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PROSODIC CUES TO THE SYNTACTIC STRUCTURE OF SUBORDINATE CLAUSES IN SWEDISH

Mikael Roll

Introduction

It is by now well documented that Scandinavian subordinate clauses introduced by complementisers such as Swedish *att* ‘that’ may exhibit typical main clause word order. It is also generally accepted that the difference in word order reflects syntactic and semantic differences (Andersson 1975, Holmberg & Platzack 1995, Vikner 1995, Stroh-Wollin 2002). The word order difference arises from the use of clause level adverbials or topicalised constituents that, however, are not directly related to the semantic differences. Therefore, *att*-clauses without clause level adverbials or topicalised constituents may receive two different syntactic (Holmer, forthcoming) and semantic interpretations.

Prosody provides information about the syntactic structure. Chomsky & Halle (1968), for instance, showed a systematic correlation between syntactic structure and metrical structure. A central cue to metrical structure and syntactic phrasing is the F₀ contour (Bruce 1977, Pierrehumbert 1980, Selkirk 1984, 1995). Psycholinguistic (Kjelgaard & Speer 1999) and neurolinguistic experiments (Steinhauer et al 1999, Steinhauer 2003) have confirmed that changes in the F₀ contour may change the immediate syntactic interpretation of utterances.

The purpose of the present study is to show that the syntactic and semantic ambiguity of *att*-clauses can be solved if their F₀ contour is taken into consideration. *Att*-clauses with main clause word order are introduced by a rise in the F₀ contour, which is absent in ordinary subordinate clauses.

To give a clearer picture of the research question, common clause structures in Swedish will be presented in section 1. It will also be shown why some subordinate clauses are ambiguous as regards their syntactic and semantic structure. A prosodic solution to the ambiguity problem will be suggested in section 2. Section 3 describes an experiment that clarifies the nature of the prosodic solution to ambiguous *att*-clauses. In section 4, the main conclusions are summed up and discussed.

1 Word order and clause structure in Swedish

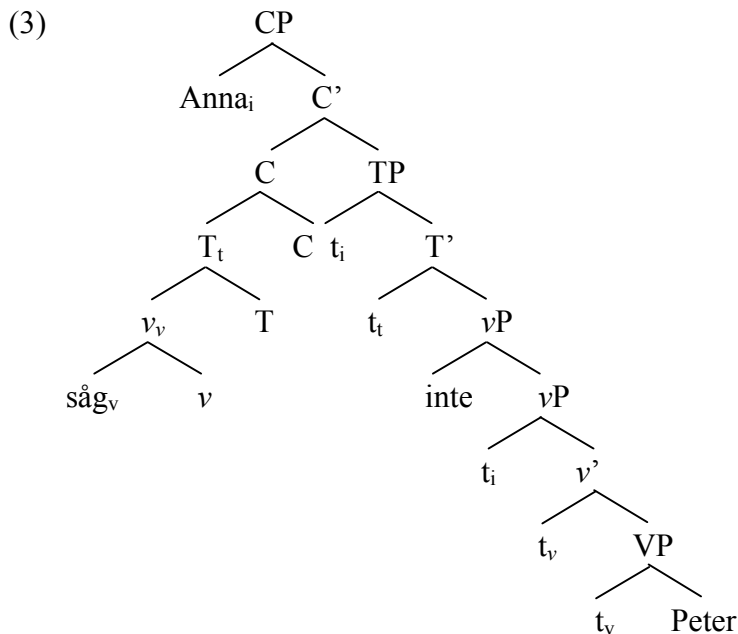
1.1 Main clauses and subordinate clauses

Swedish is a verb second language (Holmberg & Platzack 1995). This means that the finite verb is always the second constituent of a main clause. In the main clause in (1) below, the finite verb *såg* ‘saw’ follows the subject *jag* ‘I’ in second position. In (2), it is still in second position, now following the object *Peter*, which has moved to the left edge of the clause through topicalisation. In both (1) and (2), the finite verb precedes the clause level adverbial *inte*.

(1) Anna såg inte Peter
 Anna saw not Peter

(2) Peter_i såg hon inte t_i
 Peter saw she not

The reason for the finite verb’s second position is that its root and inflectional heads adjoin to C, the highest head of the clause (Platzack 1986), as illustrated in (3). If the object is topicalised as in (2), it is raised to CP, where it impedes the subject’s further movement, forcing it to stay within TP.

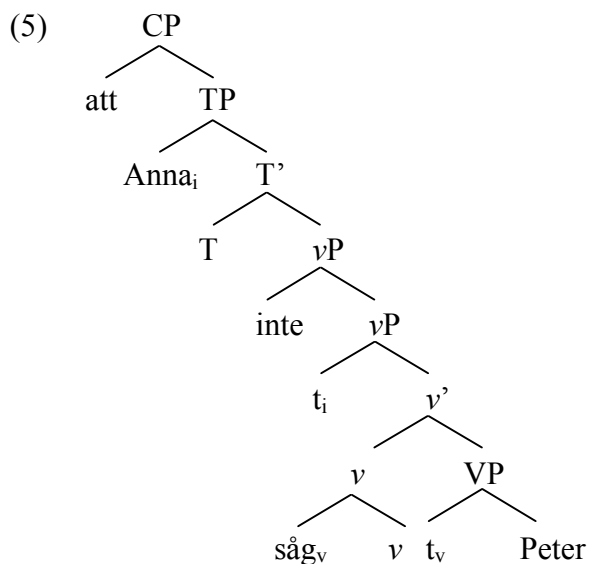


Prototypical subordinate clauses, henceforth ‘SC’, in Swedish are not verb second. In the SC in (4), the finite verb has the fourth position in the clause. The

striking difference between the SC in (4) and the main clause in (1) is that the clause level adverbial *inte* precedes the finite verb in the SC, whereas it follows the finite verb in the main clause.

- (4) Jag hoppades att Anna inte såg Peter
 I hoped that Anna not saw Peter

The reason why SCs are not verb second is that subordinating complementisers are free morphemes in Swedish. Therefore, the finite verb does not adjoin to C, but stays within *vP*, as in (5). Subordinating complementisers also block movement of all other kinds of elements with a phonological content to CP, so the subject stays within TP, and the object cannot be topicalised. Clause level adverbials such as *inte* have a fixed position (Pollock 1989).



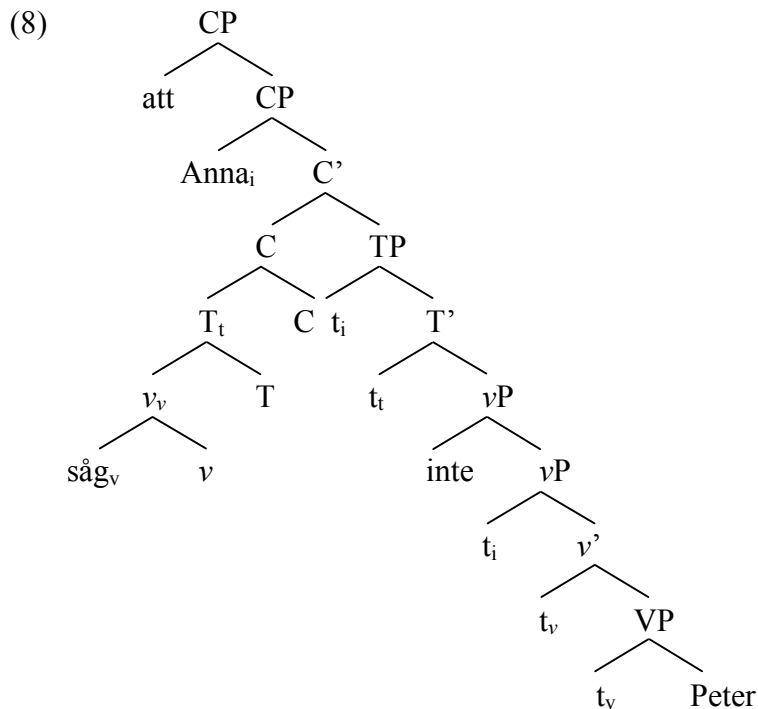
1.2 Embedded Main Clauses

In spoken Swedish, subordinate clauses introduced by the complementiser *att* often exhibit typical main clause characteristics, including topicalisation (6) and placement of a clause level adverbial after the finite verb (7).

- (6) Problemet är att honom_i såg jag t_i
 the.problem is that him saw I

- (7) Jag sa att Anna såg inte Peter
 I said that Anna saw not Peter

In (6) and (7), the complementiser *att* takes a main clause as its complement, which is consequently called an ‘Embedded Main Clause’ (EMC) (Holmberg & Platzack 1995). The structure of the EMC in (7) appears in (8). The finite verb has adjoined to C and thus precedes the clause level adverbial, contrary to the SC in (5), where the finite verb follows the clause level adverbial, since it stays within *vP*.



Swedish EMCs coincide with main clauses in their clause type (in the sense of Chomsky 1995) (Hooper & Thompson 1973, Andersson 1975, Stroh-Wollin 2002). Crucially, declarative main clauses are assertions, in the sense that they assert the truth-value of their proposition. SCs are never assertions in the same way. One way of illustrating this is by adding a clause that negates the truth of the preceding proposition to a main clause (9) and an SC (10). In (9), the result is a semantic clash between the assertion of the main clause proposition and its subsequent negation. In (10), there is no semantic clash, because the SC has no specified truth-value. What is asserted is the truth of the main clause (‘I said’).

(9) *Anna såg inte Peter, men det gjorde hon
 Anna saw not Peter but that did she

(10) Jag sa att Anna inte såg Peter, men det gjorde hon
 I said that Anna not saw Peter but that did she

For an EMC (11), the result is the same as for the declarative main clause. This indicates that the truth of the EMC in (11) is asserted in the same fashion as it is in the main clause in (9).

(11)*Jag sa att Anna såg inte Peter, men det gjorde hon
 I said that Anna saw not Peter, but that did she

1.3 Ambiguous att-clauses

The only visible difference between the SC in (5) and the EMC in (8) is the linear order between the finite verb and the clause level adverbial. If the clause level adverbial is removed, the two structures are linearly identical. Thus, it is impossible to determine whether the subordinate clause in (12) below is an EMC or an SC. Its structure may correspond to that in (5) as well as to the one in (8). Consequently, it is impossible to tell whether the speaker wishes to assert the truth of the proposition of the subordinate clause or not, given only the linear string of words.

(12) Jag sa att Anna såg Peter
 I said that Anna saw Peter

It should be pointed out that the extent of the ambiguity of *att*-clauses such as the one in (12) is narrowed down when their semantic environment is considered. The assertiveness of EMCs is incompatible with counter-assertive verbs. If a verb e.g. indicates that the proposition of its complement does not happen in the real world, the proposition has no truth-value to assert. Two common such verbs are *vilja* ‘to want’ and *hoppas* ‘to hope’. These verbs may take SCs as their complements (13), but not EMCs (14). In other words, if an *att*-clause appears as the complement of a counter-assertive verb, it is not ambiguous, but most likely an SC.

(13) Jag hoppas att Anna inte såg Peter
 I hope that Anna not saw Peter

(14)*Jag hoppas att Anna såg inte Peter
 I hope that Anna saw not Peter

Not all verbs are counter-assertive, however. A few examples are ordinary verbs like *säga* ‘to say’, *mena* ‘to mean’, *höra* ‘to hear’, *veta* ‘to know’, and expressions like *problemet är* ‘the problem is’ and *det är konstigt* ‘it is strange’. *Att*-clauses that are complements to these verbs and do not contain any clause level adverbials or topicalised constituents are syntactically and semantically ambiguous.

2 A prosodic solution to the ambiguity problem

Although it is impossible to tell whether an *att*-clause without clause level adverbials or topicalised elements like (12) is an SC (5) or an EMC (8) based on its word order, one could expect that some prosodic parameter could disambiguate the two clause types. As has been shown, there is a difference in clause type between EMCs and SCs: EMC are assertions whereas SCs are not. Differences in clause type are often indicated by changes in the F0-contour, e.g. the difference between declarative and interrogative clauses in many 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. Bruce (1998) shows how independent syntactic phrases in general start with a rise in the F0-contour following word accent patterns in Swedish.

Since EMCs are independent assertions and SCs are not, a possible prosodic difference is that EMCs constitute independent intonational phrases apart from the complementiser *att*, whereas the intonational phrase of an SC includes the complementiser, or the SC is included in a larger intonational phrase. The beginning of the intonational phrase of an EMC should be marked by a phrase-initial rise in the F0 contour of the first accented word.

3 Production experiment

3.0 Introduction

An experiment was performed with the purpose of identifying a prosodic difference between EMCs and SCs. 24 written sentences organised in pairs as in (15) below, where one member is an evident EMC (condition A) and the other an evident SC (condition B), were used. The structure of the EMCs was evident due to final clause level adverbials. In the SCs, VP adverbials were used. The structure of the SCs was unambiguous because they were complements to counter-assertive verbs. The pairs were constructed in such a way that they would have the same word accents in the same order. After the complementiser *att*, the same disyllabic noun and verb followed in both the EMCs and the SCs. All word accent combinations were used in the first two words, i.e. I + I, I + II, II + II, and II + I.

The hypothesis was that an F0 rise would appear in the first word of the EMCs, but not in the SCs. The rise would follow the word accent, but not coincide totally with a focal rise. Therefore, it was hypothesised to occur between the L tone of the first word and the first H peak of the second word, in bold type

in (15). When the second word had accent I, its first H peak would occur in the last syllable of the preceding word (Bruce 1977).

(15) Context question: Vad sa / vill du händer (inte) med ölen?
What said / want you happens not with the.beer

Condition A, EMC: Jag sa att ölen rinner inte
I said that the.beer flows not

Condition B, SC: Jag vill att ölen rinner lite
I want that the.beer flows a.little

3.1 Method

Six native speakers of East and West Swedish (Bruce & Gårding 1978), four females, participated. They were recorded when reading the 24 sentences as answers to context questions eliciting focus on the verb of the subordinate clause, as in (15). The sentences were presented to the subjects in randomised order mixed with 24 filler sentences. The subjects were asked to rehearse each sentence silently and to look at the experiment leader when uttering it.

EMCs are to a large extent barred by the written norm. To avoid results from subjects that, biased by the written norm, would pronounce the EMCs in an unnatural way, the subjects were asked to read the first page and tell if there were any sentences they felt uncomfortable about. The data from subjects who had problems with EMC sentences were not included in the results.

The answers to the context questions were digitally recorded in a soundproof room and analysed in the speech analysis tool Praat. The frequency at the lowest point of the L of the initial noun in the subordinate clause and the frequency at the highest point of the first H of the subsequent verb, as indicated in (15), were measured in semitones, 0 semitones = 100 Hz. The frequency difference between the two points was calculated and related to the two conditions. A paired samples *t*-test was performed to evaluate the statistical significance of the difference in the rise between the two conditions. If a subordinate clause contained a focussed initial noun, despite the questions eliciting unfocussed nouns, it was not included in the test.

3.2 Results

Since four of the six subjects experienced some EMC as uncomfortable, only the results of two subjects were used. Both were East Swedish speakers, one male and

one female. A statistically significant difference between EMCs and SCs was found in the rise from the L of the initial noun to the first H peak of the subsequent verb. For the male speaker, the mean rise in the EMCs (condition A) was 3.88 semitones (SD = 1.65), and the mean rise in the SCs (condition B), 1.05 semitones (SD = 0.71), $p < .0001$. The difference between the EMC rise and the SC rise was 2.83 semitones (SD = 1.47). Since the male speaker focussed the noun in one EMC example, that sentence and its SC counterpart were discarded.

For the female speaker, the mean rise in the EMCs (condition A) was 4.64 semitones (SD = 1.82), and the mean rise in the SCs (condition B), 2.02 semitones (SD = 1.58), $p < .0001$. The difference between the EMC rise and the SC rise was 2.62 semitones (SD = 1.29).

In Figure 1, an example of an EMC with an accent I noun and an accent I verb produced by the male speaker is presented. Figure 2 shows the corresponding SC.

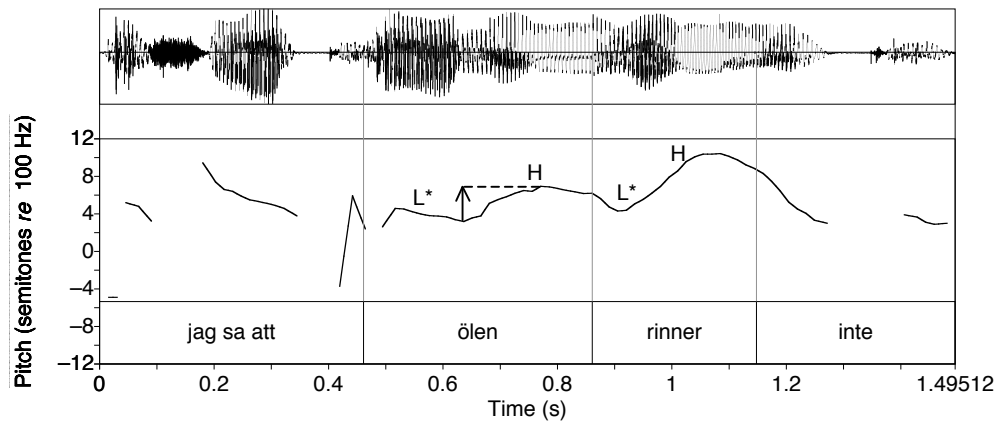


Figure 1. EMC realised by male speaker, acc I + acc I

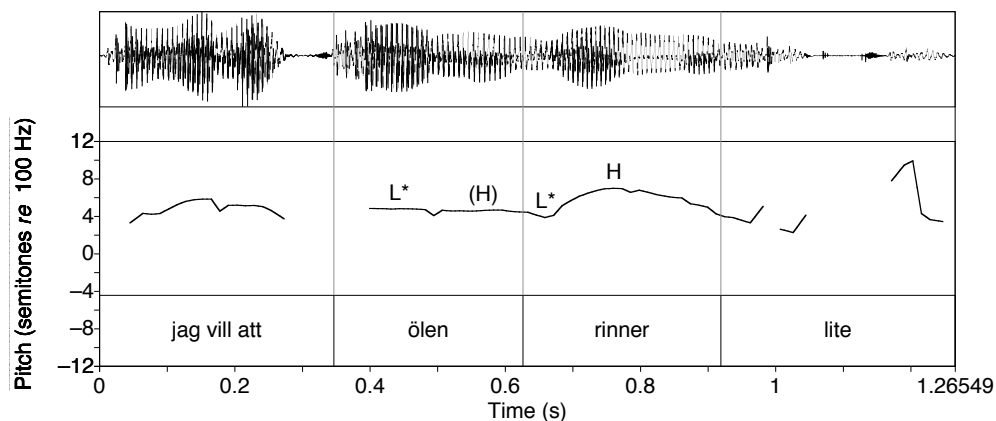


Figure 2. SC realised by male speaker, acc I + acc I

The first H peak of the accent I verb *rinner* ‘flows’ in the EMC in Figure 1 occurs as the result of a rise in the F0 contour at the onset of the second syllable of the accent I noun *ölen* ‘the beer’. The rise that was measured extends from the lowest point of the L of the noun to the highest point of the subsequent H peak of the verb, as indicated in Figure 1. It is different from a focal rise, which would start in the nucleus of the first syllable of the accent I noun (Bruce 1977).

In the corresponding SC (Figure 2), the F0 contour remains fairly flat until the focal rise in the nucleus of the first syllable of the accent I verb *rinner* appears.

3.3 Analysis

No SC had a higher initial rise than its corresponding EMC. The reason that the average SC rise was 1.05 and 2.02 semitones and not closer to zero is that some accent II verbs were used. Accent II words have an initial high peak realising their word accent tone H*. Therefore, the difference between the SCs and EMCs with accent II verbs was not the presence or absence of a first peak in the verb, but rather the relative height of the same peak. Figure 3 shows the sentence *jag hoppas att Anna målar lite* ‘I hope that Anna paints (a) little’, containing an SC produced by the female speaker. The accent II verb *målar* has a H* peak, but it is relatively low.

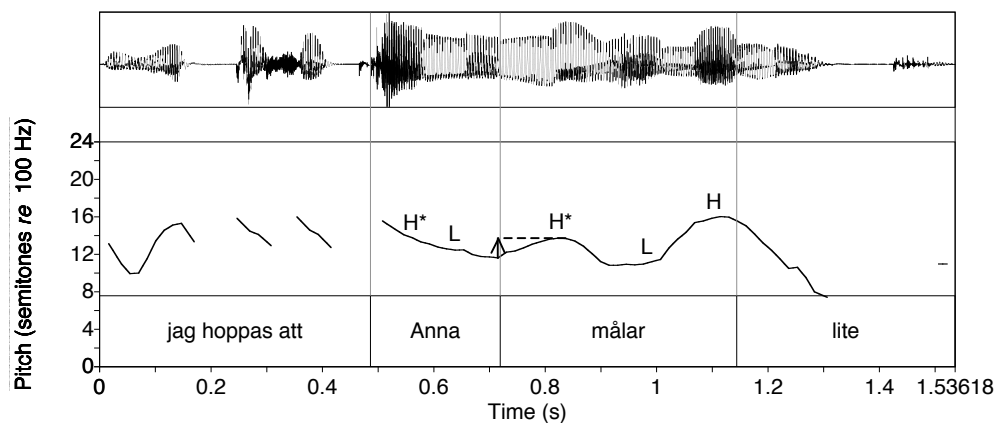


Figure 3. SC realised by female speaker, acc II + acc II

In Figure 4, the corresponding sentence containing an EMC, *jag menar att Anna målar inte* ‘(lit.) I mean that Anna paints not’, is shown. Here, the H* peak of the verb has about the same timing as the one in the SC in Figure 3, but it is higher in relation to the preceding L. The difference in frequency between the H* of the verb in Figure 3 and Figure 4 is held to be the phrase-initial rise of the EMC.

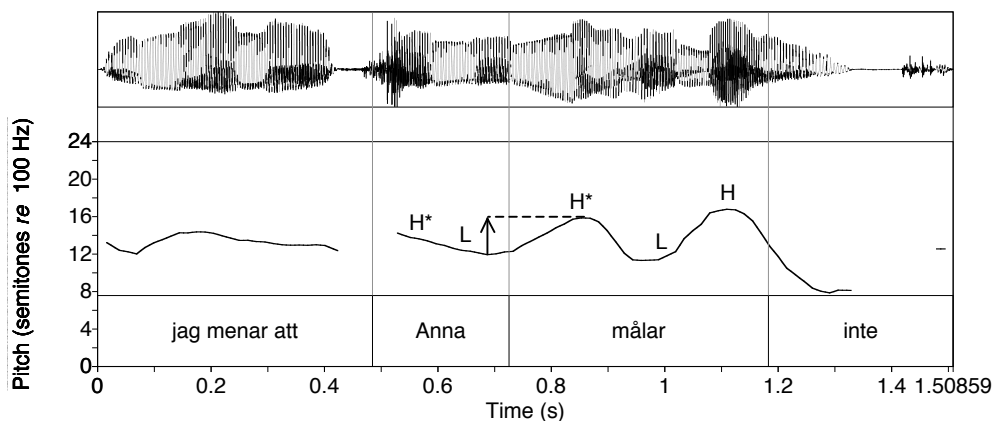


Figure 4. EMC realised by female speaker, acc II + acc II

In conclusion, to get the phrase-initial rise of an EMC starting with two disyllabic accented words, the F0 difference between the L of the first word and the first H peak of the second word is calculated. Then, the same difference in the corresponding SC is subtracted from the result to eliminate the word accent contribution. The phrase-initial rise in the EMCs understood in this way was very similar for the two speakers: 2.83 semitones (SD = 1.47) for the male speaker, and 2.62 semitones (SD = 1.29) for the female speaker.

4 Discussion

The main conclusion of this study is that there is a prosodic difference between ordinary Subordinate Clauses (SC) and Embedded Main Clauses (EMC). The difference consists in a phrase-initial rise of 2-3 semitones that appears in the F0 contour of EMCs, but not in the F0 contour of SCs. Further, the phrase-initial rise follows Swedish word accent patterns in a way that differentiates it from a focal rise. In spoken language, it is thus possible to resolve the ambiguity of *att*-clauses that do not contain any clause level adverbials or topicalised constituents (12). The unavailability of graphic conventions to represent prosodic features of EMCs could be one reason why they are largely banned in written language.

Acknowledgements

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