PROSODIC CUES TO THE SYNTACTIC STRUCTURE OF SUBORDINATE CLAUSES IN SWEDISH

Mikael Roll

Department of Linguistics and Phonetics
Lund University
D level essay
September 2004
Supervisor: Merle Horne

CONTENTS

ABBREVIATIONS AND SYMBOLS

C	Complementiser (note 3)
C-I	Conceptual-Intentional (section 1)
CQ	Context Question (note 14)
EMC	Embedded Main Clause (section 2)
F0	Fundamental frequency
Hz	Hertz
H	High tone (section 5.1)
L	Low tone (section 5.1)
p	The probability that two means that are hypothesised two be distinct fall within the deviation of one single mean.
re	Reference value (note 15)
SC	Subordinate Clause (section 2)
SD	Standard Deviation
SM	Sensorimotor (section 1)
T	Tense (note 3)
t	Trace (note 1)
V	Verb
v	Light verb (note 5)
XP	Maximal phrase / projection (note 3)
X'	Intermediate phrase / projection
x_i	(Co)index
*	Ungrammatical (syntax); word tone (prosody) (section 5.1)
¬	Negator

0 INTRODUCTION

In Swedish, there is a difference between the core word order of main clauses and subordinate clauses. The difference is apparent when a clause contains a clause level adverbial. In main clauses, clause level adverbials are always placed after the finite verb. In most kinds of subordinate clauses, in contrast, they are placed before the finite verb. A common clause level adverbial is the negator *inte* 'not'. In the main clause in (1) below, *inte* is found in its correct place after the finite verb *har* 'has'. Therefore, the sentence is grammatical. In (2), the same main clause appears with *inte* before the finite verb *har*. The position of the negator in relation to the finite verb makes the sentence ungrammatical. In (3), a subordinate clause with *inte* before the finite verb is shown. Since the negator is in the correct position in relation to the verb, the sentence is grammatical. The subordinate clause in (4), however, is ungrammatical, because the negator is in an incorrect position, after the finite verb.

(1)   Hon   har   inte   sett   Peter
      She   has   not   seen   Peter

(2)   *Hon   inte   har   sett   Peter
      She   not   has   seen   Peter

(3)   Jag   undrar   om   hon   inte   har   sett   Peter
      I   wonder   if   she   not   has   seen   Peter

(4) *Jag   undrar   om   hon   har   inte   sett   Peter
      I   wonder   if   she   has   not   seen   Peter

Another difference between main clauses and subordinate clauses in Swedish is that main clauses permit 'topicalisation' (5), whereas most types of subordinate clauses do not (6). Topicalisation means that a constituent moves from its usual place to the left edge of a clause, resulting in a slight change in its interpretation.

(5)   Peter$_i$ har   hon   inte   sett   t$_i$
      Peter   has   she   not   seen

(6)   *Jag undrar om   Peter$_i$ har   hon   inte   sett   t$_i$
      I   wonder   if   Peter   has   she   not   seen

The restriction for clause level adverbial placement and topicalisation in subordinate clauses is not absolute. Subordinate clauses that are introduced by the complementiser *att* 'that' sometimes appear with a clause level adverbial after the finite verb (7) or with a topicalised constituent (8), especially in spoken language. Since these word orders are usually restricted to main clauses, one might say that the subordinate clauses in (7) and (8) have main clause word order (Holmer, forthcoming). *Att*-clauses may also have usual subordinate clause word order, as illustrated in (9).

(7)   Jag   sa   att   Anna   har   inte   sett   Peter
      I   said   that   Anna   has   not   seen   Peter

(8)   Jag   sa   att   Peter$_i$ har   hon   sett   t$_i$
      I   said   that   Peter   has   she   seen

(9) Jag sa   att   Anna inte har   sett Peter
    I   said that Anna not   has   seen Peter

In generative grammar, it is assumed that clause level adverbials have a fixed position (Pollock 1989). What has moved in (7) in relation to (9) is not the negator, but the finite verb of the subordinate clause. Topicalisation is only possible under the same conditions that exist when finite verb movement occurs (Holmberg & Platzack 1995). Thus, in (8), it is also possible to say that the finite verb has left its original position.

    If the negator is in the same place in (7) and (9), it is impossible to tell whether the verb has moved or not if the negator is removed, obtaining (10) below.

(10) Jag sa   att   Anna har   sett Peter
     I   said that Anna has   seen Peter

The question might seem unimportant at first sight. However, the movement or immobility of the verb depends on the presence or absence of other syntactic elements. These elements carry a semantic content, so that (7) and (9) have different meanings. As will become evident throughout the essay, main clause word order makes the *att*-clause in (7) assertive, whereas ordinary subordinate clause word order indicates that the *att*-clause in (9) is not assertive. Since the *att*-clause in (7) is assertive, it cannot be contradicted within the same utterance, as illustrated in (11). The non-assertive *att*-clause in (9) has no such limitations (12). In other words, an *att*-clause such as the one in (10) can receive two different interpretations, depending on which syntactic structure is assigned to it, one corresponding to (7), or one corresponding to (9).

(11) *Jag sa   att   Anna har   inte sett Peter, men det   har   hon
     I   said that Anna has   not   seen Peter   but that has   she

(12) Jag sa   att   Anna inte har   sett Peter, men det   har   hon
     I   said that Anna not   has   seen Peter   but that has   she

In this essay, it will be proposed that the solution to the apparent ambiguity problem in (10) may be found in its prosodic realisation. It will be suggested that (10) has basically two possible prosodic phrasings, (13) and (14). In (13), the clause subordinated to the complementiser *att* constitutes an intonational phrase on its own. This prosodic phrasing indicates that the *att*-clause has the same syntactic and semantic structure as the *att*-clause in (7). In (14), the *att*-clause does not constitute an independent intonational phrase, and thus it can be considered to be structurally similar to (9). The difference between (13) and (14) will be a rise in the F0 contour that appears at the beginning of the *att*-clause in (13), but not in (14).

(13) Jag sa   att   (Anna har   sett Peter)
     I   said that Anna   has   seen Peter

(14) Jag sa   att   Anna har   sett Peter
     I   said that Anna has   seen Peter

The theoretical framework of the essay is presented in section 1 together with a short discussion on the placement of prosody within a general language model. To give a clearer picture of the research question, the structure of *att*-clauses will be reviewed in the following sections. In section 2, their syntactic structure will be presented, and in section 3, their

semantic structure. In section 4, a means for partially disambiguating *att*-clauses, based on which verbs may take one or the other kind as their complements, will be shown. The prosodic solution to the syntactic and semantic ambiguity will appear in section 5. It will be suggested that a rise in the F0 contour appears at the beginning of *att*-clauses of the kind in (7), (12) and (13), but not in *att*-clauses like those in (9), (11) and (14), and that this disambiguates them structurally. Section 6 contains an experiment where the phrase-initial rise is measured for two speakers of East Swedish, one male and one female. Section 7, finally, is a general discussion and a summary of the findings in the essay.

1 THEORETICAL FRAMEWORK

The basic framework of this essay is the model of the language faculty presented in Chomsky (1995a, 2000, 2001a, b). The model consists of four components: a 'lexicon', a 'narrow syntax', a 'phonological component', and a 'semantic component'. The lexicon is basically a "list of exceptions", i.e. a list of everything that cannot be derived from smaller meaningful parts. It therefore consists mostly of morphemes and word-like units, but also of idioms. In narrow syntax, the elements of the lexicon are combined into hierarchical structures. Lexical items introduced in narrow syntax and structures derived in it are called 'syntactic objects'. The combination of syntactic objects can proceed in two ways. A syntactic object may either be combined with another syntactic object distinct from it, or with a syntactic object contained in it. The first case is referred to as 'Merge' and the second as 'second Merge'. Second Merge involves copying of the reintroduced syntactic object. The copy is represented by a 't'[1].

At certain points, the syntactic derivation is transferred to the phonological and semantic components. The semantic component has an interface to conceptual-intentional (C-I) systems. Therefore, it transforms the hierarchical structures derived in narrow syntax to a format legible to these. The first-merged syntactic objects are interpreted in terms of internal semantic relations, such as 'Agent' or 'Patient', whereas the second-merged objects are interpreted in relation to external elements, e.g. in terms of discourse structure. In this way, one constituent may receive two interpretations if it exists in two copies at different places in a structure.

The phonological component has an interface to sensorimotor (SM) systems, and therefore transforms the derivation to a format legible to these. The conditions that the SM interface imposes on the linguistic structure are not directly related to hierarchical relations, but since the linguistic structure is hierarchical in its nature due to conditions from the C-I interface, the linear sound representation must reflect a hierarchical structure in some way.[2]

It is not obvious where prosody should be located in the general model. Chomsky & Halle (1968) showed an extensive correlation between metrical structure and syntactic structure. Selkirk (1984, 1995) and Zubizarreta (1998) have demonstrated further correspondences between syntactic features, especially focus-presupposition relations, and prosody. Psycholinguistic (Kjelgaard & Speer 1999) and neurolinguistic findings (Steinhauer et al 1999, Steinhauer 2003) indicate that the prosodic realisation of a sentence may influence its immediate syntactic and semantic interpretation. It might therefore seem attractive to incorporate a prosodic dimension to narrow syntax, or place a prosody-related component after narrow syntax, before the phonological and semantic components. Zubizarreta (1998) suggests an assertion structure component related to focus-presupposition distinctions, which is directly reflected in prosody, at this location. Her strongest argument is that the focus of a

---

[1] Copying is sometimes conceived of as movement, and t as a 'trace' of the displaced element. The difference between copying and movement has great theoretical implications, but is not particularly relevant for the goals of this essay, so I will refer to the same phenomenon as 'copying', 'movement', or 'dislocation' indistinctly.

[2] See Kayne (1994) and Chomsky (1995b) on this issue. See also Chomsky (2001b) for a different point of view.

clause may consist of a unit that does not correspond to one syntactic object. As Zubizarreta herself notes, such a component violates the inclusiveness condition (Chomsky 1995a:228), stating that no features may be added from the point where lexical items enter a derivation until the outcome of the semantic component.

A violation of the inclusiveness condition implies a complication of the grammar that should preferably be avoided. Therefore, even focus should be viewed as a feature that is introduced with the lexical items and interpreted within the semantic component. In this way, focus is present within the narrow syntax derivation that is transferred to the phonological component. If prosody is simply part of the phonological component, information about focus and syntactic structure may be available to it. In other words, the minimal assumption should still be that prosody forms part of the phonological component that may reflect focus-presupposition distinctions present in the narrow syntax derivation, without any intermediate components.

The intonational contour has shown to be a central cue to syntactic phrasing (Bruce 1977, Selkirk 1984, 1995), and is therefore the prosodic feature that will be considered in this essay.

2 SYNTACTIC STRUCTURE OF *ATT*-CLAUSES

In this section, the syntactic structure of *att*-clauses will be briefly reviewed. It will become clear that *att*-clauses may have two alternative structures, which are evident only in the presence of clause level adverbials or topicalised constituents.

Like all Scandinavian languages, Swedish is a verb-second language (see e.g. Holmberg & Platzack 1995). This means that no more than one constituent is allowed to precede the finite verb of a main clause. Compare the topicalised Swedish main clauses in (15) and (16) with their Modern English counterpart in (17). The Swedish main clause is acceptable when the topicalised object *Peter* is the only constituent preceding the finite verb *såg* 'saw' (15), but unacceptable when both the topicalised object and the subject *jag* 'I' precede the finite verb (16). In English, on the contrary, topicalised main clauses typically exhibit the same word order that is barred in Swedish, with two constituents preceding the finite verb (17).
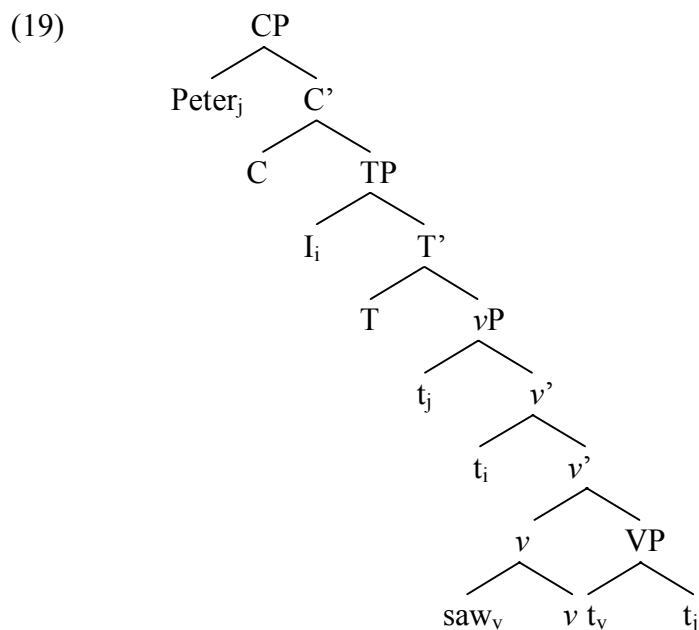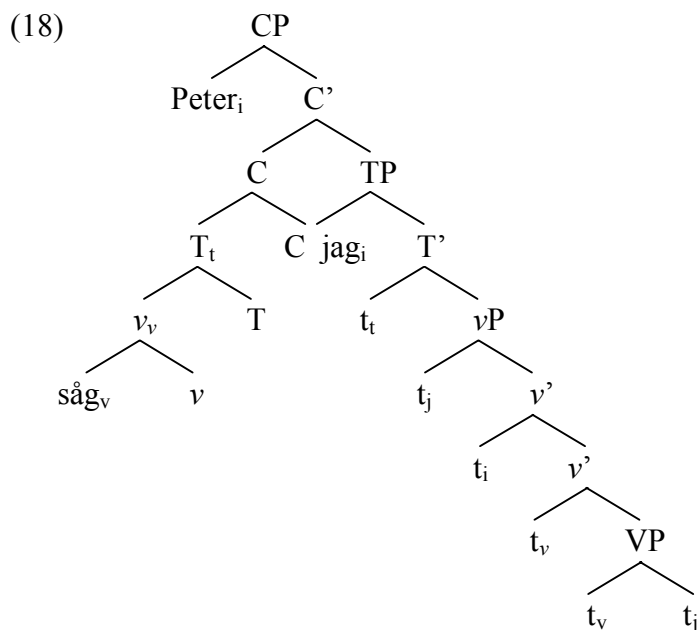
(15) Peter såg jag
     Peter saw I

(16) *Peter jag såg
     Peter I saw

(17) Peter I saw

Platzack (1986) hypothesises that this difference is due to a feature, present in verb second languages, but absent in languages that are not verb second, that requires the root and inflectional heads of the finite verb to adjoin to C, the head of the highest projection in a clause. Thus, the syntactic structure of the Swedish main clause in (15) would be the one presented in (18), whereas the structure of the English main clause in (17) would be the one in (19)[3].

---

[3] The denominations 'CP' and 'TP' are historical artefacts in generative grammar. C and T are 'heads' – basically bound or free morphemes – that may or may not have a phonological content. The heads project to phrases (P). The phrase concept has been present from the very beginning of generative grammar (Chomsky 1957), but has changed radically since then, especially in Chomsky (1994). C is sometimes a complementiser, and was therefore initially called COMP (Chomsky 1981). T stands for 'tense', which together with agreement earlier was a feature of I, an inflection head. Pollock (1989) introduced the 'split I' hypothesis, where T and

(18)

CP
├─ Peter_i
└─ C'
   ├─ C
   │ ├─ T_t
   │ │ ├─ v_v
   │ │ │ ├─ såg_v
   │ │ │ └─ v
   │ │ └─ T
   │ └─ C jag_i
   └─ TP
      └─ T'
         ├─ t_t
         └─ vP
            ├─ t_j
            └─ v'
               ├─ t_i
               └─ v'
                  ├─ t_v
                  └─ VP
                     ├─ t_v
                     └─ t_j

(19)

CP
├─ Peter_j
└─ C'
   ├─ C
   └─ TP
      ├─ I_i
      └─ T'
         ├─ T
         └─ vP
            ├─ t_j
            └─ v'
               ├─ t_i
               └─ v'
                  ├─ v
                  │ ├─ saw_v
                  │ └─ v t_v
                  └─ VP
                     └─ t_j

Verb second is not the only consequence of the finite verb adjoining to C. There are also some peculiarities when it comes to the linear ordering of finite verbs and clause level adverbials, such as *aldrig* 'never' and *inte* 'not'. Clause level adverbials are usually assumed to adjoin to the highest verb phrase[4], which is vP in the present framework[5]. Consider the English (20) and Swedish (21) main clauses below. Their structures are presented in (22) and (23) respectively. In English main clauses (22), the finite verb stays within vP, so the word order is subject – clause level adverbial – finite verb. In Swedish main clauses (23), the root and inflectional

---

Agr(eement) became independent heads in the syntactic derivation. Later, Chomsky (1995) advocated convincingly for the suppression of Agr as an independent head, leaving only T. The status of both C and T as single heads has since been further questioned (Rizzi 1997 and Cinque 1999, respectively).
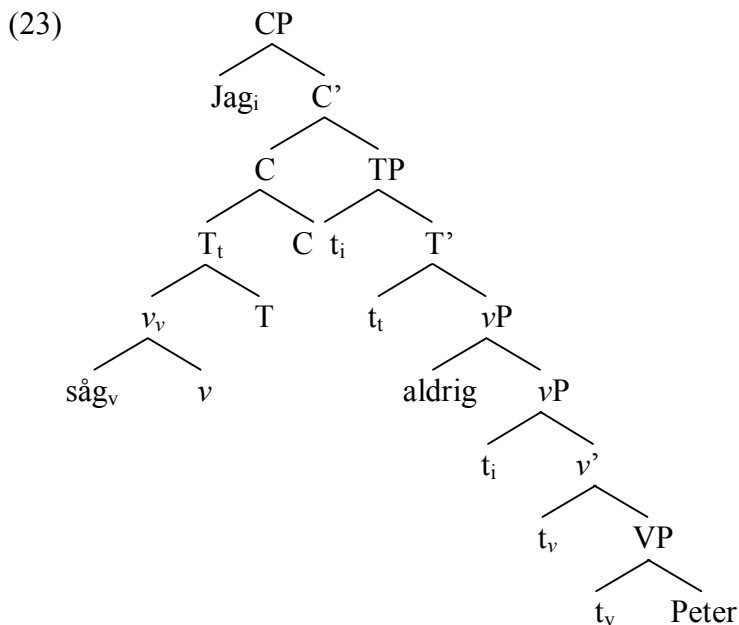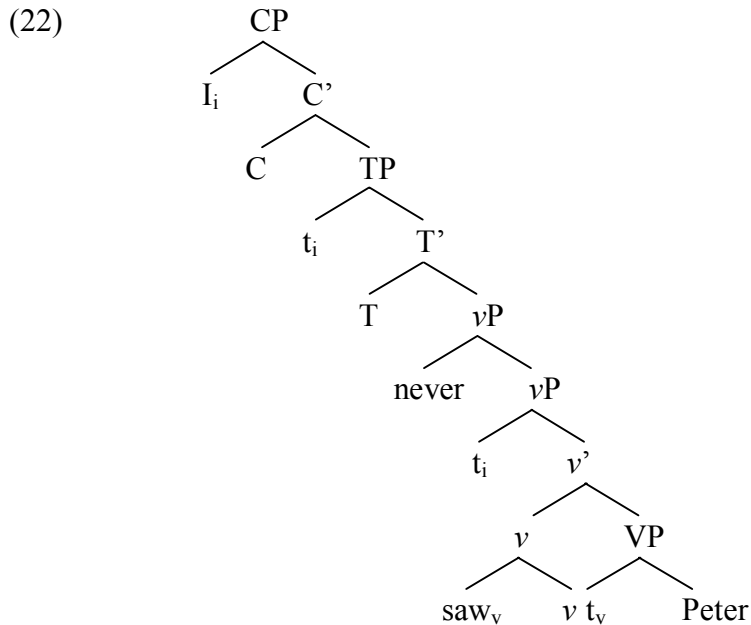
[4] See Holmberg & Platzack (1995) for such an analysis of Scandinavian clause level adverbials.

[5] v is a 'light verb' that, in this case, expresses transitivity. It can be thought of as a causative morpheme (see Hale & Keyser 1993).

heads of the finite verb leave *v*P to adjoin to C, thus crossing the clause level adverbial so that the derived word order is subject – finite verb – clause level adverbial.
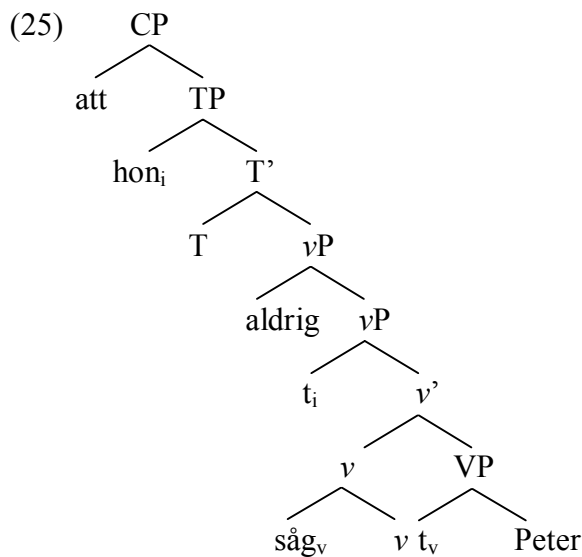
(20) I   never   saw   Peter

(21) Jag   såg   aldrig   Peter
     I   saw   never   Peter

(22)

```
                    CP
                  /    \
                I_i     C'
                      /    \
                     C      TP
                          /    \
                        t_i     T'
                              /    \
                             T      vP
                                  /    \
                               never    vP
                                      /    \
                                    t_i     v'
                                          /    \
                                         v      VP
                                       /  \    /   \
                                   saw_v  v t_v    Peter
```

(23)

```
                     CP
                   /    \
                Jag_i    C'
                       /    \
                      C      TP
                    /   \   /    \
                  T_t    C t_i    T'
                /   \          /    \
              v_v    T        t_t    vP
            /   \                   /    \
         såg_v   v              aldrig    vP
                                        /    \
                                      t_i     v'
                                            /    \
                                          t_v     VP
                                                /    \
                                              t_v    Peter
```

Subordinate clauses are introduced by complementisers that are free morphemes in both English and Swedish. This means that the finite verb cannot adjoin to C in Swedish subordinate clauses. It therefore stays within *v*P, just as was the case in English main (and subordinate) clauses. Swedish subordinate clauses thus have practically the same word order as English main clauses, i.e. subject – clause level adverbial – finite verb. This is illustrated in the subordinate clause in (24) and its syntactic representation in (25).

8

(24) Jag hoppas att hon aldrig såg Peter
     I   hope   that she never saw Peter

(25)
```
              CP
            /    \
         att      TP
                /    \
            hon_i     T'
                    /    \
                   T      vP
                        /    \
                    aldrig    vP
                            /    \
                          t_i     v'
                                /    \
                               v      VP
                             /   \   /    \
                         såg_v   v t_v    Peter
```

If the structure of the subordinate clause in (25) is compared with the main clause in (23), it becomes clear that not only the verb escapes from movement to CP in (25), but also the subject *hon*. Actually, nothing that has phonological content may be raised to CP when a subordinating complementiser is present. A raised phrase would need to merge to the phrase projected by the complementiser, CP, so that it would be extended and the original CP would become an intermediate projection, C'. In Holmberg & Platzack's (1995) framework, the subject occupies this position, called [Spec, C], in unmarked main clauses. Dislocation to [Spec, C] is possible neither for subjects (26), nor topicalised (27) or wh-moved (28) objects in subordinate clauses. It is only possible if the raised phrase continues its movement to a higher position, leaving a phonologically empty copy in [Spec, C] (29)[6].

(26) *... [$_{CP}$ **hon$_i$** [$_{C'}$ att [$_{TP}$ t$_i$ [$_{vP}$ aldrig [$_{vP}$ t$_i$ såg Peter]]]]]
             she   that   never   saw Peter

(27) *... [$_{CP}$ **Peter$_j$** [$_{C'}$ att [$_{TP}$ hon$_i$ [$_{vP}$ aldrig [$_{vP}$ t$_j$ t$_i$ såg t$_j$]]]]]
            Peter   that   she   never   saw

(28) *... [$_{CP}$ **vem$_j$** [$_{C'}$ att [$_{TP}$ hon$_i$ [$_{vP}$ aldrig [$_{vP}$ t$_j$ t$_i$ såg t$_j$]]]]]
            who   that   she   never   saw

(29) [$_{CP}$ vem$_j$ [$_{C'}$ sa$_v$ [$_{TP}$ du$_k$ [$_{vP}$ t$_j$ t$_k$ t$_v$ [$_{CP}$ **t$_j$** [$_{C'}$ att [$_{TP}$ hon$_i$ [$_{vP}$ aldrig [$_{vP}$ t$_j$ t$_i$ såg t$_j$]]]]]]]]]]]
      who   said   you   that   she   never   saw

Even so, topicalisation does appear with some restrictions in subordinate clauses introduced by *att* in Swedish, especially in spoken language. It does not, however, have the form of (26)-(27) above. Rather, it is simply an instance of a more general phenomenon, namely main clause word order in subordinate clauses. Consider (30)-(32) below. The subordinate clause in (30) has the usual subordinate clause word order of the example in (24), i.e. subject – clause level adverbial – finite verb. In (31), however, the word order of the subordinate clause is

---

[6] The structures are simplified in several ways for ease of exposition. See e.g. Platzack (1998) or Radford (2004) for the interpretation of bracket notation.
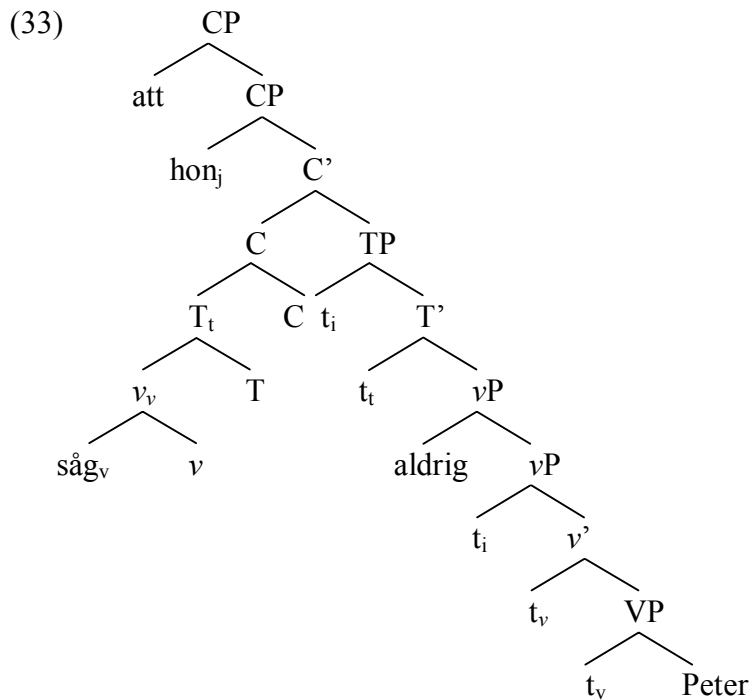
subject – finite verb – clause level adverbial, just as in the main clause in (21). The subordinate clause in (32) contains a topicalised phrase, the object *Peter*, and has the same word order as ordinary topicalised main clauses, such as (15).
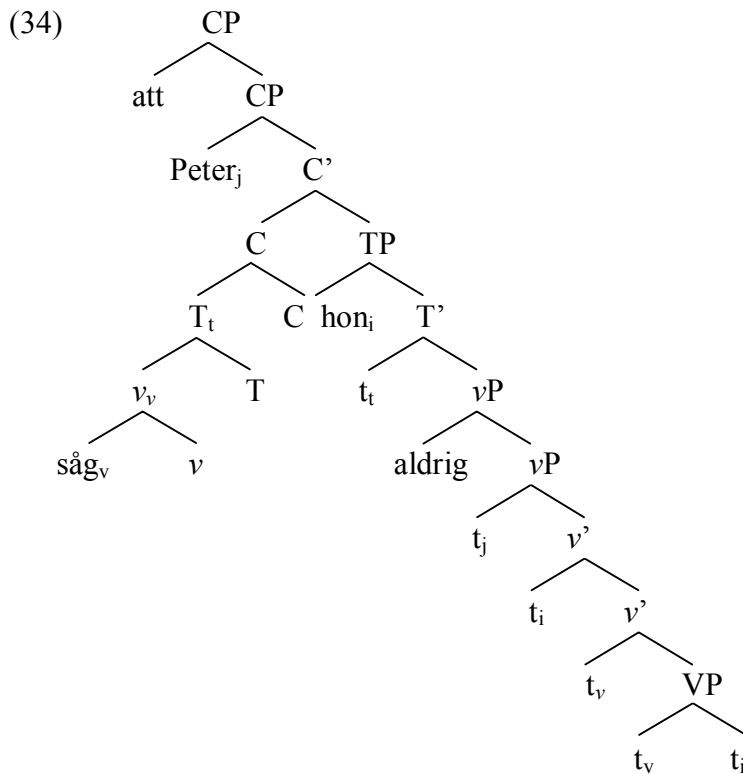
(30) Jag sa   att   hon   aldrig såg   Peter
     I   said that she   never saw Peter

(31) Jag sa   att   hon   såg   aldrig Peter
     I   said that she   saw   never Peter

(32) Jag sa   att   Peter$_i$ såg   hon   aldrig t$_i$
     I   said that Peter   saw   she   never

The simplest assumption is that the complementiser of these sentences simply subordinates main clauses, so that the structure of the subordinate clause in (31) is the one represented in (33), and that of the subordinate clause in (32), the one in (34).

(33)

```
                    CP
                  /    \
               att      CP
                      /    \
                  honⱼ      C'
                          /    \
                        C        TP
                      /   \     /   \
                   Tₜ      C tᵢ     T'
                 /   \            /   \
              vᵥ      T        tₜ      vP
            /   \              / \
         sågᵥ    v        aldrig  vP
                                /   \
                              tᵢ     v'
                                   /    \
                                 tᵥ      VP
                                       /    \
                                     tᵥ      Peter
```

(34)

```
                        CP
                   ┌────┴────┐
                  att        CP
                       ┌──────┴──────┐
                     Peterⱼ          C'
                              ┌───────┴───────┐
                              C               TP
                         ┌────┴────┐      ┌────┴────┐
                        Tₜ         C   honᵢ         T'
                    ┌───┴───┐           ┌───────────┴───────┐
                   vᵥ       T          tₜ                   vP
                ┌───┴───┐                          ┌─────────┴─────────┐
              sågᵥ      v                        aldrig               vP
                                                              ┌────────┴────────┐
                                                             tⱼ                 v'
                                                                        ┌───────┴───────┐
                                                                       tᵢ              v'
                                                                                ┌───────┴───────┐
                                                                               tᵥ              VP
                                                                                        ┌───────┴───────┐
                                                                                       tᵥ              tᵢ
```

This analysis was introduced by Platzack (1986) and was further elaborated in Holmberg & Platzack (1995). As will become evident in the next section, it has some semantic support, and thus it will henceforth be assumed as the structure underlying main clause word order in subordinate clauses[7]. I will follow Holmberg & Platzack (1995) in calling these structures Embedded Main Clauses (EMC) as opposed to ordinary Subordinate Clauses (SC).

The status of an *att*-clause as EMC or SC is evident only if it contains a clause level adverbial or a topicalised (or, more marginally, wh-moved) constituent. Hence, it becomes obvious that the *att*-clause in (35) below is an SC due to the clause level adverbial *aldrig*, and that the *att*-clauses in (36) and (37) are EMCs due to the clause level adverbial in (36), and to the topicalised object *Peter* in (37).

(35) Anna sa [$_{CP}$ att [$_{TP}$ honᵢ [$_{vP}$ aldrig [$_{vP}$ tᵢ såg Peter]]]]
     Anna said   that   she   never   saw Peter

(36) Anna sa [$_{CP}$ att [$_{CP}$ honᵢ sågᵥ [$_{TP}$ tᵢ [$_{vP}$ aldrig [$_{vP}$ tᵢ tᵥ Peter]]]]]
     Anna said   that   she   saw   never   Peter

(37) Anna sa [$_{CP}$ att [$_{CP}$ Peterⱼ sågᵥ [$_{TP}$ honᵢ [$_{vP}$ tⱼ tᵢ tᵥ tⱼ]]]]
     Anna said   that   Peter saw   she

If no clause level adverbials or topicalised elements are present in an *att*-clause, it is impossible to tell whether it is an EMC or an SC. The *att*-clause in (38) may be either an SC (39) or an EMC (40). In other words, if only the word string is taken into consideration, it is ambiguous as regards its syntactic structure.

(38) Anna sa   att   hon såg Peter
     Anna said that she   saw Peter

---

[7] See Stroh-Wollin (2002) for a further elaboration within the framework of Rizzi (1997).

(39)

```
            CP
          /    \
        att     TP
              /    \
           hon_i    T'
                  /    \
                 T      vP
                      /    \
                    t_i     v'
                          /    \
                         v      VP
                       /   \   /    \
                    såg_v  v t_v    Peter
```

(40)

```
            CP
          /    \
        att     CP
              /    \
           hon_j    C'
                  /    \
                 C      TP
               /   \   /    \
             T_t    C t_i    T'
            /   \          /    \
          v_v    T       t_t     vP
         /   \                 /    \
      såg_v   v              t_i     v'
                                   /    \
                                 t_v     VP
                                       /    \
                                     t_v    Peter
```
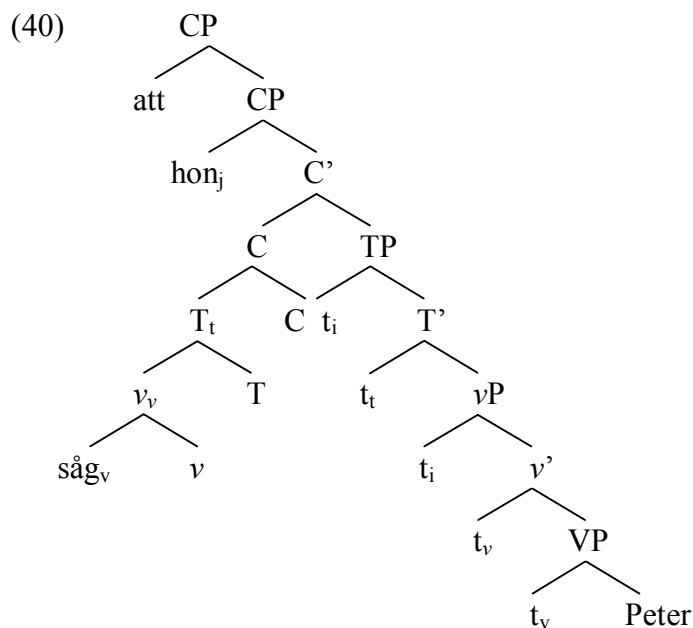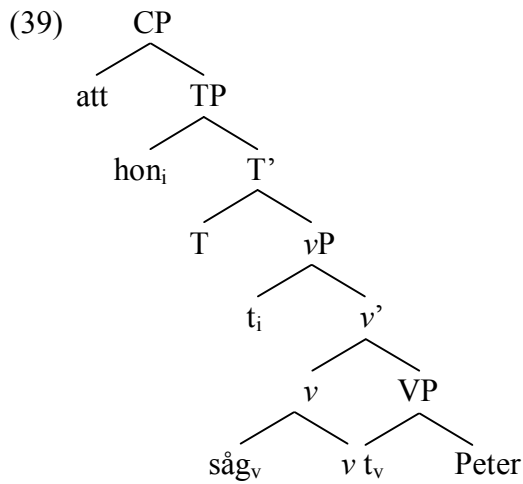
3 SEMANTIC STRUCTURE OF *ATT*-CLAUSES

In the preceding section, it was shown that an *att*-clause that does not contain any clause level adverbials or topicalised elements can be assigned two different syntactic analyses. If the structural ambiguity did not correspond to any semantic ambiguity, it would not matter for communicative purposes and structuring of ideas which of the structures was used, an SC or an EMC. If such were the case, the difference between EMCs and SCs would be an epiphenomenon in the language system. In this section, however, it will become clear that there is indeed a semantic difference between EMCs and SCs: EMCs are assertions, whereas SCs are not.

Chomsky (1995a:294) suggests a strict economy condition on the syntactic derivation. It is formulated as a principle saying that no category enters a derivation if it will not have any effect on the outcome. This means that a category must be legible at least at one of the interfaces of syntax. In other words, there can be no categories that are both semantically and phonologically empty. This reasoning implies that an SC (39) and an EMC (40) must receive different interpretations according to the analysis above, since the EMC contains an extra C. C is usually assumed to express a relation between a clause and its discourse environment. Such a relation is called the 'Force' of the clause (Rizzi 1997) or specification of the 'clause

type' (Chomsky 1995a). Thus, C specifies whether a clause is a question (41), a declarative (42), an imperative (43), etc., or if it is e.g. a temporal restriction of another predicate (44), or a modifier of a nominal expression (45).

(41) Did Peter come?

(42) Peter came.

(43) Come!

(44) She [burst into tears **[when Peter came]**]

(45) [The day **[when Peter came]**] was the worst day that year.

The question is what kind of meaning the second C of an EMC carries. If an EMC is truly an embedded main clause, its C should specify the same clause type as the C of an ordinary main clause does. As can be seen in (41)-(43) above, main clauses may have several kinds of Force. However, questions and imperatives are not so common as EMCs, so I will concentrate on declaratives. To see what is special about declaratives, we may first compare them with questions. The sentences in (41) and (42), repeated here as (46) and (47), have exactly the same propositional content in the same tense, COME(peter) in past tense. The difference between them is the attitude they express towards the truth-value of the same proposition. If a speaker utters the question (46), he asks if the proposition COME(peter) is true or false. If he instead utters the declarative sentence in (47), he *asserts* that the proposition COME(peter) is true. We may therefore follow Hooper & Thompson (1973) in considering declarative main clauses as assertions.

(46) Did Peter come?

(47) Peter came.

It is easy to see that SCs are not assertions in the same sense as declarative main clauses. In (48) below, the speaker asserts that the proposition of the main clause (49) is true, i.e. that Anna said what is expressed in the subordinate clause. He does not, however, specify the truth-value of the proposition P of the subordinate clause, represented in (50). In other words, as far as the speaker is concerned, Peter might have come, but he might as well not have, regardless of what Anna says.

(48) Anna   sa   [att   Peter   inte   har   kommit]
     Anna   said that   Peter   not   has   come

(49) SAY(anna, P)

(50) P: ¬COME(peter)

To demonstrate this difference between main clauses and SCs, an adversative clause negating the propositional content of the preceding clause may be added to a declarative main clause and a subordinate clause respectively. If the truth of the preceding clause is asserted, the result should be semantically deviant. If the truth-value of the preceding clause is unspecified, it should be semantically acceptable. The utterance in (51) below containing an SC, followed by an adversative clause negating its propositional content, is acceptable. This shows that the proposition expressed by an SC is not asserted. The utterance in (52), on the other hand,

contains a declarative main clause followed by the same adversative clause negating its propositional content. This utterance is semantically deviant, indicating that the propositional content of a declarative main clause is asserted.

(51) Jag sa att Peter inte har kommit, men det har han
     I   said that Peter not has come   but that has he

(52) *Peter har inte kommit, men det har han
      Peter   has not come   but that has he

If a declarative EMC has the same Force as a declarative main clause, it should also be semantically deviant in the same context. That this is the case is shown in (53) below[8]. In (53), an EMC is followed by an adversative clause that negates its propositional content. The result is that (53) is semantically odd in the same way as (52). In other words, EMCs are assertions in the same way as declarative main clauses are.

(53) *Jag sa att Peter har inte kommit, men det har han
      I   said that Peter has not come,   but   that has he

An interesting question is what happens to the assertion of the main clause in sentences containing an EMC. Hooper & Thompson (1973) employ tag questions to show which proposition in a sentence is asserted. They claim that the function of tag questions "is to ask for confirmation about the truth of an assertion, or to express doubt or uncertainty about the truth of an assertion" (p. 471). Further, they say that tag questions are generally applied only to main assertions (p. 481). This way they show that e.g. the subordinate clause in (54) may be the main assertion of the sentence (p. 471).

(54) I suppose that acupuncture really works, doesn't it?

The Swedish expression *eller hur* (literally 'or how') is similar to English tag questions in that it asks for a confirmation about the truth of an assertion. If *eller hur* is added to a sentence containing an SC, it is taken to ask for an assertion about the truth of the main clause proposition. Thus, in (55) below what the speaker requests with the "tag question" is a confirmation that he said what is expressed by the subordinate clause. If an EMC is used instead of the SC, *eller hur* requests a confirmation about the truth of the proposition expressed by the EMC. Therefore, the speaker uses the tag question in (56) to get a confirmation about Peter's arrival. It thus seems that an EMC takes over the role of main assertion from the main clause.

(55) Jag sa att Peter inte har kommit, eller hur?
     I   said that Peter not has come   or   how

(56) Jag sa att Peter har inte kommit, eller hur?
     I   said that Peter has not come   or   how

Summarising, it is now clear that the C of EMCs as well as ordinary declarative main clauses expresses an assertion of the truth-value of the proposition that its clause contains. Further, a sentence may probably contain several assertions, but these are ordered hierarchically, and an EMC proposition is higher valued than a main clause proposition. What is more important is that there is a semantic difference between EMCs and SCs, namely that EMCs are assertions,

---

[8] See also Stroh-Wollin (2002).

whereas SCs are not. This means that what may have seemed to be a grammatical curiosity now becomes an issue related to information structure. As was shown in (38)-(40), repeated here as (57)-(59), a subordinate clause that does not contain any clause level adverbials or topicalised elements is ambiguous as regards its syntactic structure. This means that (57) might have either the structure of (58) or that of (59). We have now seen that this syntactic ambiguity truly reflects a semantic ambiguity. The truth of the proposition expressed by the EMC in (59) is asserted, whereas the truth of the proposition expressed by the SC in (58) is not.

(57) Anna sa att hon såg Peter
Anna said that she saw Peter

(58) [$_{CP}$ att [$_{TP}$ hon$_i$ [$_{vP}$ t$_i$ såg Peter]]]
that she saw Peter

(59) [$_{CP}$ att [$_{CP}$ hon$_i$ [$_C$ såg$_v$ C] [$_{TP}$ t$_i$ [$_{vP}$ t$_i$ t$_v$ Peter]]]]
that she saw Peter

4 VERBS THAT TAKE EMCS AS COMPLEMENTS

In this section, a typology of verb expressions that for semantic reasons do not take EMCs as complements will be presented. In this way, the environment in which *att*-clauses are ambiguous will be narrowed down. The unlikelihood of some verb expressions to take EMCs as complements will be seen as a consequence of the assertive interpretation that EMCs receive.

If there are verb expressions whose semantic content is incompatible with the assertiveness of EMCs, their clausal complements would never be ambiguous, but would always be SCs. Four kinds of verb expressions would be expected to be counter-assertive in the relevant sense. First, verb expressions that qualify their complement propositions as unreal or hypothetical should be incompatible with an assertive complement proposition. There would be a semantic clash between the assertion that the proposition is true and the verb expression saying that it is unreal, i.e. that it does not have any truth-value in the real world. This semantic quality of verb expressions has been referred to as "irrealis mode" (Saeed 2003:138). Second, verb expressions that explicitly negate the truth of their complement proposition should be unacceptable with an assertion of the truth of the same proposition. Third, verb expressions that negate the certainty of the truth of their complement propositions should be incompatible with assertions. Finally, an assertive interpretation of a complement should be incompatible with verb expressions that qualify their complements as containing presupposed information. It would be senseless to assert the truth of a proposition that both the speaker and the hearer already assume to be true.[9]

Verbs that typically express irrealis are verbs of volition or wish, such as *vilja* 'to want', or *hoppas* 'to hope'. In (60) below, the proposition of the subordinate clause does not describe something that happens in the real world. Rather, it describes a possible future event among others, which the speaker wants to occur. In other words, it is impossible to assign a truth-value to this proposition, and consequently there is no truth to assert.

---

[9] This idea comes from Hooper & Thompson (1973). They make an extensive semantic classification of verbs that may or may not take 'root transformed' clauses, i.e. clauses that have undergone e.g. topicalisation, as their complements. Their classification will not be considered here, since a "root-transformed subordinate clause" in their sense does not correspond unerringly to the EMC unit presented here. One difference is that EMCs in which the structure is disambiguated by clause level adverbials would not count as root-transformed clauses. Andersson (1975) applies the classification to Swedish clauses, and modifies it.

(60) I want [that Peter comes]

As expected, EMCs are unacceptable as complements to verbs of this class. The verb *vilja* cannot take an EMC as its complement (61), but only an SC (62). The same thing happens with *hoppas* 'hope', which is combined with an EMC in (63), with an unacceptable result, and with an SC in (64), without any problem.

(61)	*Jag	vill	att	Peter	kommer	inte
	I	want	that	Peter	comes	not

(62)	Jag	vill	att	Peter	inte	kommer
	I	want	that	Peter	not	comes

(63)	*Jag	hoppas	att	Peter	kommer	inte
	I	hope	that	Peter	comes	not

(64)	Jag	hoppas	att	Peter	inte	kommer
	I	hope	that	Peter	not	comes

An example of a verb whose main content is the very negation of the truth of its complement proposition is *förneka* 'deny'. This verb can have an SC as a complement (66), but never an EMC (65).

(65)	*Jag	förnekar	att	Peter	kommer	inte
	I	deny	that	Peter	comes	not

(66)	Jag	förnekar	att	Peter	inte	kommer
	I	deny	that	Peter	not	comes

A verb expression that negates the certainty of the truth of its complement proposition is *tvivla på* 'doubt'. In (67), it is shown that there is a semantic clash when this verb is combined with the assertiveness of an EMC. It is of course compatible with the lack of assertion of an SC (68).

(67)	*Jag	tvivlar	på	att	Peter	kommer	inte
	I	doubt	on	that	Peter	comes	not

(68)	Jag	tvivlar	på	att	Peter	inte	kommer
	I	doubt	on	that	Peter	not	comes

Verbs that intrinsically assert the truth of their complement propositions can be included in this class if they are negated. When negated, they also affirm the uncertainty of their complement propositions. An example is *påstå* 'assert'. If this verb is negated, it cannot be combined with an EMC (69). If it is not negated, this is fully possible (70). Not surprisingly, it may also take an SC as a complement, even when it is negated (71).

(69)	*Jag	påstår	inte	att	Peter	kommer	inte
	I	assert	not	that	Peter	comes	not

(70)	Jag	påstår	att	Peter	kommer	inte
	I	assert	that	Peter	comes	not

(71) Jag påstår inte att   Peter inte kommer
     I   assert not that Peter not   comes

An example of a verb that presupposes the truth of its complement proposition is *ångra* 'regret'.[10] It is senseless to regret something that is not true. Since the complement proposition of the verb *ångra* is already assumed to be true, it is also senseless to assert its truth. Therefore, *ångra* can only take SCs as complements (73), but not EMCs, since they assert the truth of the proposition they express (72).

(72) *Jag ångrar att   jag gick inte hem   sen
      I   regret that I   went not   home then

(73) Jag ångrar att   jag inte gick hem   sen
     I   regret that I   not   went home then

Summerising, it is possible to a certain extent to disambiguate the syntactic and semantic structure of *att*-clauses that do not contain any clause level adverbials or topicalised constituents if certain semantic characteristics of the verb expression that takes the *att*-clause as a complement are known. Some verbs are inherently counter-assertive in that they require complement propositions that have no truth-value, or negate, doubt, or presuppose the truth of their complement propositions. Since EMCs are assertions, they are incompatible with such verbs. Hence, clausal complements of these verbs must be SCs.

Still, there remain many verb expressions that are not counter-assertive. These verb expressions may have complements that are SCs or EMCs, depending on what degree of assertion they express. Some examples are given below. In (74) and (77) sentences with EMCs are shown, disambiguated by the clause level adverbial *aldrig* 'never'. In the sentences of (75) and (78), the same verbal expressions subordinate SCs. In (76) and (79), the corresponding sentences with ambiguous subordinate clauses are shown. The subordinate clauses are structurally and semantically ambiguous since they do not contain any clause level adverbials.

(74) Jag menar att   Peter skulle aldrig göra det
     I   mean that Peter would   never   do   it

(75) Jag menar att   Peter aldrig skulle göra det
     I   mean that Peter never   would   do   it

(76) Jag menar att   Peter skulle göra det
     I   mean that Peter would   do   it

(77) Problemet   är   att   Peter skulle aldrig göra det
     The.problem is   that Peter would   never   do   it

(78) Problemet   är   att   Peter aldrig skulle göra det
     The.problem is   that Peter never   would   do   it

(79) Problemet   är   att   Peter skulle göra det
     The.problem is   that Peter would   do   it

---

[10] See also Hooper & Thompson for this issue.

5   THE PROSODIC STRUCTURE OF *ATT*-CLAUSES

5.0 INTRODUCTION

In this section, the possibility of disambiguating *att*-clauses by means of their prosodic realisation will be introduced. The main idea to be explored will be that the prosodic realisation of *att*-clauses is sensitive to the assertive / non-assertive distinction. A reason for exploring this possibility will be the use of prosody for distinguishing other kinds of Force in some languages, e.g. declarative vs. interrogative Force.

In the preceding sections, it was shown that *att*-clauses are syntactically ambiguous if they do not contain topicalised elements or clause level adverbials, and are not subordinate to a counter-assertive verb expression. It was also shown that the syntactic difference between EMCs and SCs mirrors a difference in the speaker's attitude towards the truth-value of the proposition expressed by the *att*-clause. To be more precise, an EMC asserts the truth of its proposition, whereas an SC does not specify anything about the truth-value of its proposition, but relies entirely on its matrix verb for this purpose. Hence, if a speaker wishes to assert the truth-value of an *att*-clause that is not the complement of a counter-assertive verb, he will need to either add a clause level adverbial to it, or topicalise some of its constituents. This, however, is not the primary effect of clause level adverbial insertion and topicalisation. Clause level adverbials primarily modify a predicate, e.g. negating it, as in the case of *inte* 'not' and *aldrig* 'never', or specifying its temporal range, as *alltid* 'always'. When a constituent undergoes topicalisation, it receives a new interpretation, mainly as expressing presupposed information. As a result, a speaker must add information that is not directly related to the assertion structure of the *att*-clause in order to show whether it was meant as an assertion or not.

As is quite obvious, however, this is not the way that human language typically works. We do not for instance have to negate a proposition in order to present it as question. Rather, there are independent mechanisms that clarify the status of a clause as being a question or a declarative sentence. In Swedish and English, word order fulfils this function for yes/no questions. Other languages, like Russian, may make use of bound or free morphemes for the same purpose. Yet other languages, e.g. Spanish, have the same word order in declarative as in interrogative clauses, and do not employ any visible morphemes to specify the Force of a clause. Typically, in these languages, what makes the difference is the prosodic realisation of the clause. In Spanish, the F0 contour usually falls at the end of declarative clauses, whereas it rises at the end of interrogative clauses.

If in some languages the F0 contour is modified at the end of a CP in order to identify its Force, then CP must be recognisable as a unit within the phonological component. Additionally, the Force of C must be able to influence the prosodic realisation of a CP. One might therefore expect the difference between an assertive CP and a non-assertive CP to be reflected in their respective prosodic realisations if there is no other direct means for distinguishing them.

An initial hypothesis is that an EMC constitutes an intonational phrase on its own, in order to show its relative independence as an assertion, whereas the clause that the complementiser of an SC subordinates would form part of a larger intonational phrase. The question is how the intonational phrase containing the EMC would be delimited. The material before the EMC may be the same both syntactically and semantically as for an SC, so no difference would be expected there. Since both EMCs and SCs usually end their matrix clauses, they should be similar at the end. Only the beginning of the clause remains. Bruce (1998:140) describes the

typical F0 contour of independent phrases with no specific focalisation[11] in Swedish as containing two tonal peaks, one at the beginning of the phrase, and the other at the end of the phrase. The resulting pattern is a rise within the first accented word, followed by a fall in the subsequent word, and a rise followed by a fall within the last accented word. The rise and fall at the end of the phrase is often referred to as a 'nuclear tone', which corresponds to a 'nuclear stress', the metrically most prominent part of a phrase (Chomsky & Halle 1968, Selkirk, 1984, 1995, Zubizarreta 1998). The rise within the first accented word can be called a 'phrase-initial rise', a signal that an intonational phrase starts. The phrase-initial rise could be what marks an EMC as an independent intonational phrase in contrast to an SC.

The hypothesis is supported by findings from other languages. 't Hart & Collier (1975) describe an initial rise as a usual feature of the F0 contour of declarative main clauses in Dutch. This rise is most likely a variant of the accent that marks the beginning of an intonational phrase in Bolinger (1965). Beckman & Edwards (1994) illustrate how such a phrase-initial accent usually consists of a rise or a fall, associated with the first accented syllable of a phrase in English.

Further, Seidl (2001) assumes that 'strong phases' (Chomsky 2001a) are the only syntactic units that are visible in the phonological component[12]. Something similar could be a consequence of Chomsky's (2001a, b) proposal that the narrow syntax derivation is transferred to the phonological component phase by phase. Crucially, CP is a strong phase, but not TP. Therefore, CP should be able to constitute an independent intonational phrase (80), whereas TP should not (81).

(80) I consider ([CP that he is intelligent])

(81) *I consider ([TP him to be intelligent])

Seidl's findings strengthen the hypothesis that EMCs are distinguished from SC by constituting their own intonational phrases apart from the complementiser that subordinates them. In an EMC, the complementiser *att* subordinates a CP (82), which is a strong phase, and thus a recognisable unit in the phonological component. The *att* of an SC, however, subordinates a TP (83), which is not recognisable in the phonological component. Therefore, an EMC structure, but not an SC structure, may constitute an intonational phrase that is independent from the complementiser.

(82) Jag   sa   att   [CP mannen ringer inte]
     I   said   that   the.man rings   not

(83) Jag   sa   att   [TP mannen inte   ringer]
     I   said   that   the.man not   rings

The prosodic structure of (82) should be the one represented in (84), and that of (83), the one shown in (85). In (84), there should be a phrase-initial rise within *mannen* and a nuclear tone distributed between *ringer* and *inte*. In (85) the nuclear tone should be the same as in (84), but the phrase-initial rise of *mannen* is expected to be absent.

---

[11] Focus is taken to be relevant information that is not presupposed, i.e. that is not shared by the speaker and the hearer.
[12] This might be true for a stage of the phonological component posterior to linearisation, which must have access to more detailed syntactic structure (Chomsky 1995b).

(84) Jag   sa   att   (mannen   ringer inte)
     I   said   that   the.man   rings   not

(85) Jag   sa   att   mannen   inte   ringer
     I   said   that   the.man   not   rings

If there is a difference in prosodic phrasing between (84) and (85), it is no longer necessary to use a clause level adverbial to differentiate the two sentences. Thus, the subordinate clause of (86) would not be ambiguous when spoken. If it is an EMC, it gets the prosodic phrasing indicated in (87); if it is an SC, the prosodic phrasing is as represented in (88).

(86) Jag   sa   att   mannen   ringer
     I   said   that   the.man   rings

(87) Jag   sa   att   (mannen ringer)
     I   said   that   the.man rings

(88) Jag   sa   att   mannen   ringer
     I   said   that   the.man rings

In the following sections, the phonetic realisation of the phrase-initial rise will be overviewed. In order to analyse intonational patterns in Swedish, basic word accent patterns must be considered. The next section will therefore contain a short review of Swedish word accents.

5.1 SWEDISH WORD ACCENTS

Bruce (1998) suggests that a phrase-initial rise is likely to follow the word accent of the first accented word. In Swedish, there are two word accents, accent I and accent II. The difference between accent I and accent II words lies in the timing of their peaks (Bruce 1977) in East and West Swedish (Bruce & Gårding 1978). Both accent I and accent II words have a tonal gesture with two high peaks when they are focussed, and one high peak when they are de-focussed. The difference is that the peaks of accent I words occur earlier than those of accent II words.

In Figure 1[13], the tonal gestures of focussed accent I and accent II words are shown. Consider first the accent-I pattern. It begins with a high tone, henceforth 'H', in the syllable preceding the stressed syllable. A fall from the H leads to a low tone, 'L' at the beginning of the stressed vowel. The L associated with the stressed syllable is called the 'word tone' and is represented with an asterisk. After the L*, a rise starts within the stressed syllable if the word is focussed. This rise is often referred to as a 'focal rise' ('sentence accent rise' in Figure 1). The focal rise ends in a H peak somewhere at the end of the stressed syllable or in the beginning of the following syllable. If the word is utterance final, there is also a fall within its last syllable as part of the nuclear tone, termed 'terminal juncture fall'. If an accent I word is mono- or disyllabic and its first syllable is stressed, the first peak and the word accent fall may occur within the last syllable of the preceding word (Bruce 1977), or simply not be realised, if the accent I word is phrase initial.

The accent II pattern starts with a rise to a high word tone, 'H*' occurring at the beginning of the stressed vowel. The word accent fall starts within the same vowel and ends in an L at the end of the first syllable. If the word is focussed, there is a focal rise starting at the beginning of the following syllable. The terminal juncture fall occurs within the last syllable if the word is utterance final. Accent II words never have less than two syllables.

---

[13] From Bruce (1977). The tone labels are added in accordance with the same figure in Bruce (1998).

20
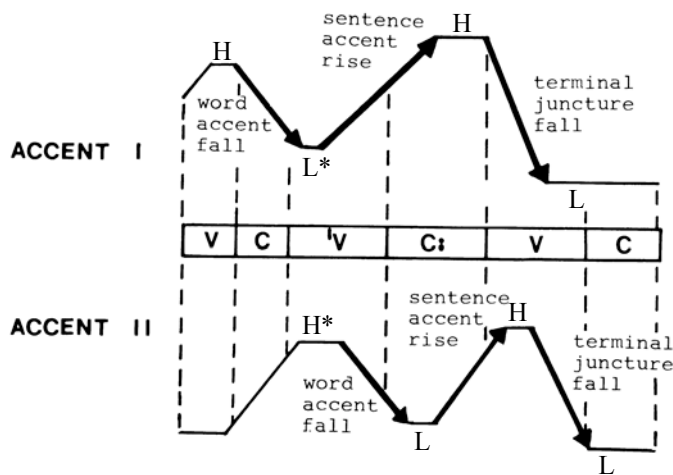
Figure 1. Accent I and accent II (Bruce 1977)

5.2 DISTRIBUTION OF THE PHRASE-INITIAL RISE

In this section, the phonetic realisation of evident EMCs and SCs will be presented. It will become obvious that EMCs start with a rise in the F0 contour that merges with the first H peak of the second word of the phrase, whereas SCs do not. The rise will be shown to follow Swedish word accent patterns.

If evident EMCs and SCs are recorded, it is easy to see that a phrase-initial rise does occur as predicted in the first accented word of EMCs, but not in the first accented word of SCs. In order to show how this rise is distributed over accent I and accent II words, a male native speaker of East Swedish recorded four pairs of sentences consisting of a main clause and a subordinate clause in the speech analysis tool Praat. All subordinate clauses were intransitive and contained three disyllabic words. Of these, the first was a full noun, and the second a verb. The noun and the verb were the same in the subordinate clauses of both sentences in each pair. The third word was the clause level adverbial *inte* 'not' in the subordinate clause of one of the sentences (89), and the VP adverbial *lite* 'a little' in the other (90). The clause level adverbial *inte* in final position makes the subordinate clause an evident EMC. The adverbial *lite*, on the other hand, may occur in final position in both SCs and EMCs, and thus it leaves the clause ambiguous as to its syntactic structure. In these sentences, however, the verb that takes the subordinate clause as a complement is *hoppas* 'hope'. Since this verb is one of the counter-assertive (irrealis) verbs, which cannot take an EMC as a complement, it disambiguates the subordinate clause as an SC. As a result, one of the members of each sentence pair contained an evident EMC (89), whereas the other contained an evident SC (90). Further, the two subordinate clauses of each sentence pair were fully comparable as to their prosodic realisation, since both *inte* and *lite* are accent II words. The first two words appeared in all possible word accent combinations.

All of the sentence pairs are presented below. In order to get comparable prosodic results and to avoid a focal rise on the initial noun that could be confused with a phrase-initial rise, context questions[14] giving all lexical items except the verb of the subordinate clause as presupposed information, and presenting the verb as focus, were provided. These are shown in italics above each sentence.

---

[14] 'Context questions' are questions that present some information as given, in order to elicit focus on elements expressing new information. The expression can also be used in a more abstract sense, to designate the question that would correspond to a certain focalisation. See e.g. Bruce (1977) and Zubizarreta (1998).

In the first pair, (89) and (90), both the noun, *mannen* 'the man', and the verb, *ringer* 'rings', are accent I words.

(89) CQ: *Vad   sa   du   att   mannen inte gör?*
                  What   said you   that   the.man   not   does

        EMC: Jag sa   att   mannen   ringer   inte
                I   said that the.man   rings   not

(90) CQ: *Vad   hoppas du   att   mannen gör?*
                  What   hope   you   that   the.man does

        SC: Jag hoppas att   mannen   ringer   lite
                I   hope   that   the.man   rings   a.little

The subordinate clauses in (91) and (92) consist of the accent I noun *mannen* 'the man' and the accent II verb *målar* 'paints':

(91) CQ: *Vad   sa   du   att   mannen inte gör?*
                  What   said you   that   the.man   not   does

        EMC: Jag sa   att   mannen målar inte
                I   said that the.man   paints not

(92) CQ: *Vad   hoppas du   att   mannen gör?*
                  What   hope   you   that   the.man does

        SC: Jag hoppas att   mannen målar lite
                I   hope   that   the.man   paints a.little

In (93) and (94), the noun *Anna* 'Anna' has accent II, and the verb *ringer* accent I:

(93) CQ: *Vad   sa   du   att   Anna inte gör?*
                  What   said you   that   Anna   not   does

        EMC: Jag sa   att   Anna   ringer inte
                I   said that Anna   rings   not

(94) CQ: *Vad   hoppas du   att   Anna gör?*
                  What   hope   you   that   Anna does

        SC: Jag hoppas att   Anna   ringer lite
                I   hope   that   Anna   rings   a.little

Both the noun *Anna* and the verb *målar* 'paints' in (95) and (96) have accent II:

(95) CQ: *Vad   sa   du   att   Anna inte gör?*
                  What   said you   that   Anna   not   does

        EMC: Jag sa   att   Anna   målar inte
                I   said that Anna   paints not

(96) CQ: *Vad* *hoppas* *du* *att* *Anna* *gör?*
          What   hope   you   that   Anna   does

      EMC: Jag hoppas att Anna målar lite
           I   hope   that Anna paints a.little

In Figure 2[15], the waveform and F0 contour of the realisation of the sentence containing an EMC in (89) is shown. Both the noun and the verb are disyllabic and have accent I. The F0 contour of the first word, the unfocussed noun *mannen*, starts with a word accent fall to an L* and shows no focal rise in the first syllable. A rise does occur, but not until the second syllable of the same word. The F0 contour peaks at the end of the nucleus of the second syllable; then it declines slightly to reach the L* of the first syllable in the focussed verb *ringer*. As was mentioned in the preceding section, the first H peak of an accent I word may occur within the last syllable of the preceding word. In this way, the peak resulting from the rise in the noun coincides with the first H of the verb. The verb is a focussed accent I word, so the F0 contour rises within its stressed first syllable.
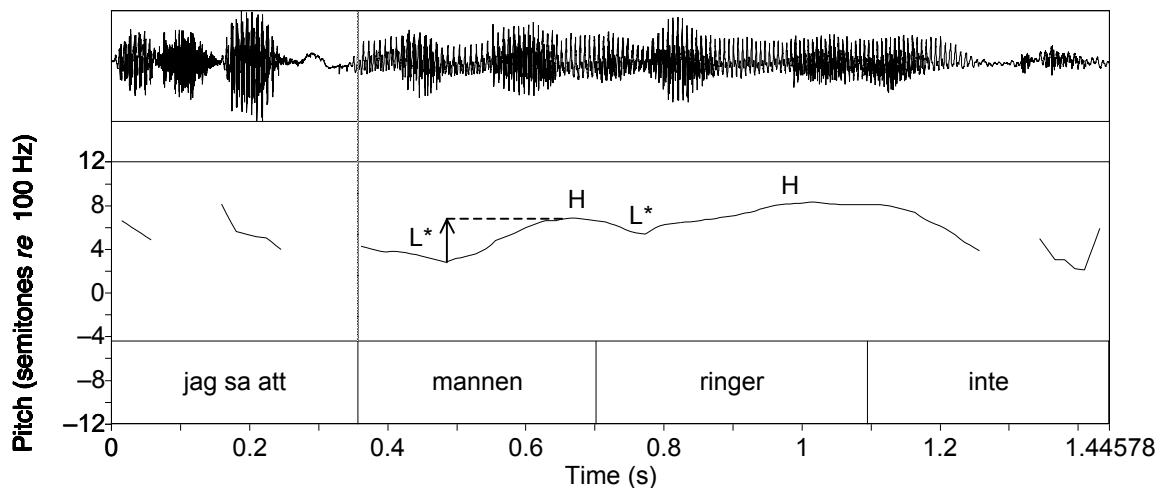
Figure 2. EMC with accent I + accent I

Compare now the realisation of the EMC in (89) with that of the SC in (90), presented in Figure 3. In the SC, as in the EMC, the F0 contour of the noun starts with a word accent fall to the L* within the first syllable. However, there is no rise within the second syllable of the noun, but rather the F0 contour continues descending until it reaches the L* in the first syllable of the accent I verb. At that point, there is a rise signalling that the verb is focussed.

    The prosodic difference between an EMC and an SC consisting of a disyllabic unfocussed accent I noun followed by a disyllabic focussed accent I verb is thus a rise in the second syllable of the noun, occurring in the EMC, but not in the SC. The rise follows the word accent of the two words, ending in a peak that coincides with the first H of the second accent I word, although before the actual starting point of the word.

---

[15] The F0 contour is measured in semitones, a logarithmic scale. Twelve semitones correspond to a doubled value in the Hertz scale. Hence, if 0 semitones = 100 Hz, then 12 semitones = 200Hz, and 24 semitones = 400Hz. "*re* 100Hz" means that the reference value to the semitone scale in Hertz is 100, i.e. 0 semitones = 100Hz.
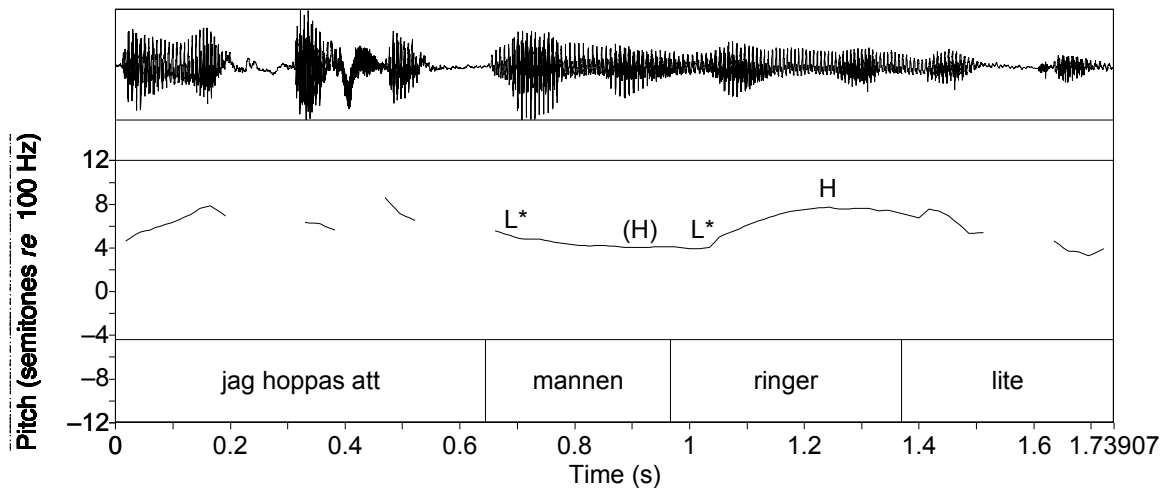
Figure 3. SC with accent I + accent I

The prosodic realisation of the EMC in (91) is shown in Figure 4. Here, the first word, *mannen*, is the same accent I noun as before, but the subsequent verb, *målar*, has accent II. The F0 contour of the first word initially follows the same pattern as the first word of the EMC in Figure 2. It starts with a word accent fall down to the L* and remains low throughout the first syllable. Then, in the second syllable, it rises. At this point, the difference with Figure 2 is found. While the F0 contour rose, peaked and fell within the second syllable of the accent I word followed by another accent I word in Figure 2, the rise in the second syllable of the first word in Figure 4 does not decline, but rather merges to the H* peak of the following accent II verb *målar*. Again, the peak following the rise of the first word corresponds to the word accent tone of the second word.
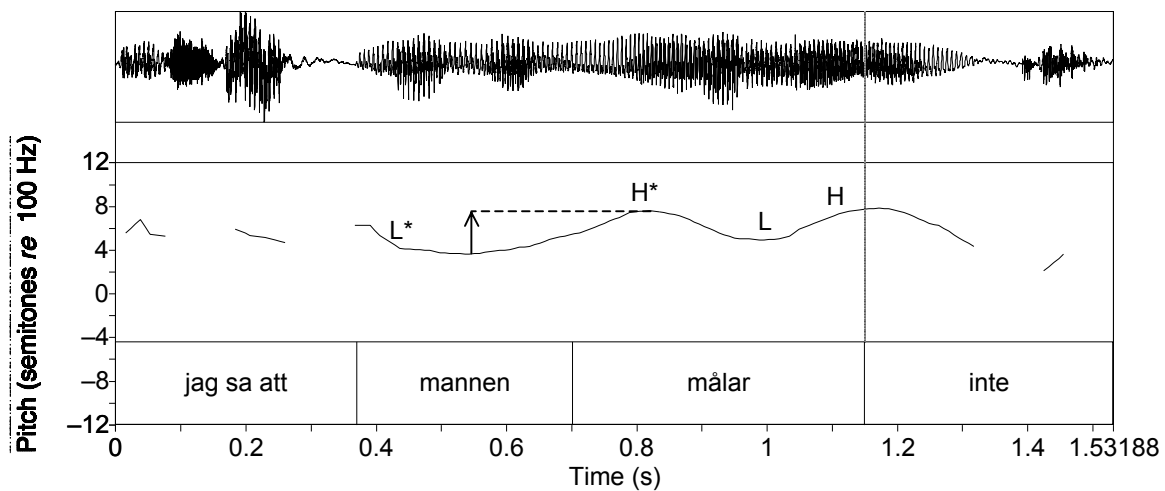
Figure 4. EMC with accent I + accent II

The SC counterpart to the EMC in Figure 4 is the subordinate clause in (92). Its phonetic realisation is represented in Figure 5. At the beginning, there is again a great similarity with the accent I + accent I pattern, which was illustrated for SCs in Figure 3. In the first syllable of the clause-initial noun, the F0 contour falls to the L*. It remains low throughout the whole

word, i.e. there is no rise like that which occurred in the second syllable in Figure 2 and Figure 4. Then the great difference between the accent I + accent I pattern and the accent I + accent II pattern comes. Whereas the prosodic difference between the EMC in Figure 2 and the SC in Figure 3, where the verb had accent I, was concentrated in the F0 pattern of the noun, in the SC in Figure 5, where the verb has accent II, even the verb is associated with a different prosodic pattern as regards the EMC in Figure 4. In the EMC, the accent II verb following an accent I noun had a much higher first peak than the same verb in the SC in Figure 5 has. What seems most probable is that the relative height of the verb's word accent H* is actually the same in both the EMC and the SC. However, as there is no boundary between the phrase-initial rise and the first peak of the accent II verb, the height of the peak in the EMC is the sum of the rise and the normal height of the H*.
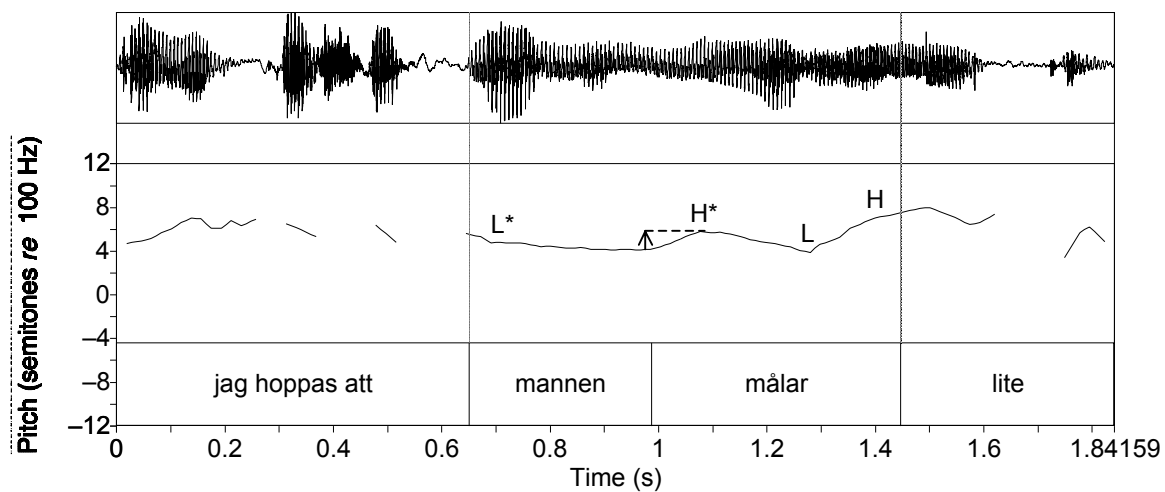
Figure 5. SC with accent I + accent II

If the EMC consists of an accent II noun and an accent I verb, as in (93), the phonetic realisation is as represented in Figure 6. The word accent H* in the stressed vowel falls to an L within the coda of the first syllable, the first mora of a long /n/. Within the next mora of the long /n/, which is the onset of the second syllable, the F0 contour rises. It reaches its peak at the boundary between the second syllable of the noun and the first syllable of the verb, coinciding approximately with the first H peak of the accent I verb. Then there is a fall to the L* of the verb. After that, the focal rise of the verb occurs as expected.
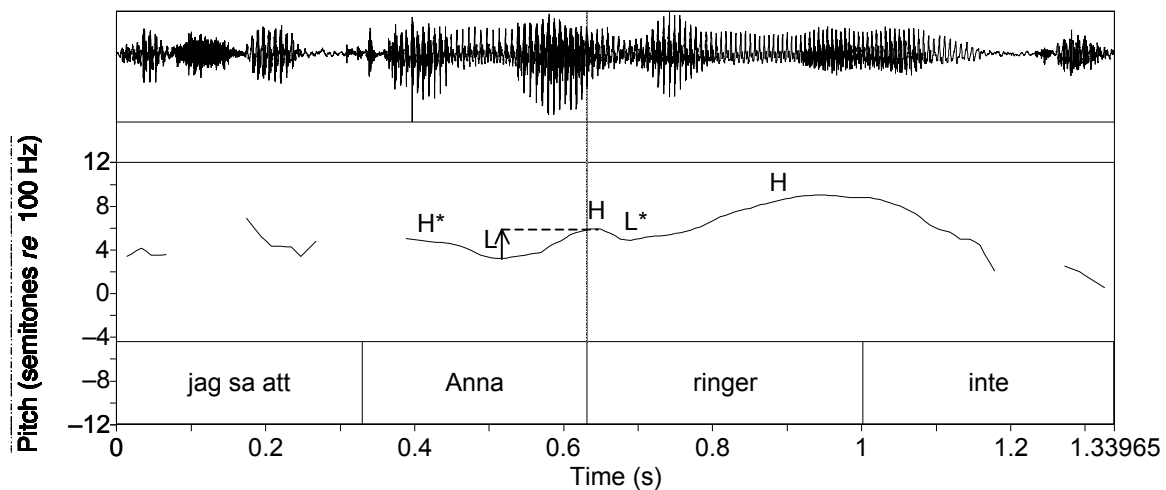
Figure 6. EMC with accent II + accent I

In Figure 7, the SC corresponding to the EMC in Figure 6 is shown. This is the SC of example (94). The noun in the SC behaves quite differently from that of the EMC. Most significant is the fact that there is no rise within the accent II noun. It starts with a H* and a subsequent word accent fall. The fall continues until the L* of the subsequent accent I verb. Then, there is a focal rise in the verb, perhaps a little bit earlier than expected.

The main difference between an EMC and an SC consisting of an unfocussed disyllabic accent II noun and a focussed disyllabic accent I verb, is then the rise that appears in the second syllable of the noun in the EMC of Figure 6 but is absent in the corresponding noun in the SC of Figure 7. The rise peaks at the expected location of the first H peak of the accent I verb.
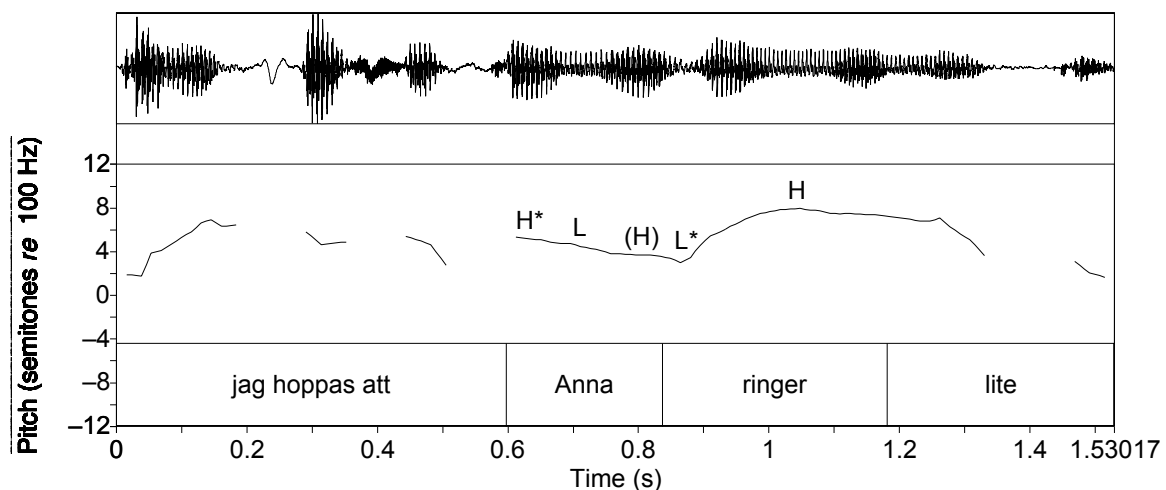
Figure 7. SC with accent II + accent I

The last F0 pattern is that of the accent II + accent II examples. The phonetic realisation of the EMC in (95) is represented in Figure 8 below. The accent II noun starts with a H*; then the word accent fall follows. The fall continues until the end of the second syllable, where the phrase-initial rise begins. The rise ends in a high peak at the beginning of the stressed vowel of the accent II verb, coinciding with the H* of the verb. After that, the word accent falls to a

26

low tone, and the subsequent focal rise of the verb occurs without any deviation from what is expected.
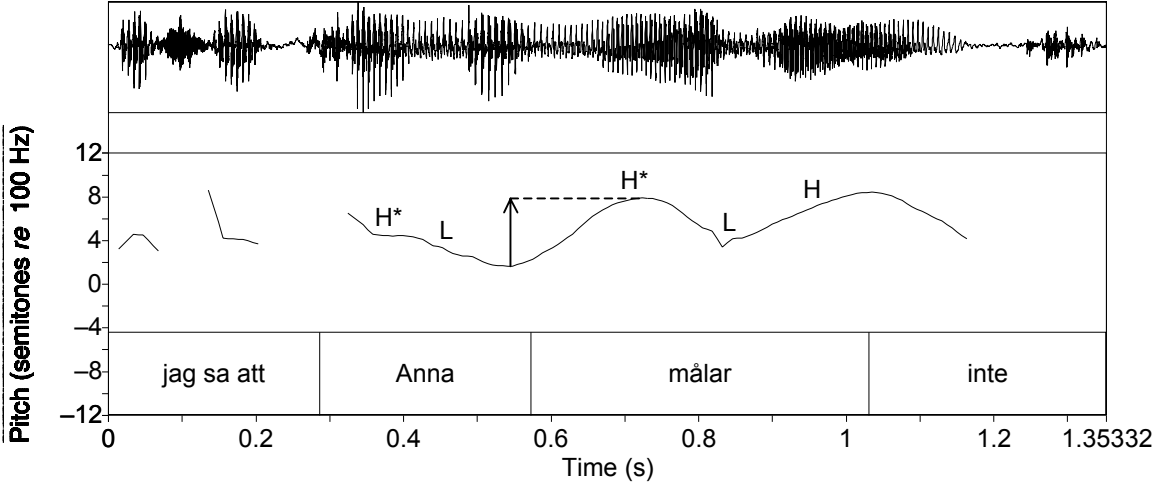
Figure 8. EMC with accent II + accent II

The SC of (96), presented in Figure 9, shows an F0 pattern very similar to its EMC counterpart at the beginning. Again, the accent II noun starts with a H* and a following word accent fall to an L. The rise towards the H* of the following accent II verb appears almost at the same point as in Figure 8, just a little bit later. However, the H* of the verb in the SC in Figure 9 is much lower than it was in the corresponding EMC in Figure 8. This is exactly what happened in the accent I + accent II examples of Figure 4 and Figure 5. As in that case, the explanation is that the H* is added to the phrase-initial rise, so that the relatively higher word accent H* in Figure 8 is the result of a combination of both.
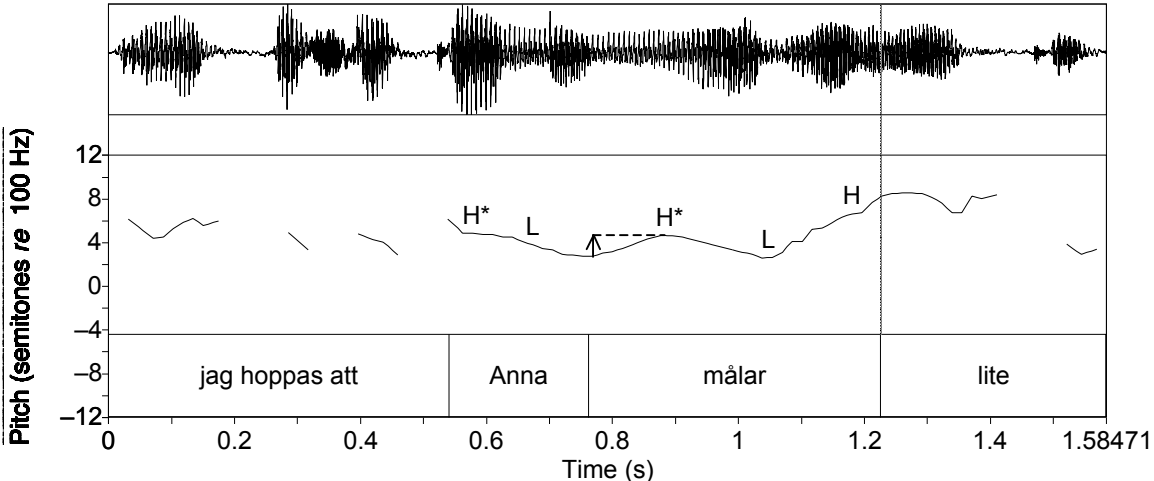
Figure 9. SC with accent II + accent II

Some observations about the phrase-initial rise of EMCs can now be made. First, if the second word is focussed and has accent I, the rise is restricted exclusively to the first word (Figure 2 and Figure 6). If the second word has accent II, the rise of the first word is merged with the first peak of the second word (Figure 4 and Figure 8). This is not surprising; if the second word has accent I, the F0 contour must reach the L* within the first syllable, so the rise has to

occur before that. Further, if the rise is to be associated with word accents, its culmination should occur where an H peak is expected for disyllabic accent I words, i.e. within the last syllable of the preceding word. The first high peak of disyllabic accent II words, on the other hand, is the H* of their first syllable, so the phrase-initial rise in the first word may land within the second word.

Second, the phrase-initial rise usually occurs later than a focal rise would. In the accent I words, the rise occurs not in the first syllable, as would normally be the case for focussed accent I words, but in the second (Figure 2 and Figure 4). When two accent II words follow each other, the rise occurs almost at the same time as the usual rise to reach the H* of the second accent II word (Figure 8 and Figure 9, respectively). The difference is rather the height of the H* peak. It is significantly higher when it is the result not only of the H*, but also of the phrase-initial rise (Figure 8). Only when the second word has accent I and the first one accent II (Figure 6), does the phrase-initial rise occur more or less where it would be expected if it were a focal rise. This is again the result of the L* in the first syllable of the second word. The phrase-initial rise must reach its peak within the second syllable of the first word in order to reach the low word tone in the first syllable of the second word, and it is in any case preferable that the rise follows the word accent of the verb, coinciding with its first H peak.

Compare next the accent I + accent II pattern (Figure 4) with the accent II + accent II pattern (Figure 8). As we have seen, an accent II word in second position permits a very late timing of the phrase-initial rise. Nevertheless, there is a difference in timing when the first word has accent I and when it has accent II. In the accent I word, the rise starts at the beginning of the second syllable, whereas in the accent II word it starts only at the end of the second syllable. This probably reflects the general difference in timing between accent I and accent II words. The accent gesture of accent I words is timed earlier than that of accent II words. If the phrase-initial rise is preferred to occur later than a focal rise would, that would be later for accent II words than for accent I words, because the focal rise would appear later.

It may be concluded from this section that a phrase-initial rise associated with Swedish word accents occurs within the first accented word of EMCs, but is absent in SCs. It is thus plausible that speakers distinguish EMCs from SCs by means of different prosodic realisations.

A further question is how we know that the phrase-initial rise is not actually a late focal rise of some sort, giving information about the first word of the CP rather than about the Force (see section 3) of the whole CP, as observed by Horne et al (2001). In the following section, the EMCs in (89), (91), (93), and (95) will be presented with a focal rise at the first word in order to exclude at least the possibility that the phrase-initial rise would be an ordinary focal rise.

5.3 EMCs WITH FOCAL RISE

In the preceding section, the distribution of the phrase-initial rise over disyllabic accent I and accent II words in EMCs containing three words was shown. In order to show that the rise cannot be equated with focal rise, the sentences containing EMCs, i.e. (89) (Figure 2), (91) (Figure 4), (93) (Figure 6), and (95) (Figure 8), were recorded with a context question eliciting focus on both the noun and the verb of the EMCs. Recall that in the examples in 5.2 only the verb is assumed to be focussed. The context question was the same for all sentences (97).

(97) Vad   sa   du   att   vem   inte   gör?
     What   said you   that   who   not   does

Figure 10 shows the same sentence as Figure 2, i.e. (89), now with focus on both the noun and the verb. The difference between the EMCs in Figure 10 and Figure 2 is striking. Whereas in Figure 2, the rise did not appear until the second syllable of the noun *mannen*, it occurs already between the onset and the nucleus of the stressed first syllable of the noun in Figure 10. This is in line with what would be predicted for a focal rise. After the peak, there is a fall down to the L* of the verb. The verb is realised in more or less the same way as in Figure 2.
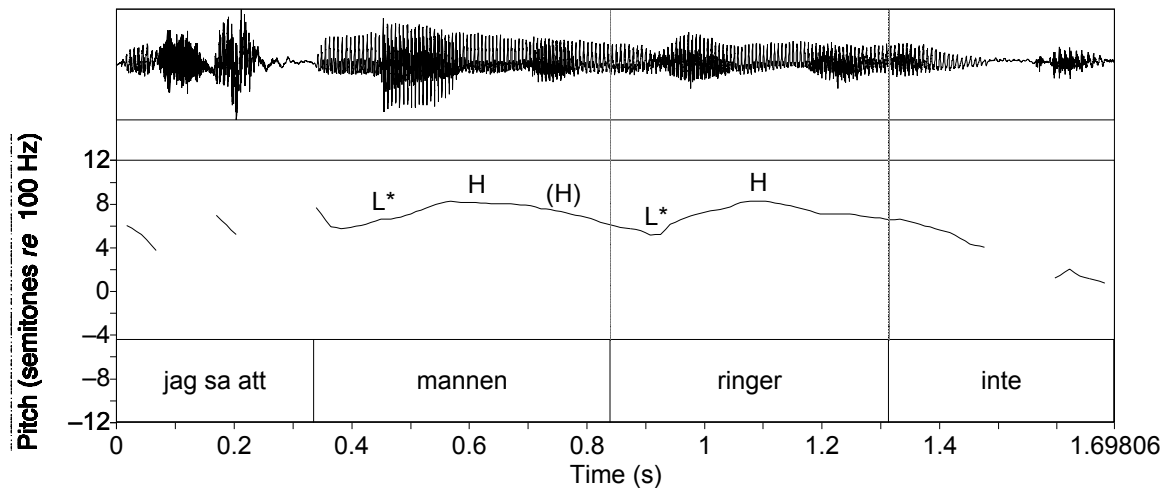
Figure 10. Focussed EMC with accent I + accent I

Compare next the version of the EMC in (91) that appears in Figure 11 with that of Figure 4. The EMC consists of an initial accent I noun followed by an accent II verb. Whereas in Figure 4 only the verb was focussed, both the noun and the verb are focussed in Figure 11. Something similar to what is observed in Figure 10 is repeated in Figure 11. A rise starts between the onset and the nucleus of the stressed syllable of the accent I noun. Then a fall beginning in the long /n/ between the first and the second syllable follows. There is a slight rise to reach the H* of the accent II verb. Note that the H* peak of the verb is much lower in this realisation than it was in Figure 4. Actually, it is more similar to the H* of the verb of the SC that corresponds to (91), shown in Figure 5. This indicates that the phrase-initial rise coincides with the focal rise in Figure 11.
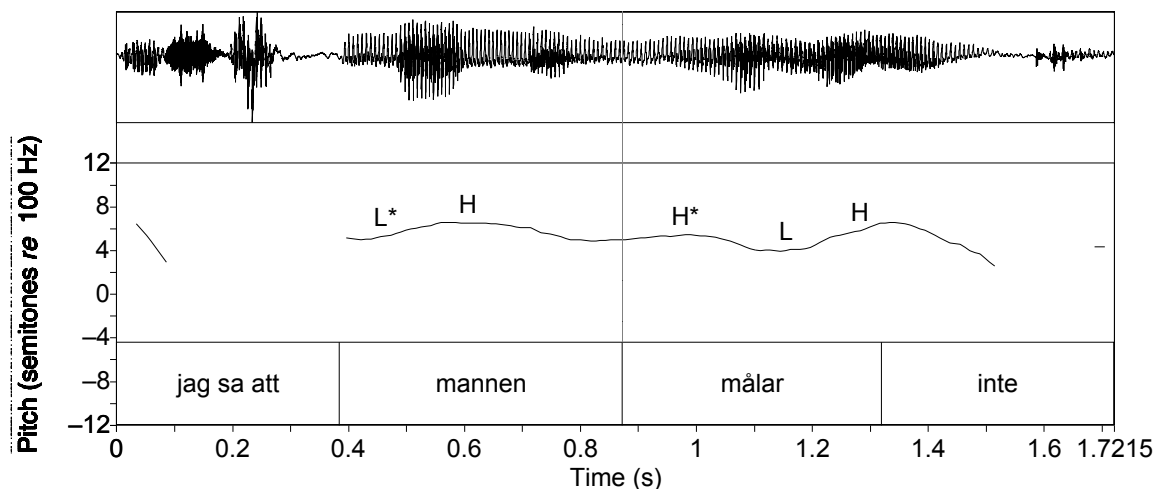
Figure 11. Focussed EMC with accent I + accent II

Consider next Figure 12, showing the realisation of the EMC in (93) with both the accent II noun and the accent I verb focussed. The F0 pattern of Figure 12 is quite similar to that of Figure 6. As mentioned in the preceding section, this is because the F0 contour must reach the first H peak of the accent I verb early enough to be in time for the L* at the beginning of the nucleus of the first syllable of the accent I verb. Therefore, the phrase-initial rise in Figure 6 coincides approximately with the focal rise in Figure 12. However, the fall from the first H peak of the verb to its L* is less steep and the focal second peak of the verb is lower in Figure 12 than in Figure 6.
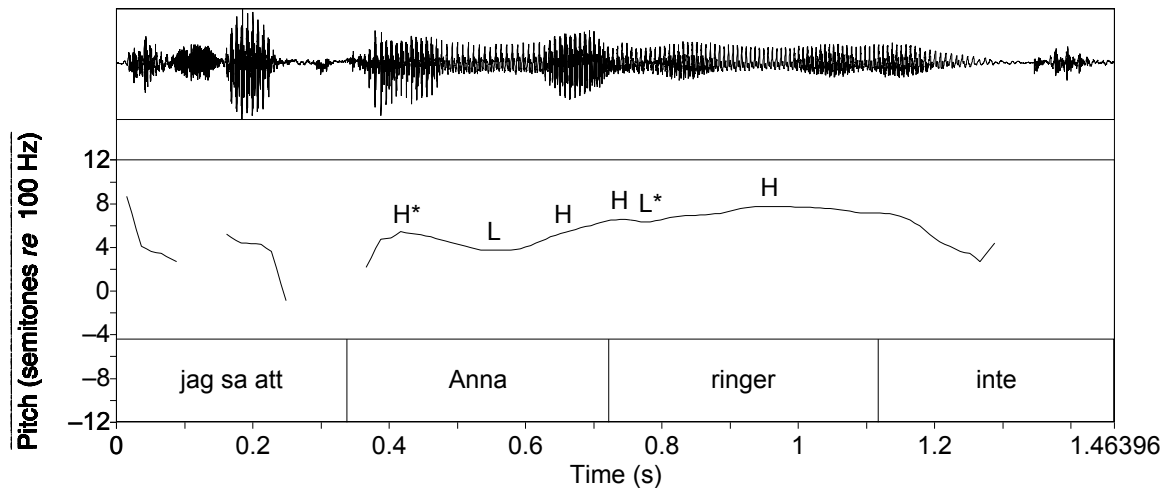
Figure 12. Focussed EMC with accent II + accent I

In Figure 13, a realisation of (95) where both the accent II noun and the accent II verb are focussed is presented. If it is compared with the unfocussed version in Figure 8, the timing difference of the rise in the noun is again striking. Whereas in Figure 8 the rise begins later than would be predicted for a focussed accent II word, in Figure 13 it looks clearly like a focal rise with respect to timing. It starts at the onset /n/ of the second syllable of the noun.
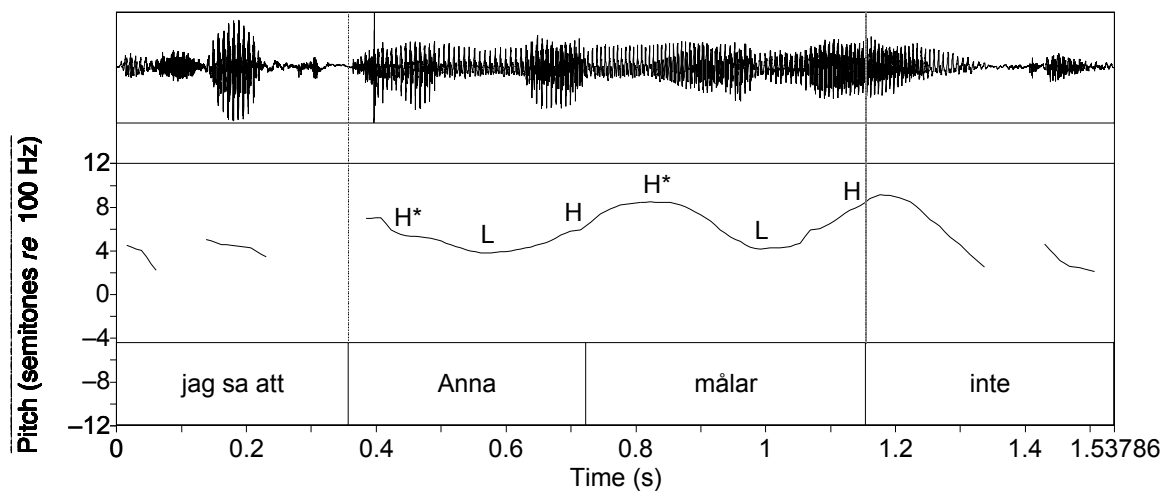
Figure 13. Focussed EMC with accent II + accent II

Concluding this section, it is clear that the phrase-initial rise observed in the first words of the EMCs of Figure 2 - Figure 9 is not a focal rise. The clearest difference between a focal rise and the phrase-initial rise is that the phrase-initial rise is timed later when possible. This difference was obvious in all word accent combinations except accent II + accent I.

6 THE PHRASE-INITIAL RISE IN A PRODUCTION EXPERIMENT

6.0 INTRODUCTION

It has now been shown that there is a phrase-initial rise in the prosodic realisation of EMCs that is absent in SCs, and that this rise is distinct from an ordinary focal rise. The examples above were mainly meant as a demonstration of how the phrase-initial rise may be realised. To find a statistically significant difference in the realisation of them, an experiment was performed.

In a pilot study, a native speaker of East Swedish was instructed to read a list of sentences, some of which contained evident EMCs and SCs. The result was that a rise in the F0 contour similar to the one appearing in the EMCs of Figure 2 - Figure 9 was present at the beginning of many of the EMCs, but in none of the SCs. Based on these results, the initial hypothesis for the experiment was that there would be a difference between the initial part of the F0 contour of EMCs and SCs.

Sentences containing evident EMCs (98) and SCs (99) were used. Both the EMCs and the SCs contained a disyllabic noun followed by a disyllabic verb. After the verb, a clause level adverbial followed in the EMCs, and a VP adverbial in the SCs.

				L* (H)	L* H	
(98) Jag	sa	att	ölen	rinner	inte	
	I	said	that	the.beer	flows	not

				L* (H)	L* H	
(99) Jag	vill	att	ölen	rinner	lite	
	I	want	that	the.beer	flows	a.little

The frequency at the lowest point of the L of the noun and the highest point of the first H of the verb (in bold type in (98) and (99)) was measured, and the difference between the two points calculated. When the second word had accent I, its first H peak appeared in the preceding word (see section 5.1). The difference between these two points is the initial rise of the subordinate clause. The statistical hypothesis was that the height of this rise would be different for EMCs and SCs.

It seemed plausible that it was due to the experimental design that not all of the EMCs began with an F0 rise in the pilot study. The sentences containing EMCs were constructed in a way that made them structurally ambiguous at the part where the phrase-initial rise should occur, if they were read linearly. Only a final clause level adverbial disambiguated them. EMCs are not expected to appear in written language, since the written norm bars them to a large extent. Therefore, it was probable that the absence of a phrase-initial rise in some EMCs was because an SC was expected instead of an EMC at the ambiguous point. An additional but related problem was that it might be difficult to realise EMCs in a natural way when reading them, since they are typically produced in spoken language.

To avoid these problems, a more spontaneous speech-like production of the sentences had to be elicited. Since it is difficult to elicit comparable evident EMCs and SCs in e.g. an

interview, reading written sentences in some way was still the only option. Therefore, a new procedure that was intended to combine the advantages of read speech and spontaneous speech was created. Instead of spelling out the sentences immediately, the subjects were asked to rehearse each sentence silently first. Then, the experiment leader asked a question to which the sentence was a possible answer. The subject answered using the sentence he had just repeated to himself. While speaking, he was requested to look at the experiment leader. In this way, the subject knew when he was going to produce an EMC, and was not mislead to read it as if it were an SC at the structurally ambiguous point.

The written norm is so strong that many Swedish speakers claim themselves never to use EMCs, even when speaking. It may be true that these speakers reduce their use of EMCs in contexts where the structure is conspicuous, but it is unlikely that anyone could control his language to the extent of completely removing the possibility of asserted subordinate clauses from his linguistic competence. The problem for the experiment related to the tendency of some speakers to try to follow written norms while speaking was that all EMCs in the experiment were of the most conspicuous kind there is, with a final clause level adverbial. Thus, if the subjects were following written norms, they would detect the sentences containing EMCs immediately and judge them as unacceptable. If they consciously considered the sentences unacceptable, it would be problematic for them to produce them in a natural way.

To avoid such unnatural realisations of the sentences containing EMCs, the subjects were asked to read the first page of sentences before conducting the experiment, and were asked if there were any sentences that they felt uncomfortable about. If a subject detected any sentence containing an EMC that he felt uncomfortable about, his recording was not used.

6.1 METHOD

A list of 24 sentences, organised in pairs with one member containing an evident EMC (100) and the other an evident SC (101), was created. Thus, there were two conditions, condition A being EMC structure, and condition B, SC structure. The structure was evident in the EMCs because of the final clause level adverbial *inte* 'not', and in the SCs, because of the irrealis verbs taking them as complements. In the same way as in the sentence pairs in section 5, both sentences of each pair were identical as regards their accent pattern, and differed segmentally only when it came to the last word, which was *inte* 'not' in the EMCs and *lite* 'a little', or *ofta* 'often' in the SCs. 12 filler sentences consisting of main clauses with the same content as some of the EMCs and the SCs (102) were also created, as well as 12 filler sentences that were a combination of the main clauses that had EMC complements and the corresponding ambiguous subordinate clauses (103). In total, the list presented to the subjects consisted of 48 sentences. In order to avoid misleading focal rises at the beginning of the subordinate clauses, context questions eliciting focus on the verb of the subordinate clauses were created (in italics above each sentence). The sentences were presented in randomised order and divided into four groups.

(100) CQ: *Vad   sa   du   händer   inte   med   veden?*
                   What   said you   happens   not   with the.wood

Condition A: Jag   sa   att   veden   brinner   inte
              I   said that   the.wood   burns   not

32

(101)	CQ:	*Vad*	*vill*	*du*	*händer*	*med*	*veden?*
		What	want	you	happens	with	the.wood

	Condition B:	Jag	vill	att	veden	brinner	lite
		I	want	that	the.wood	burns	a.little

(102)	CQ:	*Vad*	*händer*	*(inte)*	*med*	*veden?*
		What	happens	not	with	the.wood

	Filler:	Veden	brinner	inte / lite
		The.wood	burns	not a.little

(103)	CQ:	*Vad*	*sa*	*du*	*händer*	*med*	*veden?*
		What	said	you	happens	with	the.wood

	Filler:	Jag	sa	att	veden	brinner	lite
		I	said	that	the.wood	burns	a.little

Six native speakers of East and West Swedish (Bruce & Gårding 1978), of which four were females, participated. The subjects entered a soundproof room one at the time together with the experiment leader. They were asked to read the first page of the list and tell if they felt uncomfortable about any of the sentences. Then, they read the sentences one by one, according to the following procedure. First they rehearsed each sentence silently. The experiment leader asked the relevant question, and the subjects answered using the sentence they had just repeated to themselves. While answering, they were requested to look at the experiment leader. If they were not satisfied with some realisation, they were given the chance to repeat it, and the new realisation was then the one that was counted. After reading the whole list, the first group of twelve sentences was repeated, and only the second realisation of these sentences was counted. The reason was that most of the subjects were rather stressed at first because of the experimental design, and were therefore unfocussed, but got used to it after reading some sentences.

The answers to the context questions were digitally recorded and transformed to a computer-readable format. They were then analysed in the speech analysis tool Praat. The two conditions were identical with respect to the sequence of word accents. Their prosodic structure was therefore comparable. The frequency at the lowest point of the L of the first noun in the subordinate clause and at the highest point of the first H of the subsequent verb was measured. If the verb had accent I, its first H peak occurred within the noun. The frequency difference between the two points was calculated in order to evaluate its relation to the two conditions. It was measured in semitones (see note 15) to minimise non-proportional differences between distinct voices. If there were any focussed nouns produced, despite the questions eliciting unfocussed nouns in the subordinate clause, those sentences were discarded.

The hypothesis was that there would be a difference between the initial F0 contour of EMCs (condition A) and SCs (condition B). In order to be able to accept the hypothesis, a t-test was performed on the scores for the two conditions. A *t*-test shows the likelihood that the difference in the scores measured for two conditions falls within the range of the deviation of one single mean. As each subject read both the A and the B sentences, a related samples *t*-test was used. Such a *t*-test is used with repeated measures designs, i.e. when the same subject is tested under both conditions, so that the scores form pairs. As the A and B subordinate clauses formed pairs that differed phonetically only in the segments of the last word, but not in any word accent, the related samples *t*-test was particularly suitable.

6.2 RESULTS

Four of the six subjects were ruled out because they found some EMC unnatural in some way. Left were only two subjects, one male and one female, both speakers of East Swedish. The results for the male speaker under condition A and B are presented in Table 1 and Table 2 respectively, and the results for the female speaker under condition A and B, in Table 3 and Table 4 respectively. Clauses 1-3 had accent I + accent I, clauses 4-6 had accent II + accent II, clauses 7-9 had accent I + accent II, and clauses 10-12 had accent II + accent I. Sentences nr 9 were discarded for the male speaker, since the noun of the EMC in condition A contained a focal rise.

For the male speaker, the mean rise under condition A was 3.88 semitones (SD = 1.65), and the mean rise under condition B, 1.05 semitones (SD = 0.71), $p < .0001$. For the female speaker, the mean rise under condition A was 4.64 semitones (SD = 1.82), and the mean rise under condition B, 2.02 semitones (SD = 1.58), $p < .0001$. In other words, for both speakers there was a statistically significant relation between syntactic structure and prosodic realisation, such that there was a higher rise between the L of the first word and the first H of the second word in an EMC than in an SC.

For the male speaker, there is no overlap between the condition A and the condition B rise. For the female speaker, the rise in 4-9 under condition B is higher on the average than the rise in 10-12 under condition A. 4-9 are the clauses that have an accent II verb as the second word. It is obvious that what makes the condition A rise in 4-9 higher than the condition B rise in 10-12 is that the speaker makes a quite high H* peak in accent II words, even when there is no additional rise, whereas the first peak of her accent I words is almost absent without a phrase-initial rise. What is important is that the rise is always higher in condition A than in condition B for each sentence pair, without exception.

The mean rise from the L of the first word to the first H of the second word is 2.83 semitones (SD = 1.47) higher for the male speaker, and 2.62 semitones (SD = 1.29) for the female speaker under condition A than under condition B. Although the range of the difference is 4.25 semitones for the male speaker and 5.03 semitones for the female speaker, it is always present. The difference between the rise under condition A and B is the part of the rise that is not a consequence of word accents. Therefore, the mean phrase-initial rise was 2.83 semitones (SD = 1.47) for the male speaker, and 2.62 semitones (SD = 1.29) for the female speaker.

Table 1. Condition A, male speaker

EMC nr	Accents	L word 1	H1 word 2	Rise
1	I+I	4.787	8.167	3.380
2	I+I	4.910	7.680	2.770
3	I+I	3.580	7.039	3.459
4	II+II	2.954	9.594	6.640
5	II+II	3.600	10.899	7.299
6	II+II	3.236	7.497	4.261
7	I+II	3.706	7.153	3.447
8	I+II	3.447	6.336	2.889
10	II+I	2.695	5.149	2.454
11	II+I	3.815	7.720	3.905
12	II+I	3.163	5.339	2.176

Table 2. Condition B, male speaker

SC nr	Accents	L word 1	H1 word 2	Rise
1	I+I	1.575	2.802	1.227
2	I+I	3.929	5.264	1.335
3	I+I	4.788	4.725	-0.063
4	II+II	2.369	3.900	1.531
5	II+II	3.218	4.867	1.649
6	II+II	1.736	3.592	1.856
7	I+II	2.683	4.389	1.706
8	I+II	2.746	4.230	1.484
10	II+I	3.060	3.572	0.512
11	II+I	3.019	3.234	0.215
12	II+I	4.715	4.829	0.114

Table 3. Condition A, female speaker

EMC nr	Accents	L word 1	H1 word 2	Rise
1	I+I	11.123	17.818	6.695
2	I+I	10.711	15.201	4.490
3	I+I	11.948	15.554	3.606
4	II+II	11.307	15.927	4.620
5	II+II	11.397	17.230	5.833
6	II+II	10.893	17.587	6.694
7	I+II	12.138	16.546	4.408
8	I+II	11.007	16.850	5.843
9	I+II	10.144	17.140	6.996
10	II+I	12.655	14.996	2.341
11	II+I	11.752	13.797	2.045
12	II+I	12.169	14.289	2.120

Table 4. Condition B, female speaker

SC nr	Accents	L word 1	H1 word 2	Rise
1	I+I	11.857	12.764	0.907
2	I+I	12.726	14.278	1.552
3	I+I	12.373	13.408	1.035
4	II+II	11.660	13.824	2.164
5	II+II	11.907	14.646	2.739
6	II+II	10.240	14.985	4.745
7	I+II	10.607	14.258	3.651
8	I+II	11.120	15.107	3.987
9	I+II	11.021	13.912	2.891
10	II+I	12.073	12.302	0.229
11	II+I	10.900	11.179	0.279
12	II+I	11.973	12.064	0.091

An example of an EMC with accent I + accent I produced by the male speaker is provided in Figure 14. The corresponding SC appears in Figure 15. Notice the first H peak of the accent I verb in Figure 14, which is absent in Figure 15.
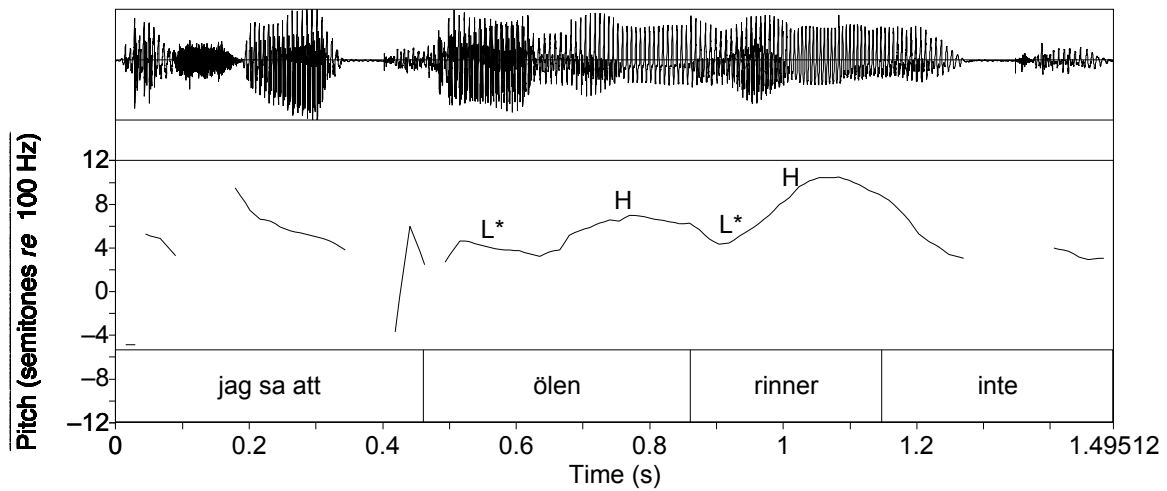
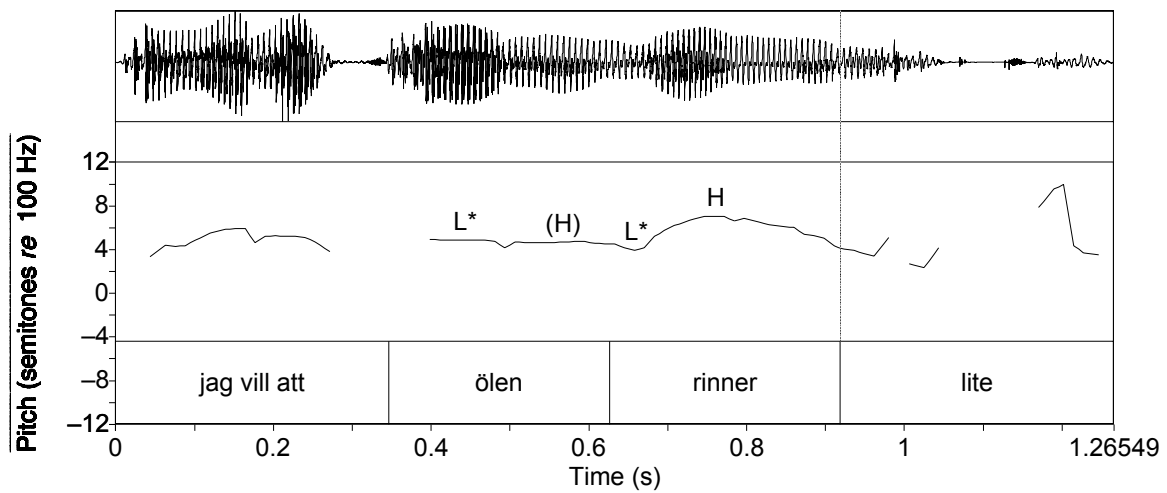Figure 14. Example of an accent I + accent I EMC produced by male speaker

Figure 15. Example of an accent I + accent I SC produced by male speaker

One of the accent II + accent II EMCs produced by the female speaker is shown in Figure 16, and its SC counterpart in Figure 17. The difference between the EMC in Figure 16 and the SC in Figure 17 is the relative height of the H* of the accent II verb.
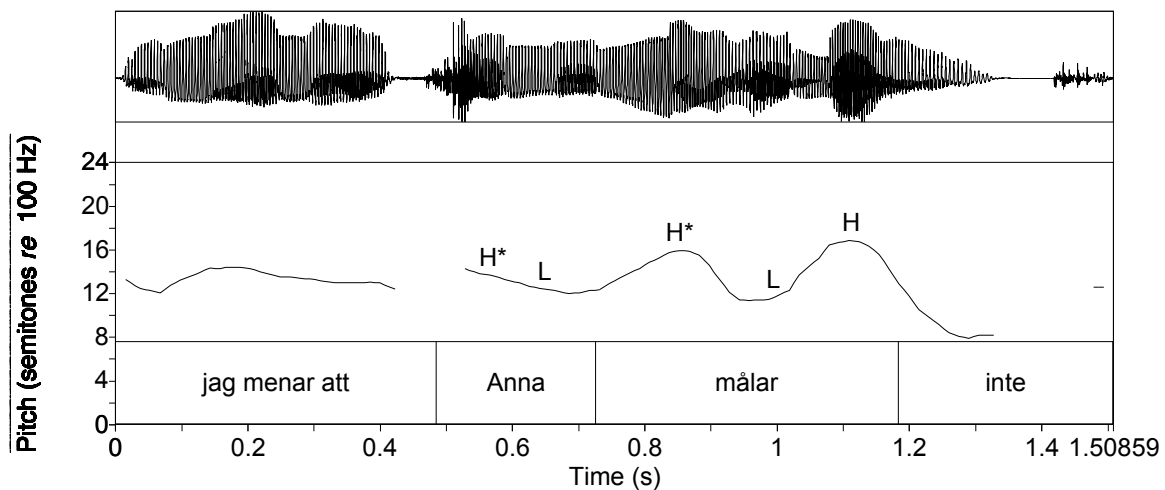
36

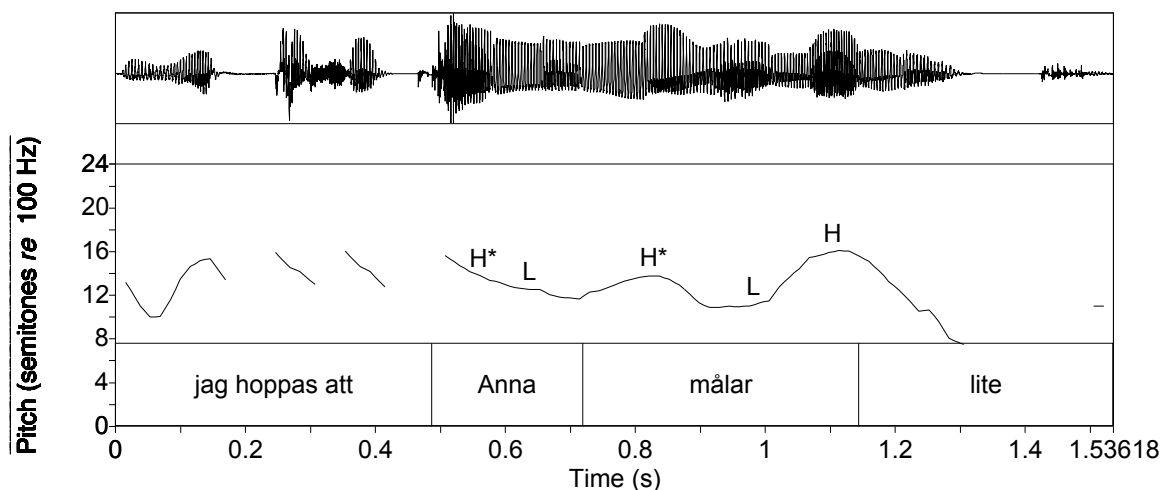Figure 16. Example of an accent II + accent II EMC produced by female speaker

Figure 17. Example of an accent II + accent II SC produced by female speaker

6.3 DISCUSSION

The two speakers that did not feel uncomfortable about any evident EMC made a consequent prosodic distinction between evident SCs and EMCs. The distinction consisted in a difference of on the average 2.82 semitones for the male speaker and 2.62 semitones for the female speaker between the rise from the L of the first word to the first H of the second word in EMCs and SCs. The part of the rise that was present in EMCs but not in SCs can be called a phrase-initial rise, since it is hypothesised to be the beginning of an intonational phrase that marks EMCs as relatively more independent phrases as compared to SCs. The statistically significant presence of the phrase-initial rise for these two speakers means that they use something more than the positioning of clause level adverbials or topicalised elements to indicate what the syntactic structure of an *att*-clause is.

7 CONCLUSION AND DIRECTION OF FURTHER RESEARCH

The research question leading to the study reported on here was whether there is a prosodic means for determining whether an *att*-clause is an ordinary subordinate clause (SC) or an embedded main clause (EMC). Throughout the study, it has become clear that there is indeed a prosodic distinction between SCs and EMCs. The difference consists in a phrase-initial rise in the F0 contour at the beginning of EMCs, but not at the beginning of SCs. The phrase-initial rise was measured for one male and one female speaker. The male speaker made an initial rise that was in average 2.83 semitones (SD = 1.47) higher in EMCs than in SCs ($p < .0001$). For the female speaker, the rise was in average 2.62 semitones (SD = 1.29) higher in EMCs than in SCs ($p < .0001$).

The phrase-initial rise at the beginning of EMCs is taken to be the beginning of an intonational phrase disregarding the complementiser *att*, reflecting a CP that constitutes an independent assertion. The C of an SC introduced by *att* lacks information about Force, so such an SC does not contain any independent intonational phrase, and hence no phrase-initial rise, showing that it is semantically and syntactically more dependent than an EMC. Further, the phrase-initial rise of EMCs indicates a prosodic boundary between *att* and its complement CP. CP but not TP has been proposed to be visible as a unit at a certain stage of the phonological component (Seidl 2001). In an SC, *att* takes a TP as its complement. Since TP is not visible as a unit within the phonological component, there can be no boundary between *att* and its complement in an SC.

There are some methodological problems related to the investigation of phenomena that are so restricted to spoken language as EMCs are. In the present study, the common belief that one speaks as one writes has played a particularly important role. This belief lead to a considerable reduction of the number of participants in the experiment (section 6). It also makes a more controlled perception experiment almost impossible. If in an experiment the subjects listen e.g. to sentences containing EMCs with and without a phrase-initial rise and are to judge their acceptability, it is highly likely that they will be biased by the written norm to an extent that makes the results unreliable.

What has to be tested is the immediate reaction to the sentences as a product of the "core grammar", i.e. the system described in section 1, and not of posterior reflection. Such a reaction can be measured in the brain activity with Event Related Potentials (ERP) equipment.[16] An example of what could be done is comparing the immediate brain reaction to evident EMCs and ambiguous *att*-clauses with a phrase-initial rise as complements to counter-assertive verbs, and see if it is the same. Then, it would also become evident what kind of violation it is, semantic or syntactic. In this study, the clash has been assumed to be semantic.

It is also important to investigate how the phrase-initial rise is realised in different dialects. Therefore, a production study of more extensive spontaneous speech material, such as the SweDia 2000 corpus, could be performed.

---

[16] See Hagoort et al 1999 and Friederici 2002 for overviews.

ACKNOWLEDGMENTS

REFERENCES

Andersson, L-G. 1975. *Form and function of subordinate clauses*. Gothenburg: Gothenburg University, Department of Linguistics.

Beckman, M. & Edwards, J. 1994. Articulatory evidence for differentiating stress categories. In P. Keating (ed.) *Phonological structure and phonetic form: papers in laboratory phonology III*, 7-33. Cambridge: Cambridge University Press.

Bolinger, D. 1965. Pitch accent and sentence rhythm. In I. Abe & T Kanekiyo (eds.) *Forms of English: accent, morpheme, order*, 139-180. Cambridge, Mass.: Harvard University Press.

Bruce, G. 1977. *Swedish word accents in sentence perspective*. Lund: Gleerup.

Bruce, G. 1998. *Allmän och svensk prosodi*. Lund: Lund University, Department of Linguistics and Phonetics.

Bruce, G. & Gårding, E. 1978. A prosodic typology for Swedish dialects. In E Gårding, G. Bruce & R. Bannert (eds.), *Nordic Prosody*, 219-228. Lund: Lund University, Department of Linguistics and Phonetics.

Chomsky, N. 1957. *Syntactic structures*. The Hague: Mouton.

Chomsky, N. 1995a. *The minimalist program*. Cambridge, Mass.: MIT Press.

Chomsky, N. 1995b. Bare phrase structure. In G. Webelhuth (ed.), *Government and binding theory and the minimalist program*. Oxford. Blackwell.

Chomsky, N. 2000. Minimalist inquiries: the framework. In R. Martin, D. Michaels and J. Uriagereka (eds.), *Step by step: Essays on minimalism in honour of Howard Lasnik*. Cambridge, Mass.: MIT.

Chomsky, N. 2001a. Derivation by phase. In M. Kenstowicz (ed.), *Ken Hale: A life in language*, 1-52. Cambridge, Mass.: MIT Press.

Chomsky, N. 2001b. *Beyond explanatory adequacy*. MIT occasional papers in linguistics 21. Cambridge, Mass.: MITWPL.

Chomsky, N. & Halle, M. 1968. *The sound pattern of English*. New York: Harper and Row.

Cinque, G. 1999. *Adverbs and functional heads: a cross-linguistic perspective*. New York: Oxford University Press.

Friederici, A. 2002. Towards a neural basis of auditory sentence processing. *Trends in Cognitive Science* 6, 78–84.

Hagoort, P., Brown, C., & Groothusen, J. 1993. The syntactic positive shift (SPS) as an ERP measure of syntactic processing. *Language and Cognitive Processes* 8, 439–483.

Hale, K. & Keyser, J. 1993. .On argument structure and the lexical expression of syntactic relations.. In K. Hale & J. Keyser (eds.), *The view from Building 20*, 53-109. Cambridge, Mass.: MIT Press.

't Hart, J. & Collier, R. 1975. Integrating different levels of intonation analysis. *Journal of Phonetics* 3, 235-255.

Holmberg, A. & Platzack, C. 1995. *The role of inflection in Scandinavian syntax*. Oxford: Oxford University Press.

Holmer, A. Forthcoming. The place of Swedish in word order typology. In Å. Viberg (Ed.) The typological profile of Swedish. Special issue of *Sprachtypologie und Universalienforschung*.

Hooper, J. & Thompson, S. 1973. On the applicability of root transformations. *Linguistic Inquiry* 4, 465-497.

Horne, M., Hansson, P., Bruce, G. & Frid, J. 2001. Accent patterning on domain-related information in Swedish travel dialogues. *International Journal of Speech Technology* 4: 93-102.

Kayne. 1994. *The antisymmetry of syntax*. Cambridge, Mass.: MIT Press.

Kjelgaard, M. & Speer, S. Prosodic facilitation and interference in the resolution of temporary syntactic closure ambiguity. *Journal of Memory and Language* 40, 153-194.

Pierrehumbert, J. 1980. *The phonology and phonetics of English intonation*. Cambridge, Mass.: MIT Press.

Platzack, C. 1986. Comp, Infl and Germanic word order. In L. Hellan & K. Christensen (eds.), *Topics in Scandinavian syntax*, 185-234. Dordrecht: Reidel.

Platzack, C. 1998. *Svenskans inre grammatik – det minimalistiska programmet.* Lund: Studentlitteratur.

Pollock, J. 1989. Verb movement, universal grammar, and the structure of IP. *Linguistic Inquiry* 20:365-424.

Radford, A. 2004. *English syntax – an introduction*. Cambridge: Cambridge University Press.

Rizzi, L. 1997. The fine structure of the left periphery. In L. Haegeman (ed.), *Elements of grammar: A handbook of generative syntax*. Dordrecht: Kluwer.

Saeed, J. 2003. *Semantics*. Oxford: Blackwell.

Seidl, A. 2001. *Minimal indirect reference – a theory of the syntax-phonology interface*. New York: Routledge

Selkirk, E. 1984. *Phonology and syntax: the relation between sound and structure.* Cambridge, Mass.: MIT Press.

Selkirk, E. 1995. Sentence prosody: intonation, stress, and phrasing. In J. Goldsmith (ed.), *The handbook of phonological theory*, 550-569. Cambridge, Mass.: Blackwell.

Steinhauer, K. 2003. Electrophysiological correlates of prosody and punctuation. *Brain and Language* 86, 142-164.

Steinhauer, K., Alter, K. & Friederici, A. 1999. Brain potentials indicate immediate use of prosodic cues in natural speech processing. *Nature Neuroscience* 2:191-196.

Stroh-Wollin, U. 2002. Som-*satser med och utan* som. Uppsala: Uppsala University, Department of Scandinavian languages.

Vikner, S. 1995. *Verb movement and expletive subjects in the Germanic languages*. Oxford: Oxford University Press.

Wichmann, A. 2000. *Intonation in text and discourse*. London: Longman.

Zubizarreta, M. 1998. *Prosody, focus, and word order*. Cambridge, Mass.: MIT Press.