. The linguistically-relevant test for Swedish compounding is the stress test mentioned above.[2] Swedish grammar allows for the concatenation of more than two roots in the formation of one compound, which yields what will be called a complex compound. A complex nominal compound is then a compound noun that contains a compound noun and a simple noun.

(3)   *kommitté* 'committee'
          film.kommitté 'film committee'
          student.film.kommitté 'student film committee'

The recursiveness of Swedish compounding is capable of yielding much longer and more complex nominal compounds:

flagg.stång.s.knopp.s.putsare.s.medhjälpare.n
flag pole LINK knob LINK polisher LINK assistant the
'the assistant to polisher of the knob at the top of a flag pole'

In this thesis, however, I will focus only on the three-part complex nominal compounds of Swedish (such as that seen in (3) above).

The compound noun can serve as the head or non-head of a complex compound. The term "head" refers to the stem in the compound that determines the semantic category of the entire compound (Williams, 1981). Since we are discussing nominal compounds, the semantic category will always be "noun". A head also determines the primary semantic meaning of a word, and is the place where nominal inflection occurs. In (3) above, 'student film committee' is a noun (as opposed to an adjective, verb, etc.) and

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[2] A stress test is also used to differentiate compounds from strings of simple nouns in English. For example, "bláckboard" is a compound noun, while "bláck bóard" is an adjective and a noun.

is dealing with some type of 'film committee'. The compound 'film committee' is the head of the complex compound in (3), making 'student' the non-head.

A compound noun can also serve as the non-head of a complex compound.

(4) *kaffekopp* 'coffee cup'
hållare 'holder'
kaffe.kopp.s.hållare 'coffee cup holder'[3]

Here, a 'coffee cup holder' is a type of 'holder', and not a type of 'coffee cup'. The entire complex compound is a noun and is dealing with some type of 'holder', both of which are determined by the head 'holder'. This means that the compound 'coffee cup' is the non-head of the complex compound in (4).

Swedish compounds are said to be right-headed, something that is also stipulated about compounds in the other Germanic languages (Williams, 1981:248). Headedness in Swedish compounds can be determined by examining the properties discussed above (semantic meaning, word category), and it is also possible to test the headedness by looking at the morphological nominal inflection that compounds can have (e.g. number, definiteness, genitive). This inflection always appears on the right-most element of a nominal compound, and the morphemes added always agree with the gender and the declension of the right-most noun, the head.

(5) *barn.bok.klubb*
child book club(common gender, 2nd declension)
'children's book club'

barn.bok.klubb.en
child book club the(common)
'the children's book club'

barn.bok.klubb.ar
child book club PLURAL(2nd decl.)
'children's book clubs'

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[3] The addition of the "s" in this complex compound is a phenomenon that will be central in this thesis.

Also, nominal inflection cannot occur compound-internally, and the compound-final inflection does not agree with any other noun in the compound other than the final noun.

(6) No compound-internal inflection   Inflection agrees with right-most N
     hund.mat   *vatten.flaska*
     dog(common) food(common)   water(neuter) bottle(common)
     'dog food'   'water bottle'

     hund.mat.en   *vatten.flaska.n*
     dog food the(common)   water bottle the(common)
     'the dog food'   'the water bottle'

     **hund.en.mat*   **vatten.flaska.t*
     dog the(common) food   water bottle the(neuter)
     'the dog food'   'the water bottle'

The two sets of Swedish examples in (6) illustrate that nominal inflection cannot occur on a noun located inside a compound, and that it must agree with the right-most noun. Since heads are the stems capable of receiving nominal inflection, and since the nominal inflection agrees with the head, the distribution of nominal inflection seen in (6) serves to further establish that Swedish compounds are right-headed.

2. The linking element

2.1 What is the linking element?

In Swedish, some simple and complex nominal compounds contain a linking element, which is usually –*s*. The linking element sometimes presents itself as a deleted vowel, which will be discussed later. The insertion of the –*s* as a linking element is interesting because it has the same surface form as the possessive clitic in modern Swedish. Compare the following examples from Swedish:

(7a) *Gustav.s bok*   (7b) *stad.s.bibliotek*   (7c) *kaffe.kopp.s.hållare*
      Gustav POSS book   city LINK library   coffee cup LINK holder
      'Gustav's book'   'city library'   'coffee cup holder'

Though the two instances of –*s* in (7a) and (7b) are identical in their phonetic and orthographic realizations, the linking element does not behave in the same way as the

cliticized possessive marker. The use of the possessive clitic always adds a possessive relation to the phrase it appears in, as seen in the example 'Gustav's book'. The linking element does not introduce a possessive relation to the compounds into which it is inserted. Evidence for this can be seen in the fact that the left-hand element in a compound (e.g. 7b) is never referential, unlike a possessive phrase (e.g. 7a) where both elements are referential (Josefsson, 1998:59). Josefsson notes that the intonation pattern of a compound containing a linking element is "quite different" from that of a possessive phrase (1998:60), which further illustrates the difference between the two. Josefsson (1998:61) points out that the *–s* linking element "occupies the same position as ordinary nominal inflection," and accordingly, the linking element cannot be added to verbs in compounds since verbs are not nominal.

(8) *varm.luft.s.ugn*   **snabb.teckna.s.kamera*
     warm air LINK oven   fast draw LINK camera
     'oven'   'snapshot camera'

It is plausible to think that the linking elements in the examples 'city library' and 'coffee cup holder' in (7) give some sense of possession to the compounds because it is the 'library of the city' and the 'holder of the coffee cup', respectively. This sense of possession is sometimes intuitive in compounds, which could explain why the linking element resembles the possessive marker. The phonetic and orthographic similarities between the linking element and the possessive clitic are not coincidental. Earlier in the history of the Swedish language, genitive inflection inside compounds may have been licit or even required. Earlier in Swedish, there was more than one possessive inflectional marker, one of which was the *–s*, and all the linking elements used in Swedish were "homophonous to the possessive marker(s)" (Josefsson, 1998:59). Some of the now-obsolete genitive markers are still used with particular stems in modern Swedish, but these markers are no longer used productively, meaning they have lost their semantic

possessiveness and now function only as linking elements. These obsolete markers are only used with particular noun stems that are considered to be "old words" or "weak stems" (Josefsson, 1998:64-5).

(9) *kyrka* 'church'   *gata* 'street'
    gård 'yard'   *belysning* 'lighting'
    kyrko.gård 'cemetery'   *gatu.belysning* 'street lighting'
                                LED-gatu.belysning 'LED street lighting'

These obsolete genitive markers are used as obsolete linking elements in simple and complex compounds in the same way *–s* is used in simple compounds. Josefsson (1998:65) suggests that "what seems to have happened is that the combinations stem + linking element have survived, even after *–o* and *–u* have ceased to function as markers of possessive."

2.1.1 The two –s linking elements

At this point it is important that I make a distinction between two separate linking elements, both of which are *–s*. Some simple compounds contain a linking *–s* that looks the same as the linking *–s* in complex compounds, but the two do not behave the same. The linking element in simple compounds is now obsolete just like the vowel linking elements seen in (9), and its appearance in a simple compound is idiosyncratic and is triggered by particular stems.

(10) *liv.s.stil*   *choklad.mjölk.s.flaska*
     life LINK style   chocolate milk LINK bottle
     'lifestyle'   'chocolate milk bottle'

The linking element *–s* appears in the compound 'lifestyle' because the stem *liv* 'life' typically appears with the linking element in simple compounds. This *–s* is an obsolete linking element (Josefsson, 1998:64), and evidence that it is "closely attached to the element immediately to [its] left" lies in the phonetic change triggered by the obsolete linking *–s*. The obsolete linking *–s* in simple compounds causes a shortening of the

preceding vowel (Josefsson, 1998:65). This is not true of the linking –*s* seen in complex

nominal compounds, such as 'chocolate milk bottle' in (10), which is productive and

plays an active role in determining the meaning and structure of complex compounds,

which will be discussed later. Example (11), adapted from Josefsson (1998:65) illustrates

the phonetic difference between the two linking elements –*s*.

(11) *kök*   [ʃø:k]
        'kitchen'

  kök.s.dörr   [ʃøks.dœr:]
        'kitchen door'

  lant.kök.s.modell   [lɛnt.ʃø:ks.mɔdɛl]
        'country kitchen model'

2.1.2 An allomorph of the –s linking element

  The linking -*s* has an allomorph form that occurs in specific phonetic environments.

In these environments, there is final-vowel deletion on a stem, both in the phonetic

realization and in the spelling. This final-vowel deletion is represented here by (ø).

(12) *tand* 'tooth'
        borste 'brush'
        hållare 'holder'
        tand.borst(ø).*hållare* 'toothbrush holder'

This final-vowel deletion is interesting for three reasons: it occurs in the same

constructions that require the addition of the linking –*s*, it occurs in the same position on

nouns where the linking –*s* is added, and it typically bans the addition of the linking –*s*.

  I say that this process of final-vowel deletion *typically* bans the addition of the

linking –*s* because this is the general rule in Swedish, but there are some speakers who

still insert the linking –*s* after they have deleted the final vowel of the preceding stem. See

(13) below for the outcomes when a stem with a phonetically-realized final vowel is the

non-head of a complex compound.

(13) *vatten* 'water'　　　　　*vatten.flask(ø).hållare* 'water bottle holder'
　　　flaska 'bottle'　　　　　*vatten.flask(ø).s.hållare* 'water bottle holder'
　　　hållare 'holder'
　　　vatten.flaska 'water bottle'

　　　tand 'tooth'　　　　　　*tand.borst(ø).hållare* 'toothbrush holder'
　　　borste 'brush'　　　　　*tand.borst(ø).s.hållare* 'toothbrush holder'
　　　hållare 'holder'
　　　tand.borste 'toothbrush'

The compounds in the right column above show the possible formations of complex

nominal compounds when the non-head is a compound with a final vowel. In the two

examples for both 'water bottle holder' and 'toothbrush holder', the final-vowel has been

deleted. For most speakers, this deletion takes the place of the linking element insertion.

For others, this deletion does not ban the addition of the linking element. The general rule

is that the vowel deletion should be banned, meaning this should be the most frequent

form. This frequency can be seen when performing a Google Sweden[4] search for the four

possible compounds. *vatten.flask(ø).hållare* has 2,390 results, while

vatten.flask(ø).s.hållare has 85 results. *tand.borst(ø).hållare* has 112,000 results, while

tand.borst(ø).s.hållare has 153 results.[5] The compounds where there is only vowel

deletion are the most frequent, while those containing both vowel deletion and –*s*

insertion are rarer. When both processes are applied to this type of compounding it is

possible that speakers are over-regularizing the rule that inserts –*s*, but it is more likely

that the results reflect errors by native speakers or the writing of non-native speakers.

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[4] Using Google as a corpus for gathering morphological frequency has been used in other linguistics projects. See Sims, 2006.

[5] These Google Sweden results were gathered on March 6, 2012, by typing each compound into the search box at http://www.google.se. (E.g. vattenflaskhållare) Interestingly, when I searched for the compounds where there is both vowel deletion and –*s* insertion, which is considered non-standard, Google asked if I meant the corresponding compound where there is only vowel deletion, which is considered standard. This may possibly be due to the frequency of the words searched, or due to morphemic rules programmed into Google's program.

I speculate that the vowel deletion during compounding is a realization of the same process that adds the linking –s, as evidenced by its ability to ban the overt linking element –s from being inserted. Josefsson (1998:60) notes: "it is a general rule in Swedish that a linking element is present in a compound when the lefthand segment of the compound is itself a compound…except in a few, fairly well defined phonetic environments." The specific phonetic environment is as follows: if the right-most stem in a compound serving as the non-head of a complex compound ends in a phonetically-realized vowel, this vowel will be deleted and this deletion takes the place of the overt –s linking element.[6] Josefsson does not further describe this phenomenon in her 1998 work on Swedish morphology, so it is my proposal that the final-vowel deletion and the linking –s addition are allomorphs of the same process. This is significant as it reinforces the claim that the linking –s does not behave in the same way as the possessive –s. The –s/vowel deletion allomorphy will serve as further evidence for a later claim I will make, that the linking element in Swedish compounds is not simply a morphological or semantic process.

2.1.3 Summary

I have so far distinguished three instances of –s in modern Swedish: the possessive clitic, an obsolete linking element in simple compounds, and the productive linking element in complex compounds. It is the latter that is of interest and that which I will focus on. The appearance of the linking –s in complex compounds is not idiosyncratic, nor is it required to show possession since complex compounds are not possessive phrases in Swedish. The linking element in complex compounds is an active linking

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[6] The same vowel deletion that takes the place of the linking element is seen in simple compounds when the left-most stem ends in a vowel.

element that seems to be required by Swedish grammar in particular circumstances. The status of this linking element and whether it is syntactic, semantic, or both will be discussed later.

2.2 Where does the linking element occur?

The appearance of the linking element in complex nominal compounds in Swedish is predictable. If a complex compound has a compound as its non-head, that is the left-most noun, and a simple noun as its head, that is the right-most noun, the linking element will occur between the compound and the head.

(14) *barn.bok.s.klubb*[7]   *mormon.student.s.förening*
      child book LINK club   mormon student LINK society
      'club for children's books'   'society for mormon students'

In these complex compounds, the compound "children's book" specifies what type of "club" is being discussed, just as "mormon student" specifies what type of "society" is being discussed. We know that, according to our headedness criteria discussed previously, that "club" is the head of the first complex compound and "society" is the head of the second. We can apply the headedness test of nominal inflection agreement as seen in (15) below to confirm the headedness claims.

(15) *barn.bok.s.klubb.en*
      child book LINK club(common) the(common)
      'the club for children's books'
      barn.bok.s.klubb.ar
      child book LINK club(2nd decl.) PLURAL(2nd decl.)
      'clubs for children's books'

      mormon.students.s.förening.en
      mormon student LINK society(common) the(common)
      'the society for mormon students'
      mormon.student.s.förening.ar
      mormon student LINK society(2nd decl.) PLURAL(2nd decl.)
      'the societies for mormon students'

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[7] From Josefsson, 1998.

This test confirms that the right-most noun is the head of each complex compound. The right-most noun is also the head of the complex compounds seen in (16) below, which present the other possible reading for each complex compound in (14).

(16) *barn.bok.klubb*[8]   *mormon.student.förening*
      child book club   mormon student society
      'book club for children'   'student society for mormons'

Compounds of the type in (16) will never contain a linking element in Swedish. Inversely, compounds of the type in (14) will typically contain a linking element[9]. If we were to insert linking elements into the complex compounds in (16) between the non-head and the head, the compounds would become ungrammatical.

(17) *barn.bok.klubb*   →   **barn.s.bok.klubb*
      child book club   child LINK book club
      'book club for children'   *'book club for children'

      mormon.student.förening   →   **mormon.s.student.förening*
      mormon student society   mormon LINK student society
      'student society for mormons'   *'student society for mormons'

The linking element –*s* can occur in more complex compounds (e.g. [compound LINK compound], [compound LINK noun LINK noun]), but compounds like that in (14) are productive in Swedish, and this is the environment where this linking element is seen most frequently.

2.3 What does the linking element do?

      The distribution of the linking element –*s* can change the semantic interpretation of the three-part compound in which it occurs. This can be seen in the two pairs of examples below.

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[8] From Josefsson, 1998.

[9] I say "typically" because some native speakers may omit the linking element in these compounds. However, pilot data shows that if the linking element is left out of a compound with this structure then the meaning of the compound becomes unclear. Speakers in a pilot study tended to clarify the meaning by means of paraphrasis.

(18)   *barn.bok.klubb*   *barn.bok.s.klubb.*
       child book club   child book LINK club
       'book club for children' 'club for children's books'

       student.film.kommitté   *student.film.s.kommitté*
       student film committee   student film LINK committee
       'film committee for students' 'committee for student film'

I propose that the semantic interpretation changes because the appearance of the linking –*s* overtly marks a compound as having a particular structure, and compounds with different structures of course have different meanings. This linking element is thus a useful cue for resolving any structural ambiguity.

(19a) *Barn.bok.klubb.en har vuxna medlemmar.*
      The <u>book club for children</u> has adult members.

(19b) *Barn.bok.s.klubb.en har vuxna medlemmar.*
      The <u>club for children's books</u> has adult members.

(19c) *Lastbilschaufförer tillhör en student.film.kommitté.*
      Truck drivers belong to a <u>film committee for students</u>.

(19d) *Lastbilschaufförer tillhör en student.film.s.kommitté.*
      Truck drivers belong to a <u>committee for student film</u>.

As seen in the examples in (19), compounds with different structure have different meanings. The sentences in (19a) and (19c) sound questionable in Swedish and English because of the relations of the words in the complex nominal compounds. In (19a), the members of a 'book club for children' are expected to be children, not adults. If a book club contains members who are both adults and children, then this club would not be specified as a book club *for* children. Similarly, in (19c), a 'film committee for students' is not expected to have members who are students, not truck drivers (or any other profession). If a film committee contains members who are both students and truck drivers, then this film committee would not be specified as a film committee *for* students. The sentences in (19b) and (19d) sound good because the presence of the linking element inside the complex nominal compounds signals a different structure, one whose meaning

is more compatible with the rest of the sentence. The sentences in (19b) and (19d) propose plausible things: a 'club for children's books' and a 'committee for student film' are not specified for any particular kind of member. The meaning of a compound is of course tied to its internal structure, but it is noteworthy here that the linking element is a signal of a difference in structure.

It is clear that the linking –*s* plays a role in distinguishing the two readings of a complex compound for Swedish speakers. In contrast, in English the meaning of compounds must be determined either through stress placement or circumlocution (cf. "student film committee" → "committee for student film"; "student film committee" → "film committee for students"). It is worth noting at this point that the linking –*s* is not used solely for the purpose of resolving semantic ambiguity, as it occurs in three-part compounds where there is no plausible semantic ambiguity, as in (20).

(20)　*hund.leksak.s.makare*
　　　 dog toy LINK maker
　　　 'dog toy maker, maker of dog toys'

The linking –*s* should instead be thought of as a marker of a particular compound structure. While I propose that the linking element is a marker of compound-internal syntactic structure, it is unclear at this point whether the linking element is a semantic marker on its own–that is, a semantic marker irrespective of compound structure. The evidence that leads me to posit that the linking element is strictly a syntactic marker is the inability to associate the linking element with a particular semantic reading or relation. When studying the glosses of the complex compounds with the linking element presented herein, there is not one evident overarching semantic relationship: e.g. 'toothbrush holder' is a holder *for/of* a toothbrush; 'children's book club' is a club *for* children's books; 'student film committee' is a committee *for/on* student film. The *for*'s in these glosses appear to have different semantic relations with their nouns in the compounds

(e.g. equative *for*, prospective *for*, etc.). For instance, a holder for a toothbrush has a different sense of *for* than a club for children's books. At this point, I want to note that though I have been unable to associate the linking element with a particular semantic relation, it is still possible that the linking element could be a semantic marker as well. The inability to determine a purely semantic function of the linking element inside complex compounds is likely due to the scope of this project and the number of examples of Swedish compounds I was able to illicit. There is the possibility that a future project, perhaps with a larger data corpus, will be able to determine the semantic function of the linking element.

2.4 Question presented by the linking element

The Swedish linking element in complex compounds presents us with one key question: why is the distribution of the linking element restricted to compounds with a particular structure? Though the linking element may not always be needed to resolve semantic ambiguity, it always occurs in a predictable environment–at the point where a compound non-head is joined with a noun to form a complex nominal compound. This distribution leads us to believe that the linking element is used by Swedish grammar for a structural reason. I propose the linking element is used as a marker of a particular internal structure of complex compounds, which allows Swedish speakers to correctly interpret the relation of the nouns in a complex compound. The linking element can in this way be thought of as a linguistic cue that resolves potential structural ambiguity. It has been previously proposed (Josefsson, 1998; Mukai, 2008) that the linking element in complex nominal compounds is required for reasons of syntax, that is, the structuring of the compounds. Reasons for such a syntactic proposal vary from the use of the linking element to show which words modify which words in complex compounds, to its

requirement for reasons of "asymmetry" (Josefsson, 1998:60). It has also been suggested

that the linking element indicates a left-branching structure of compounds in order to

differentiate them from right-branching compounds, something that "corresponds to a

meaning difference" (Mukai, 2008:187). These proposals will be discussed in more depth

in the following chapter when I examine previous proposals on the Swedish linking

element in complex nominal compounds.

III. PREVIOUS PROPOSALS

In this chapter, I will discuss previous proposals for the linking element in Swedish complex nominal compounds. Section 1 surveys the analysis of Josefsson (1998), a primary contemporary source on Swedish morphology. Section 2 presents Kayne's (1994) antisymmetry theory of syntactic structure that Josefsson's account presupposes. Section 3 shows that part of Josefsson's analysis is incompatible with Kayne (1994). Section 4 examines a more recent proposal for Swedish compounds advocated by Mukai (2008). This account is partially based on Josefsson's account of the Swedish linking element and is also incompatible with Kayne (1994). Section 5 provides a direct comparison of Josefsson's and Mukai's accounts of Swedish complex nominal compounds.
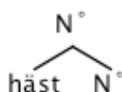
1. Josefsson (1998)

1.1 Word formation and the Minimalist Program

There is some, though not much, discussion of the Swedish complex compound

linking element in the linguistics literature. A primary contemporary source on Swedish

word formation is the Swedish linguist Gunlög Josefsson's 1998 work on word formation

in Swedish. Josefsson adopts the minimalist program in her discussion of Swedish. The

minimalist program (here forth MP) (Chomsky, 1995) is a conceptualization of the

human language faculty within the theory of generative grammar that avoids positing any

levels of representation other than the interface between syntax and the phonological

component or semantic component. Deep structure as the level of lexical insertion, for

example, is specifically denied. The MP discusses syntax and phrase structure, among

other things, and it is this portion of the program that is relevant for Josefsson's

discussion of Swedish word formation. One key point of the MP is that relations among

elements are "made explicit by linking the various elements up in a phrase structure (by

the operation MERGE)" (Zwart, 1998:215). The relations among these elements are both

thematic (theta roles) and syntactic (case assignment, agreement) (ibid.).

Josefsson argues that stems lack word class features, which has also been proposed by Chomsky (1970) and Hopper & Thompson (1984). Instead, it is the inflection on stems that carries word class features (Josefsson, 1998:24, 31). Since the noun stems that are used to build compounds in Swedish lack word class features, Josefsson proposes that "the nominal inflection is the only source of nounhood for the word," and that stems are inserted directly into the structure of compounds, which she represents as a tree structure (1998:31). Trees are typically used in discussions of syntax and Josefsson, along with many others, assume that compounds have an internal, hierarchical structure. The reason for positing hierarchical structure for compounds is the same as the reason for positing hierarchical structure of sentences: the way the elements combine and relate to one another within a structure determines the meaning of that structure. This motivates the use of tree structures since they are capable of representing the internal relations crucial to a particular meaning.

The trees of compound nouns, Josefsson argues, are built up "according to the same principles as the familiar (phrase) structure trees, primarily by the generalized transformation" (1998:32) proposed in Chomsky (1993). Merge for Chomsky is the only operation responsible for building structure. It is capable of combining two elements. Those elements can be a lexical item and a root node under construction in a designated syntactic workspace, or it can be another tree structure in the workspace. Within the Merge operation, when two constituents are merged one is projected as the head, meaning it determines the category label of the newly formed constituent. Josefsson notes that this labeling of the head is "presumably" (1998:33) a key point in Kayne's (1994) work on the antisymmetry of syntax, which will be discussed in Section 2. The constituent that projects higher, the head, determines the label of the compound that has been formed (Chomsky, 1995 in Josefsson, 1998:33).

(1)

```
        N°
       /  \
    häst   N°
```

In (1), taken from Josefsson (1998:32), the inflectional affix $N°$ is the head and it projects

its features and determines the label, or category of the compound it forms with *häst*

'horse'; here, a nominal compound since the inflection is nominal (*N*). Having an

inflectional suffix serve as the head of a word is first suggested in Williams (1981), where

the rightmost element is the head according to the righthand head rule. The structure in

(1) follows Chomsky's proposal that a complement is the "'most local' relation of an XP

to a terminal head Y, all others within YP being head-specifier (apart from adjunction)"

(Chomsky, 1994:11 in Josefsson, 1998:33), and that all other relations to an XP are

specifiers. This means, according to Josefsson, that the noun 'horse' above is the

complement to the nominal inflection $N°$. Josefsson states that the structure in (1)

contains no semantic information "of the kind we know from the syntax," but instead all

the "relevant information inherent" in the structure is in the head $N°$, thus determining the

"properties of the whole" (1998:34).

When it comes to combining one stem with another to form a compound, there are

two separate morphological objects.

(2)

```
        N°          m°
       /  \         |
    klubb  N°      bok
```
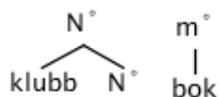
Josefsson assumes that compounding is principally "left adjunction of lexical stems on to

categories with the same structure as words" (1998:55). This adjunction can be applied

recursively, which yields multi-stem compounds. Combining this point with Josefsson's

previous point, this means a head can have a single stem as a complement and then

multiple stems as adjuncts. Josefsson's stipulation is that a noun such as *klubb* 'club' in

the structure in (2) is the *complement* of the nominal inflection *N°* (1998:34), but any

noun added higher in the structure, and thus less local to the head, is an *adjunct* (adjoined

stem). Josefsson states that the "fundamental insight" about the antisymmetry of language

proposed by Kayne (1994) for the structure of phrases can be extended to the internal

relations of words (1998:4). Josefsson follows Kayne's antisymmetry in combining the

two morphological objects in (2). Josefsson explicitly assumes left adjunction is allowed

at *X°* level (1998:56). This means that the noun *bok* 'book' can merge with the existing

structure containing *klubb* 'club' and its inflection *N°* to form a compound noun

bok.klubb 'book club'. The noun *bok* must be adjoined to the left of the noun *klubb* as this

would represent the linear order of the compound *bok.klubb* 'book club'. *Bok* is then

adjoined at a node above the existing noun *klubb + N°*, as in (3).

(3)
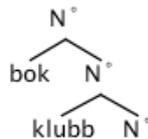
In (3), the noun *bok* has no "word class features," just like *klubb*, so the only word class

features for the compound come from the *N°* head (1998:56). Both nouns *bok* 'book' and

klubb 'club' are now adjoined to the head of the compound, the nominal inflection *N°*.

1.2 Compounding

 The structure for complex compounds is derived using the process seen in (3)

since Josefsson assumes that "we allow recursive left adjunction", meaning that "there is

in principle nothing preventing Merge from applying recursively" (1998:58).

(4)
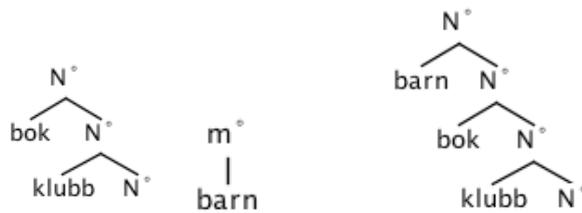
The noun *barn* 'child' is merged with the compound *bokklubb* 'book club' to create the complex nominal compound *barnbokklubb* 'book club for children, children's book club'. All three noun stems are now attached to the head of the complex compound, *N°*. The noun *klubb* 'club' is the complement of the inflection *N°*, and *bok* 'book' and *barn* 'child' are adjuncts. This structure is logical in that "each segment modifies the segment immediately to the right", which is the sense the translation gives (1998:58). Josefsson points out that this type of three-noun compounding is "highly productive in Swedish" and that it is "by no means marked" (ibid.). Swedish exhibits a second pattern of compounding, one that Josefsson labels "mediated compounds." Mediated compounds contain a linking element that is added to a stem during compounding in modern Swedish. Josefsson notes that "it is a general rule in Swedish that a linking element is present in a compound when the lefthand segment of the compound is itself a compound…except in a few, fairly well defined phonetic environments" (1998:60). Section 2.1.2 of chapter 2 discusses the difference in the linking elements in these phonetic environments.

See (5) for an example of both a non-mediated and a mediated compound.

(5)

barn.bok.klubb (*barn + bok.klubb*)	'book club for children, children's book club'
barn.bok.s.klubb (*barn.bok + klubb*)	'club for children's books, children's books' club'

The compound *barn.bok.s.klubb* is an example of a mediated compound. The structure of a compound like this must be different from that of a non-mediated compound in (4) since "the whole compound *barn+bok* modifies the single segment *klubb*" (1998:60). It is the pattern in Swedish that a compound will be mediated if the left non-head constituent is a compound, as opposed to non-mediated compounds where the left non-head is a simple noun. If one were to apply Merge to *barn* 'child' and *bok* 'book' so that they form one morphological object, then "the two constituents are in a mutual sisterhood relation to each other" (ibid.).
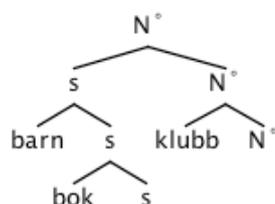
(6)
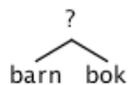
As Josefsson points out, their mutual sisterhood relation is problematic since both *barn* and *bok* c-command each other symmetrically (ibid.). If this is the structure that Swedish speakers have in their minds when forming the complex compound 'club for children's books', according to Kayne's theory *barn* 'child' and *bok* 'book' could appear in the reordered form in the surface representation (*bokbarn* 'book child'). Ruling out a symmetrical structure such as that in (6) goes along with Kayne's antisymmetry theory (1994), which will be discussed in the next section.

Since Josefsson adopts antisymmetry, she must introduce some type of asymmetry that keeps the segments in a compound in the correct order (1998:60). The linking element –*s* fills this need for Josefsson. The linking element is still considered "an inflectional element carrying no checkable features". Josefsson proposes that the –*s* carries no checkable features because she has already posited that constituents inside compounds lack word class features. This –*s* inflection is "licit if its presence is required for some reasons, crucially when required by the need for asymmetry, and if it carries no

feature requiring checking in a functional projection" (1998:61). The structure of a compound containing the linking element is seen in (7).

(7)

```
                 N°
            ╱         ╲
          s             N°
        ╱   ╲         ╱   ╲
     barn    s    klubb    N°
           ╱  ╲
        bok     s
```

The head of the complex compound *barnboksklubb* 'club for children's books' is the nominal inflection of *klubb* 'club' since it is the only segment with word class features. This means that *klubb* and its inflection in this complex compound have the same structure they would if *klubb* were a simple noun. Recall that Josefsson proposes that *klubb* is a complement to the head nominal inflection *N°* (1998:34). Josefsson also stipulates that compounding involves left adjunction of stems onto categories with the same structure as words (1998:55), so the *barn.bok.s* headed by –*s* is an adjunct.

The stem *barn* 'child' is an adjunct to its head, the linking element –*s*, since –*s* is the category of the compound (*barn.bok* 'children's book') within the complex compound (*barn.bok.s.klubb* 'club for children's books'). The stem *bok* 'book' is the complement of the head –*s*. Josefsson points out that "the presence of this head is allowed, since it is not associated with features needing checking in the syntax". And since the compound within the complex compound is adjoined to the noun *klubb*, its head –*s* cannot serve as the head of the entire complex compound (1998:61). I will put my discussion of Josefsson (1998) on hold and will return to it in section 3: Problems with Josefsson's account. I now turn to Kayne's antisymmetry syntax theory that Josefsson adopts in her account of Swedish compounding.

2. Kayne's antisymmetry of syntax (1994)

Kayne's antisymmetry syntax theory (1994) is essentially a theory of linearization. It is generally assumed that Universal Grammar allows a given hierarchical structure to be associated with more than one linear order of terminal nodes (1994:3), but Kayne opposes this assumption. Kayne proposes instead that phrase structure always determines linear order, which means that if two phrases differ in linear order, they must differ in hierarchical structure (ibid.). Kayne stipulates that a linearization has three defining properties (adapted from 1994:4):

(i) it is transitive; that is, if [x,y] and [y,z], then [x,z][10];

(ii) it is total; that is, it must cover all members of the set: for all distinct x and y, either [x,y] or [y,x];

(iii) it is antisymmetric, that is, not ([x,y] and [y,x]).

One goal of Kayne (1994) is to provide a linearization algorithm that explains the general trend in languages seen in (8).

(8) If α asymmetrically c-commands β, then α precedes β.[11]

Kayne's proposed linearization algorithm that derives (8) is called the Linear Correspondence Axiom (LCA). The LCA derives the trend in (8) by means of two things: (i) linearization is made sensitive to asymmetric c-command relations, and (ii) it stipulates that this sensitivity maps onto precedence. The LCA is comprised of many assumptions, which I will now present as lettered points. First, Kayne assumes the following version of c-command:

---

[10] A bracketed pair consists of two segments where the first segment asymmetrically c-commands the second (e.g. [x, y] = x asymmetrically c-commands y).

[11] C-command is simply the relation between constituents (nodes) in tree structures, where some command (dominate) others. The original c-command definition, proposed by Reinhart (1976:32), states that: Node A c-commands node B if neither A nor B dominates the other and the first branching node which dominates A dominates B.

a. X c-commands Y iff every phrase dominating X dominates Y and X does not contain Y.

This c-command relation is transitive, but it is not antisymmetric "since two sister nodes can c-command each other" (1994:4). Kayne adds antisymmetry to the c-command definition by taking the definition of asymmetric c-command:

b. X asymmetrically c-commands Y iff X c-commands Y and Y does not c-command X.

Kayne's LCA also assumes the following:

c. For the nonterminal X, d(X) is the set of all terminals dominated by X.

d. d(<X, Y>) is the set of all ordered pairs <x, y> such that x is dominated by X and is a member of d(X), and y is dominated by Y and is a member of d(Y).

Instead of looking only at one ordered pair <X, Y>, Kayne wants to look at a set of ordered pairs under *d*, so he introduces the "natural notion that the image of a set of ordered pairs is just the set formed by taking the union of the images of each ordered pair in the original set" (1994:5). This can be represented as follows (adapted from Johnson, 2007:5):

e. d(<Xi,Yi>,<Xii,Yii>,...,<Xn,Yn>) = d(<Xi, Yi>) ∪ d(<Xii, Yii>)…
…∪ d(<Xn, Yn>).

We must adopt the following definition of A:

f. A is the set of all nonterminals <X, Y> in a phrase marker, or tree structure, such that X asymmetrically c-commands Y.

After assuming these points, Kayne proposes the LCA:

g. d(A) is a linearization.

It is now clear how a linearization is made sensitive to asymmetric c-command relations in Kayne's theory, and this sensitivity is mapped onto precedence by Kayne's stipulation (adapted from Johnson, 2007:5):

h. Interpret every <X, Y> in a linearization as X precedes Y.

When Kayne's LCA is applied to the structure in (9) below, however, it does not derive the correct linearization.
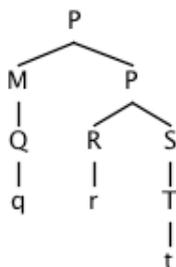
(9)

```
            K
          /   \
        J       L
        |      /  \
        j     M    P
              |    |
              m    p
```
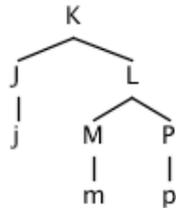
The set of A, "such that the first nonterminal asymmetrically c-commands the second" is <J, M>, <J, P> (1994:8). This means that d(A) is <j, m>, <j, p>, which linearizes "j" before both "m" and "p", but it does not linearize "m" and "p" with respect to one another. This means that the structure in (9) is illicit according to the LCA. This illicit structure is important for Kayne because it provides evidence for why one phrase cannot have two heads in X-bar theory, as well as why a head cannot take a complement that is itself a head (ibid.).

In order to create structures that directly map onto only one linear order, Kayne proposes that the LCA be used in conjunction with a new restriction on asymmetric c-command based on: (i) categories and (ii) exclusion. Kayne's c-command restriction makes a distinction between categories and segments as proposed by May (1985) and adopted by Chomsky (1986). A category is essentially an extended node. Consider the following structure taken from Kayne (1994:16):

(10)

```
            P
          /   \
        M       P
        |      /  \
        Q     R    S
        |     |    |
        q     r    T
                   |
                   t
```

The highest P is the category P, while the lowest P is a segment of the category P, but it is crucially not a category. M, Q, R, S, and T are categories in the structure in (10). Kayne uses the term "excludes" in the sense of Chomsky, meaning that a category "X excludes Y if no segment of X dominates Y" (Chomsky, 1986:9 in Kayne, 1994:133). Kayne's restriction to asymmetric c-command is thus:

(11) X c-commands Y iff X and Y are *categories* and X *excludes* Y and every category that dominates X dominates Y.

The dominance relation in the category restriction to asymmetric c-command is as follows: X dominates Y if every segment of X contains Y.

The use of the segment and category distinction not only makes Kayne's linearization restriction possible, but it is also "forced upon UG by the need to permit specifiers and adjoined phrases" (1994:16). The structures in (12) are two that Kayne uses to show the importance of the distinction between segments and categories in UG.

(12a)   (12b)
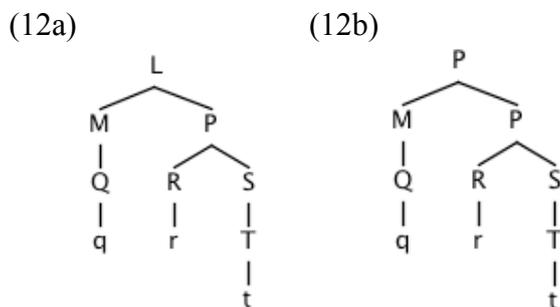
The problem, for Kayne, in (12a) is that since M asymmetrically c-commands R, it creates the ordered pair of nodes <q, r>. However, P asymmetrically c-commands Q, creating the ordered pair <r, q>. This means that this structure fails to produce a linear order of the nodes because it violates antisymmetry (Kayne, 1994:16). The structure in (12b) differs from (12a) only in that the L category has been changed to P, making the lower P a segment in the Kaynian view. Because the lower P is now a segment it can no longer enter into a c-command relation with Q, which removes the pair <r, q> from the linear order which was problematic for Kayne's antisymmetry view. Another way the pair

<r, q> could exist in the linear order for (12b) is if R asymmetrically c-commanded M (<R, M>), but this is ruled out "because P, which dominates R, does not dominate M, since only one of its segments dominates M" (1994:133). This means R cannot asymmetrically c-command M, thus producing the pair <R, M>, since the dominance relation of Kayne's c-command does not hold–every category that dominates R does *not* dominate M. The linear ordering of the terminals in (12b) is <q, r>, <q, t>, <r, t>, which is the desired linear order. It is for reasons such as the one seen in (12) that Kayne proposes the distinction between categories and nodes is forced upon UG.

Kayne proposes that the only possible ordering of the subcomponents of a phrase in Universal Grammar is specifier-head-complement, not complement-head-specifier and that the antisymmetry theory derives this universal ordering. If this order is not seen in the surface representation of a phrase in a language, Kayne would argue that the phrase has undergone movement. Holding specifier-head-complement as the only order available is what allows us to state that the linear ordering of the terminals of d(A) containing <a, b>, <a, c>, <b, c> should be interpreted as a-b-c (1994:36). Evidence for Kayne's antisymmetry claim can be found in the lack of languages with a structure like that in (13), where the ordering is complement-head-specifier.

(13)

```
        CP
       /  \
      C'   WH
     /  \
    TP   C
```
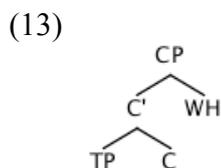
Kayne explains the consequences of his category restriction of asymmetric c-command for double clitics (or other elements) that are adjoined to a head, as is seen in French.

(14) *Je vous les envoie*
      I you them send
      'I send them to you'

In (14), two clitics (*vous*, *les*) are adjoined to a single head (*envoie*). The classical c-command definition, offered by Reinhart, could account for these double clitics with a structure that would adjoin both clitics to the head verb *envoie* 'send' as in (15), adapted from Kayne (1994:19).

(15)

```
          M
        ／ ＼
       K     M
       |    ／ ＼
      vous  L    M
            |    |
           les  envoie
```
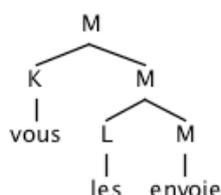
From Kayne's LCA, such a structure with double adjunction would mean that the linear ordering of the clitics is not predictable. This is because K and L, neither of which is dominated by M, c-command one another, which means neither asymmetrically c-commands the other resulting in no linear order being specified for their terminals. The linear order of *vous* and *les* is not specified, as neither <*vous*, *les*> nor <*les*, *vous*> is contained in the d(A) of the structure in (15) (1994:19). Kayne argues that when two or more clitics (here, nouns) are adjoined to a single head they "find themselves in too symmetric a relation" (ibid). More specifically, the two adjoined elements are dominated by segments of the same head but neither is dominated by the head as a category (1994:20). In (15), K and L are dominated by segments of M, but neither is dominated by M as a category. Recall that "dominate" is defined here as X dominates Y if every segment of X contains Y. Because every segment of M does not contain K or L, the category M does not dominate K or L.

The asymmetric category c-command definition, as opposed to the classical c-command definition based on nodes, would require the two clitics to fit into a structure that reflects their linear order. Kayne argues that sequences of clitics, such as those seen in the French example above "must not be analyzed as successive adjunctions to the same

head but instead should be analyzed as involving either adjunction to distinct functional heads or adjunctions of one clitic to another, or some combination thereof" (1994:21). The structure in (16) represents the adjunction of one clitic to the other and satisfies Kayne's LCA.

(16)

```
          M
        /   \
       L      M
      / \     |
     K   L  envoie
     |   |
   vous les
```
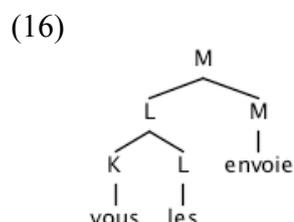
An additional advantage of Kayne's antisymmetry theory is that it accounts for the righthand head rule, proposed by Williams (1981). Kayne proposes that his antisymmetry theory derives the righthand head rule when the LCA-based theory is applied to "subword" structures, such as those for compounds (1994:131). The LCA manages to derive the righthand head rule since Kayne stipulates that in an adjunction structure the element doing the adjoining must precede the element adjoined to (1994:41). A word, for Kayne, is an adjunction structure and the head is the functional element adjoined to. This implies that the head of a word must be preceded by the rest of the word (ibid.), thus placing the head as the rightmost element.
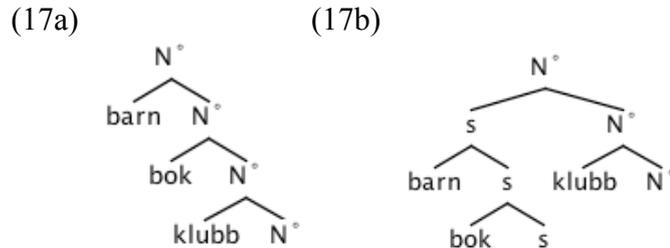
Now that I have outlined some key points of Kayne's work on the antisymmetry of syntax, I will return to the topic of Josefsson's account of Swedish compounds and discuss a theoretical problem therein.

*3. A problem with Josefsson's account*

Josefsson (1998) provides a detailed and complete account of the structure of Swedish compounds, both those with and without the linking element. Her account also correctly predicts the environments where the linking element will appear in Swedish compounding, showing that the appearance of –*s* in complex compounds is productive.

What makes Josefsson's account problematic is that one of the structures she creates is inconsistent with Kayne's antisymmetry claim and the MP that she also endorses.

Recall the structures that Josefsson proposed for complex nominal compounds in Swedish (figures (4) and (7)), repeated here in (17).

(17a)   (17b)

```
        N°                              N°
       /  \                            /  \
   barn    N°                        s      N°
          /  \                      / \    /  \
       bok    N°                 barn  s  klubb N°
              /  \                /  \
          klubb  N°             bok    s
```

Josefsson created these structures because ones combining elements like that seen in (6) (repeated here in (18)) are too symmetrical.

(18)

```
       ?
      / \
   barn  bok
```
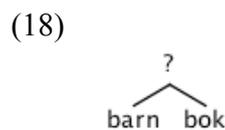
Josefsson directs the reader to see Kayne's (1994) antisymmetry for the ban on symmetrical structures in order to understand why the structure in (18) is ruled out (Josefsson, 1998:60). Josefsson states that in order to concatenate two stems, some sort of asymmetry must be introduced, which takes the shape of the linking element seen in (17b) (ibid.). This is congruous with Kayne's antisymmetry theory. The two structures in (17) exhibit what the author believes are licit mergings of morphological items, and, in (17b), a required asymmetry of some kind.

Josefsson stipulates that the closest relation to a head is a complement, and that compounding is created by recursive left adjunction of stems. Given the discussion of Kayne's antisymmetry and LCA, with its universal specifier-head-complement word order, it appears that Josefsson's analysis conflicts with Kayne's. However, Kayne concludes "a specifier is necessarily to be taken as an adjoined phrase, involving crucial use of the segment/category distinction" (Kayne, 1994:17). Kayne reaches this conclusion

because there is no other "natural way" to permit specifiers within antisymmetry theory. Because of this stipulation by Kayne, Josefsson's labeling of the stems higher than the complement as "adjuncts" is congruous with Kayne's account.

This labeling does present a problem, however. The structure in (17a) is flawed because it exhibits multiple adjunctions to a head—$N°$. Kayne's discussion of French clitics and adjunction to heads extends to Swedish compounds without the linking element, where nonhead noun stems are adjoined to a head noun. Recall from section 2 that Kayne proposes we must not analyze multiple constituents as "successive adjunctions to the same head" (1994:21). The problem presented by these structures is not a minor one given the antisymmetry theory that Josefsson adopts. Recall that antisymmetry theory is essentially a linearization hypothesis, meaning one hierarchical representation (tree) maps onto one linearization (word order), and vice versa. The structure in (17a) cannot be unambiguously linearized as is required by the antisymmetry requirements of Kayne's LCA. If it were the case that Josefsson had labeled the adjuncts as specifiers instead, it would still pose a problem for Kayne's antisymmetry theory since Kayne restricts the number of specifiers, which are cases of adjunction, to one per head (1994:22). The structure in (17b) is licit in Kayne's antisymmetry view: the linking element –*s* is the head of the compound within the complex compound, *barnbok* 'children's book', with the noun *bok* 'book' as its complement and the noun *barn* 'child' as its adjunct. The substructure *barn.bok.s* 'children's book LINK' is the adjunct to the head of the entire complex compound, $N°$, which has the noun *klubb* 'club' as its complement.

If Josefsson had adopted the classical node restriction of c-command both of her structures would be licit as the node restriction of c-command allows for multiple adjunction of elements to a head. However, this would be at the expense of any account of the linearization of the string of elements. The choice in a particular version of c-

command is not trivial, however, as properties of antisymmetry theory led Josefsson to the structure for a complex nominal compound containing a linking element in (17b). Josefsson states that the linking –*s* is inserted into the complex compound seen in (17b) "for reasons of asymmetry" (1998:61).
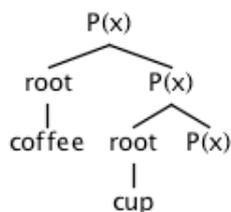
4. Mukai (2008)

Mukai's 2008 article centers on recursive compounding in English, Japanese, and Mainland Scandinavian (i.e. Danish, Norwegian, and Swedish). The goals of Mukai's work are the same as Josefsson's goals for the Swedish compounds, that is to create structures for recursive compounds within the Minimalist Program (Chomsky, 1995), but Mukai focuses on the role of morphology within minimalist syntax, and proposes unified structures for recursive compounds in all three languages mentioned above. Mukai argues "linear order is redundant in the narrow syntax, since the structure determines the word order" (Mukai, 2008:178). The narrow syntax which Mukai refers to is based on Hauser et al.'s (2002) paper on the evolution of the faculty of language, and the term is synonymous with what I have referred to as syntax (as opposed to the sensory-motor and conceptual-intentional systems behind the production of language) (Hauser et al., 2002:1571). In the narrow syntax, the structure is responsible for linearizing the elements in a string, and it is the structure that identifies the head (2008:178). Mukai points out that because of these facts, the righthand head rule (Williams, 1981) is not required to determine the head of a compound. Mukai adds, "it is important to assume that the relation between the constituents in compounds is asymmetric" (2008:180). The asymmetry Mukai refers to is the asymmetry Kayne (1994) bases the antisymmetry theory on. Recall from point (b) on page 25 that Kayne defines asymmetry in terms of c-command (1994:4):

(19) X asymmetrically c-commands Y iff X c-commands Y and Y does not c-command X.

Kayne further complicates this definition of asymmetric c-command by adding a category/node distinction, as well as an exclusion principle, but it is important to note that adopting asymmetry means to adopt a relation that is "both transitive and antisymmetric" (1994:4). Mukai does not state that she adopts Kayne's (1994) antisymmetry view, but her assumption that the elements in compounds are asymmetric implies antisymmetry theory, which is evidenced by her adoption of Josefsson's proposal which is based on Kayne's antisymmetry.

Mukai uses the terms "probe" and "goal" which were introduced by Chomsky (2000), an update to the Minimalist Program adopted by Josefsson in 1998. Mukai states, "according to Chomsky, a probe is a head which searches for a lexical item which has matching feature, called a 'goal'" (Mukai, 2008:180). The probe, with unvalued features, requires the goal, with corresponding valued features, to assign value to its features (or equivalently to check them). This means that during word formation, such as compounding, a head must "have its features valued or checked before another lexical item chosen from the lexical array is introduced in the derivation" (ibid.). The nouns in nominal compounds have the unvalued feature of Case that is valued/checked when they are merged with other roots. Nouns also have theta features which are unvalued features needing checking by another category, such as D or DP (2008:80).

(20)

```
            P(x)
           /    \
        root     P(x)
          |     /    \
       coffee root   P(x)
               |
              cup
```
Adapted from Mukai, 2008:182

A noun for Mukai is a root that is merged with *P(x)*. Property (x) feature, or *P(x)*, is a "categorical feature" (2008:182), which presumably means it determines the category of

the word. The structure in (20) is created when a root without word class features, that is a category or inflection, is merged with a *P(x)*, and the *P(x)* is the product of the merging of a theta-role feature and a noun feature–[N theta-role] (2008:182). There are two ways of checking *P(x)*, either to assign "x a value that is an index" or to delete the x. Once *P(x)* is checked, it is possible to combine this root and its *P(x)* with another to form a compound noun. A compound is formed once a new root is merged with the existing noun, and the new root's *P(x)* becomes the head of the whole compound. Since *P(x)*, the rightmost element, is the only unsaturated feature after a second root is merged, it percolates and becomes the head of the compound, (ibid.). Mukai posits that a noun "denotes a property the content of which is given by the root," and since it has already been proposed that *P(x)* is a categorical feature, the *P(x)* assigns the category label to a compound (ibid.). Mukai argues that the lefthand root in a compound (the non-head) is said to lack word class features, which Josefsson also proposed, because it lacks morphological inflection, among other things. Mukai extends Josefsson's claim of Scandinavian non-heads lacking word class features to Japanese and English non-heads also.

Mukai argues that recursive compounds are formed by merging multiple roots with *P(x)*. Mukai offers the structure in (21) for the recursive Swedish compound *barn.bok.klubb* (child.book.club) 'book club for children, children's book club' (2008:185).

(21)

```
        P(x)
        /\
    barn  P(x)
          /\
       bok  P(x)
            /\
        P(x)  klubb
```

36
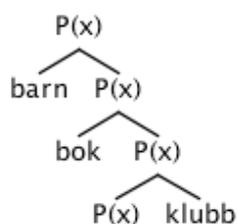
The universal head of the compound in (21) is *P(x)*, a categorical feature, which takes *barn* 'child' and *bok* 'book' as its adjuncts, and *klubb* 'club' as its complement. Note that the head of the structure is not the rightmost element as Josefsson proposed and as we would expect for Swedish. Instead, it appears that Mukai has adopted Kayne's universal underlying word order in the structure in (21): specifier–head–complement. Mukai states that the structure in (21) respects Chomsky's Extension Condition (1995), "as a result of merging root after root with a *P(x)*" (Mukai, 2008:185). The Extension Condition requires that syntactic operations occur at the root, but it does not state conditions for adjunction. I mention adjunction since the structure in (21) exhibits double adjunction of *barn* and *bok* to the head *P(x)*, which is illicit for the Kaynian antisymmetry view. I reference this problem of the Kaynian antisymmetry view since I assume Mukai has adopted antisymmetry as Josefsson (1998) has. Mukai assumes that the relations between constituents in compounds are asymmetric (2008:180), making the structure in (21) problematic for this view.

Mukai points out that it is also possible to derive left-branching compounds, and that "the difference in the branching corresponds to a meaning difference" (187). A left-branching compound, which in Swedish is one containing a linking element, is accounted for by the structure in (22) (2008:187).

(22)
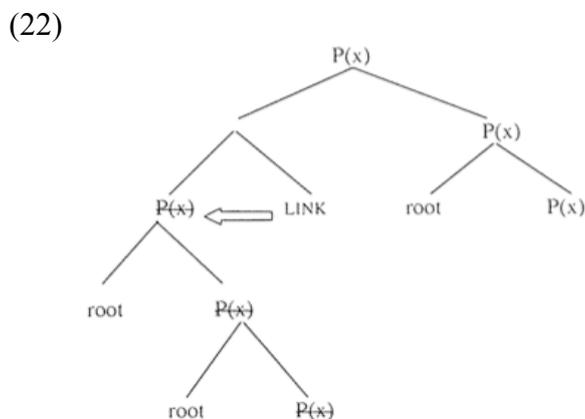
In the structure in (22), a root lacking word class features is merged with *P(x)*, and then another root merges to create a compound. This leaves the *P(x)* feature needing checking, which is done by a linking element that is merged. This structure can then be merged with another structure (*root + P(x)*), and this *P(x)* becomes the universal head of the compound since it is not lacking word class features. This analysis mirrors Josefsson's analysis that the linking element "carries no feature requiring checking in a functional projection" (Josefsson, 1998:61), but Mukai uses the linking element (still devoid of checkable features) to check the *P(x)* that is the head of the left, non-head constituent in complex compounds. The structure in (22) is licit in Kayne's antisymmetry theory since the structure is asymmetrical and does not exhibit double adjunction.

5. *Josefsson (1998) and Mukai (2008) summary*

Mukai's analysis of Scandinavian, which is based on Josefsson (1998), fails to circumvent the theoretical problem found in Josefsson's analysis: the structure for recursive Swedish compounds lacking the linking element exhibits multiple adjunction to one head. Mukai presumably adopts antisymmetry in the discussion of recursive compounds, which means this multiple adjunction is illicit. Mukai's structures for recursive compounds differ slightly from Josefsson's structures in the features used, and also in the way the elements are merged. Compare Josefsson's (1998) and Mukai's (2008) structures for Swedish complex compounds not containing the linking element in (23).
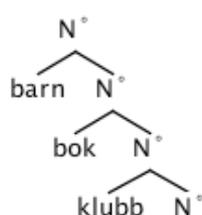
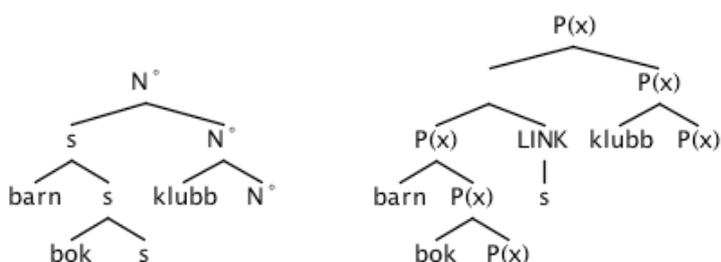(23a) Josefsson (1998)   (23b) Mukai (2008)
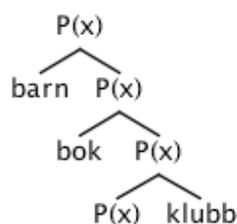
In (23a), Josefsson makes the head of the complex compound the nominal inflection *N˚*, and adjoins the three nouns to the left successively. In (23b), Mukai makes the head of the complex compound the *P(x)* feature and merges the noun *klubb* 'club' on the right closest to the head as a complement, and then *barn* 'child' and *bok* 'bok' are adjoined to the left of the head. Both (23a) and (23b) exhibit multiple adjunction, which means that the asymmetric structures cannot be linearized through Kayne's LCA. The two structures differ primarily in the way the elements are combined, but they are similar.

The two authors' structures for Swedish complex compounds containing the linking element are in seen in (24).

(24a) Josefsson (1998)   (24b) Mukai (2008)

```
                                              P(x)
                                          ____/ \
              N˚                              P(x)
          ___/ \___                       __/ \__
         s         N˚          P(x)   LINK  klubb  P(x)
       _/ \_      _/ \_       _/ \_     |
      barn   s   klubb  N˚   barn  P(x)  s
              __/ \          _/ \
             bok   s        bok   P(x)
```

In (24a), the head of the entire compound is the nominal inflection *N˚*, while the head of the non-head leftmost element is the linking element *–s*. The *–s* structure takes the noun *bok* as its complement and *barn* as its adjunct. This structure is adjoined to the *N˚* structure as its adjunct. In (24b), Mukai proposes that the two nouns *barn* 'child' and *bok* 'book' merge into one structure with *P(x)* as their head. The *P(x)* feature requires checking, so the linking element is merged to check the *P(x)*. This structure is then merged with the noun *klubb* 'club' and its *P(x)* to form the complex compound, where *P(x)* is the head. The structures in (24) are alike in that the rightmost noun *klubb* is merged to the head of the complex compound (*N˚* or *P(x)*), but they differ in the way the leftmost compound *barn.bok* and the linking element are merged to the higher structure.

Assuming that the constituents in compounds are asymmetric means adopting the Kaynian view, which would mean that a hierarchical structure of a compound should directly map onto the linear order of a compound. Josefsson (1998) and Mukai (2008) succeed in creating structures for Swedish compounds with the linking element that comply with antisymmetry theory. However, Josefsson's and Mukai's structures for Swedish compounds lacking the linking element do not comply with antisymmetry theory, with its requisite category c-command, due to double adjunction to a single head (Kayne, 1994:21).

IV. PROPOSAL FOR THE SWEDISH LINKING ELEMENT

In chapter 2, I discussed the distribution of the linking element in Swedish complex nominal compounds and showed that three-part nominal compounds exhibit the linking element only if the lefthand constituent is itself a noun-noun compound as in (1). Three-part nominal compounds where the righthand segment is a noun-noun compound, such as (2), do not contain the linking element.

(1) With the linking element:
barn.bok.s.klubb 'club for children's books'
student.film.s.kommitté 'committee for student film'
mormon.student.s.förening 'society for mormon students'

(2) Without the linking element:
barn.bok.klubb 'book club for children'
student.film.kommitté 'film committee for students'
mormon.student.förening 'student society for mormons'

In chapter 3, I surveyed two previous proposals for a syntactic analysis of the linking element: Josefsson (1998) and Mukai (2008). Josefsson (1998) offered an account of Swedish compounding based on Kayne's antisymmetry, and Mukai (2008) offered an account based in part on Josefsson (1998). I therefore discussed the antisymmetry theory of Kayne (1994) that underlies two of the works on Swedish compounding. Chapter 3 argued that Josefsson's and Mukai's analyses were partly flawed by the use of structures incompatible with Kayne's antisymmetry theory.

The purpose of this chapter is to present possible analyses for Swedish complex compounds given the facts about Josefsson's (1998) and Mukai's (2008) analyses that have been previously discussed. I propose that the best choice is Kayne's (1994)
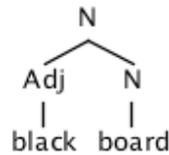
antisymmetry theory, which is capable of accounting for the syntactic structure of both types of Swedish complex compounds when applied faithfully.
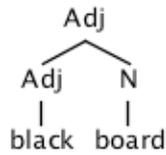
1. Background assumptions

        Hierarchical structure and c-command are relevant to complex nominal compounds even though they are words and not phrases. Delfitto et al. (2008:31) point out that there is a "general view that compounds and phrases are generated by the same component of grammar, namely syntax". This is true because there are relations among constituents in each domain of structure. For a simple noun like "book," there is no need to apply a hierarchical structure since "book" is made up trivially of one constituent, or morpheme. Once we progress from a simple noun to a noun-noun compound, the hierarchical structure becomes important. I assume that the syntactic notion "head" extends to the domain of words, so the ambiguity in a compound such as [book] + [club] has to do with which noun is assigned as the head of the compound. In English, all compounds are right-headed, so there is no ambiguity in the compound "book club"–it's a club for book lovers. In other languages, however, compounds are left-headed and "book club" could be a type of book, specifically one that belongs to a club. The head clarifies the ambiguity posed by a noun-noun compound since the head gives a compound its semantic category and essential meaning; i.e. is "book club" a type of "book" or a type of "club"? The head constituent also determines the syntactic category of a compound. This means that since I am discussing nominal compounds, all of the head constituents will be nouns. The headedness of a compound can then be represented in a hierarchical structure so that the possibly ambiguous structure of a compound becomes clear. Consider the following structures for the compound "blackboard," where the structure makes the

42

headedness explicit. The structures follow the Minimalist Program, and the labels *N* and *Adj* stand for noun and adjective, respectively.

   (3a)   (3b)

```
        N                       Adj
       / \                     / \
     Adj   N                 Adj   N
      |    |                  |    |
    black board            black board
```

In (3a), the noun "board" is the head of the compound noun "blackboard" and the adjective "black" is modifying the type of "board". In (3b), the adjective "black" is the head of the compound noun "blackboard" and the noun "board" is modifying the type of "black". English compounds are right-headed, and a "blackboard" is a type of "board", so (3a) would be the structure of the compound in English.

    Adding a third constituent to a nominal compound further complicates matters, increasing the number of possible combinations of the constituents and therefore making it necessary to understand the relation of those constituents. Take for example the three-part compound "amateur linguistics society", where there are two possible readings: linguistics society for amateurs, and society for amateur linguistics. The structures in (4) illustrate the importance of understanding the relation of the constituents in compounds. Let's adopt the classical node restriction of c-command when analyzing these structures.

    (4a)   The new graduate students, with much training but little experience, were admitted to the amateur linguistics club.

```
            N
           / \
          N   N
          |    / \
       amateur N   N
              |    |
         linguistics club
```

43
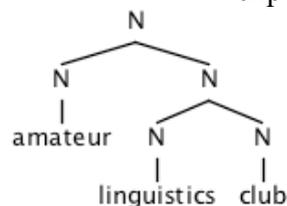
(4b)   The popular writer on language, with no formal linguistics training, was admitted to the amateur linguistics club.

```
            N
          /   \
        N       N
       / \      |
      N   N    club
      |   |
amateur linguistics
```
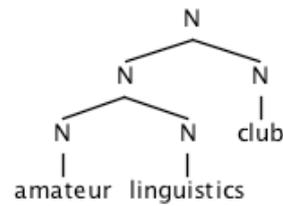
The structure in (4a) shows that the reading is a linguistics club for amateurs, where "linguistics" is merged with "club", and then "amateur" is merged specifying what kind of "linguistics club" it is. The structure in (4b) shows that the reading is a club for amateur linguistics, where "amateur" is merged with "linguistics", forming the non-head "amateur linguistics" which is then merged with "club" specifying what type of club. The structures in (4) account for the two different readings of the one surface form of the compound "amateur linguistics club". Representing the relations of constituents at the phrasal and subword levels with hierarchical structures is widely accepted in linguistics, and the authors I have so far discussed (Kayne (1994), Josefsson (1998), Mukai (2008)) have also adopted this.

Before I discuss the structure of the three-part Swedish complex nominal compounds, it is important to note that I accept that a string of nouns has both a head and a hierarchical structure. Since I assume the existence of heads, this means that the head determines the category of a string. The explanatory burden left to overcome is that the nouns within the string and within a structure must be linearized so that they reflect the word order of the compound.

2. Possible analyses

Given the discussion of Kayne (1994), Josefsson (1998), and Mukai (2008), I propose that there are three possible solutions to the problem of accounting for the structure of Swedish complex compounds:

(i) Kayne's use of the category restriction in syntax doesn't work when extended to lexical items, and another theory must be used;

(ii) Compounds employ different restrictions of c-command—some use the category restriction (e.g. those with the linking element), and some use the node restriction (e.g. those without the linking element);

(iii) There could be structures other than those proposed by Josefsson (1998) and Mukai (2008) which could account for the compounds lacking the linking element that adhere to Kayne's antisymmetry.

I propose choosing the third solution, which means adopting Kayne's antisymmetry and proposing structures for the two types of Swedish complex compounds. I will adapt a structure previously discussed for compounds containing the linking element, and replace the problematic structure for compounds lacking the linking element seen in Josefsson (1998) and Mukai (2008). I will first discuss the other possible solutions before proposing a new structure that is licit for antisymmetry theory.

If we posit that Kayne's restriction to asymmetric c-command based on categories and exclusion cannot be extended to the level of lexical items, then there are two possible outcomes: we can do away with Kayne's asymmetric c-command restriction altogether and use classical c-command relations, or we can adopt another type of theory that can account for Swedish compounds. The first possibility is the easiest, but by choosing it we lose the explanatory power seen in a theory such as Kayne's, where a hierarchical structure maps onto only one linear ordering. The category and exclusion restriction of asymmetric c-command within antisymmetry theory also solves the problem presented by symmetric structures, as noted by Kayne (1994) and Josefsson (1998): constituents in a symmetric relation c-command one another and can therefore be linearized in more than one way. The second possibility is more complex since it involves adopting a new

proposal that is capable of accounting for the structure and linearization of Swedish complex compounds. I propose that we do not abandon Kayne's antisymmetry as it solves linearization problems presented by other theories, and since it accounts for typological trends such as SVO word order. Additionally, it will not be necessary to adopt another type of theory if we propose structures for Swedish complex compounds that are licit in antisymmetry theory. This leaves the possibility, of course, that a future work on Swedish complex compounds and the linking element may make use of another model or theory that is also capable of accounting for their structure and linearization.

The second option is to assume that compounds in Swedish and, presumably, other languages make use of two restrictions of c-command: node and category. If the compounds lacking the linking element were formed using the classical node restriction of c-command, then a structure such as that in (5), proposed by Josefsson (1998), would be well-formed and would be able to be linearized.

(5)
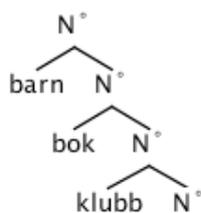
Adopting the node restriction of c-command for certain types of compounds would mean that Kayne's concept of exclusion and categories is optional. This does not necessarily go against antisymmetry theory, as Kayne (1994) is ultimately equivocal on the definition of c-command. Kayne argues that the distinction between nodes and their categories used in the two c-command definitions is "forced upon UG by the need to permit specifiers and adjoined phrases" (1994:16). He also notes that some phrases (DP, PP) usually lack an adjoined phrase or specifier. Accordingly, if we were to think about the evolution of UG, "one would therefore be led to consider the possibility of a stage lacking the

46

category/segment distinction" (1994:134). In other words, since some phrases do not contain adjoined specifiers, these phrases could have come about during a stage of language evolution where there was no distinction in c-command between nodes and their categories since phrases had no reason to be sensitive to such a distinction.

Choosing this option would mean positing that the Swedish complex compounds lacking the linking element are a more primitive type of compounding that, perhaps, emerged first in language evolution. This would entail that the Swedish complex compounds with the linking element are less primitive and were forced to appear once the distinction between nodes and categories developed. This account could also explain why the compounds with the linking element can be linearized by both restrictions of c-command, since the node restriction was already in place when the category restriction was added. Kayne has left the door open for an analysis of Swedish compounds that posits two different definitions of c-command. Support for such a speculative analysis would need to be drawn from research on proto-syntactic theories and crosslinguistic compound data that go beyond the scope of this work.

3. New proposal

The third option, and that which I propose, involves putting forth structures that circumvent the current double adjunction problem seen in Josefsson (1998) and Mukai (2008). I propose the structure in (6a) for complex compounds containing the linking element, and the structure in (6b) for complex compounds lacking the linking element. The latter type was the one harder to model in Kayne's antisymmetry theory in previous proposals.
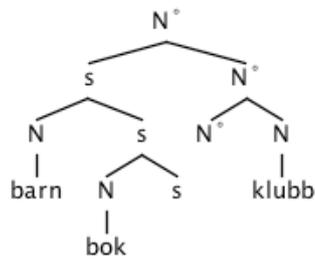
(6a)   (6b)[12]
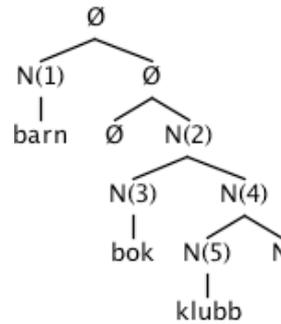
The structure in (6a), adapted from Josefsson (1998:61), is for the compound

barn.bok.s.klubb 'club for children's books', which has the following constituent

structure: [[XX]s[X]]. The head of the complex compound is the nominal inflection *N˚*,

with the noun *klubb* as a complement and the sub-structure headed by *–s* as a specifier (or

adjunct). As previously mentioned in the discussion of Josefsson's (1998) analysis, the

structure in (6a) is licit in Kayne's antisymmetry theory since it yields the one, expected

linearization. The structure in (6b) is for the compound *barn.bok.klubb* 'children's book

club', which has the following constituent structure: [[X] [XX]]. In this structure that I

propose, the head of the complex compound is a null linking element that serves as the

link connecting the noun *barn*, which is the specifier (or adjunct), and the compound

bok.klubb, which is the complement. Having a null linking element as the head of the

complex compound in (6b) does not pose any problems for antisymmetry theory, just as

having the nominal inflection in (6a) does not pose any problems. The structure in (6b)

would not be problematic for antisymmetry theory since it avoids double adjunction in

both the substructure headed by *N(2)* (*bok + klubb*), and the superstructure headed by *Ø*.

The syntactic structure of (6b) also reflects the constituent structure of its complex

compound, which makes for an intuitive syntactic structure.

The linearization of (6b) in Kayne's antisymmetry model is as follows in (7). Recall

from points (f) and (g) on page 25 that A is the set of all nonterminals <X, Y> in a tree

---

[12] I numbered the *N* labels in (7) for clarification when producing the linearization.

structure, such that X asymmetrically c-commands Y; and d(A) is a linearization of the terminals contained in A. Also, recall that asymmetric c-command is restricted by the category and exclusion principles.

(7)

A = { <N1, N2> }   d(A) = { <barn, bok> }
   <N1, N3>   <barn, N4>
    <N1, N5>   <barn, klubb>
    <N3, N5>   <bok, klubb>

The desired linearization of the nodes in (6b) is produced by Kayne's model, with its LCA and asymmetric c-command restrictions, in (7). Neither *N1* nor *N3* c-command *N4* since *N4* is a segment of the category *N2*. However, *N3* and *N5* are linearized in respect to one another because *N3* asymmetrically c-commands the category *N5*. No other linearization of the nodes in (6b) is possible because of Kayne's category and exclusion principles (e.g. <klubb, bok> and <bok, barn> are ruled out).

The structures in (6) were both created following antisymmetry theory, and unlike the previous problematic structures seen in other analyses, the new structure I propose in (6b) can be linearized by antisymmetry theory. There are of course other possible structures that can account for the two types of Swedish complex compounds that I have not thought of. The structures I proposed in (6) are those that I believe best model the syntactic structure of the compounds since they produce the expected linearization when I apply Kayne's antisymmetry theory, and since the syntactic structures reflect the constituent structures of the nouns. Another analysis I considered, and one that the reader may ponder, posits that the structure of Swedish complex compounds lacking the linking element is identical to that of the type containing the linking element. Adopting this analysis would mean proposing that all Swedish compounds contain a linking element that can be either phonologically and morphologically overt (*–s*) or null. Consider the structures in (8).
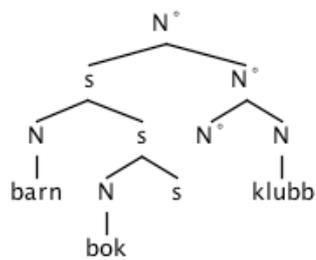
(8a) Overt LE   (8b) Null LE
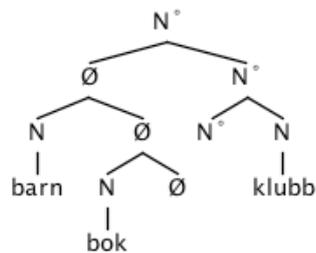
The structures in (8), adapted from Josefsson (1998:61), are identical except for the linking element. An instance of the overt linking element as in (8a) could signal to Swedish speakers that a compound has [[XX]s[X]] structure, while the null linking element as in (8b) could signal [[X][XX]] structure. Assuming a compound such as *barn.bok.klubb* 'children's book club' has the structure in (8b) seems counterintuitive since the two nouns that form the compound within the complex compound, *bok + klubb*, are not near one another in the hierarchical structure. That is, the syntactic structure does not reflect the constituent structure. It is for this reason that I gave up an analysis like this in favor of one that posits two separate structures for the two types of Swedish complex nominal compounds and their separate readings.

V. CONCLUSION

I propose that the best available theory that can model the linearization of Swedish complex nominal compounds is that of Kayne (1994), which Josefsson (1998) and presumably Mukai (2008) adopt. The extension of Kayne's antisymmetry theory of syntactic phrases to the subword level, as previous proposals have attempted, is possible if the structures we create are congruous with the core elements of antisymmetry theory: the LCA, and the asymmetric c-command restriction based on categories and exclusion. The extension of antisymmetry to the subword level is partly motivated by Kayne, who notes that such an extension can derive the righthand head rule (1994:131) which explains a trend in headedness seen in languages. Josefsson and Mukai both produce plausible analyses for the two types of Swedish compounds, but these analyses are partly problematic due to their improper application of antisymmetry theory. I was able to address this problem by proposing a new structure that is licit in antisymmetry theory and that represents the constituent order of the compound in the syntactic structure. There are, of course, other structures for the Swedish complex compounds with and without the linking element that could be proposed and defended within antisymmetry theory. My correction of a theoretical problem in the application of Kayne's theory is important because it further supports the idea that structures at the subword level can be conceptualized within antisymmetry theory.

By following the example of previous researchers and supporting Kayne's antisymmetry theory as the best choice for explaining the structure and linearization of Swedish complex compounds, we keep the explanatory power antisymmetry theory has

in explaining facts about language typology. The structures I propose are also in accord with a crux of antisymmetry theory: the universal specifier-head-complement phrase order. In both structures I propose, a specifier occurs to the left of the head and a complement occurs to the right. It is noteworthy that the structures I propose could maintain their desired linearizations even if the syntactic order were changed to specifier-complement-head, as Josefsson's (1998) structures reflect. This may be a coincidence given the circumstances of three-part Swedish compounds, but it may also provide evidence for the idea that the universal phrase order is specifier-complement-head, which has been proposed since Kayne's work on antisymmetry (e.g. Li, 2005). This is something to be considered in future work that perhaps focuses more on the crosslinguistic structure and linearization of complex compounds containing linking elements.

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