THE ARCHITECTURE OF I-STRUCTURE

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Abstract

In this paper, the inventory and the architecture of a separate i-structure representation in LFG are discussed in relation to Swedish data. It is argued that a discourse function SCENE needs to be distinguished from RHEME and GROUND. It is furthermore proposed that a characteristic that singles out sentence adverbials from other clausal modifiers is their ability to function as focus operators (cf. Rooth 1992) and that FOCUS (as is ACTIVATION) is a discourse feature, separate from the discourse functions. The analysis builds on data from a corpus study of Swedish word order (Andréasson 2007) where the information dynamics of the sentence is found to be the key to explaining much of the possible word order variation.

1   Introduction

Much recent work within LFG deals with word order phenomena in relation to the information structural component of the grammar. Just a few examples are Butt and King 1996, 2000; Choi 1997, 1999; Cook 2001; Cook and Payne 2006; King 1995; 1997; Mycock 2007; O'Connor 2006. Over the years the analyses have shifted from realising discourse function such as TOPIC and FOCUS as Grammatical Discourse Functions in f-structure to proposing a separate and more elaborated representation, mostly called *i-structure*.

In this paper I discuss the architecture of a separate i-structure representation in LFG in relation to Swedish data, mainly concerning different adverbial categories, and their function and placement. In particular, I discuss the discourse function SCENE, and the role of sentence adverbials as FOCUS OPERATORS (cf. Rooth 1992; 1996). The analysis builds on generalisations from the corpus study of Swedish word order in Andréasson (2007) where the information dynamics of the sentence is found to be the key to explaining much of the possible variation.

Following Börjars, Engdahl and Andreasson (2003) and Andréasson (2007), I assume a flat structure in the area following the finite verb in Swedish main clauses (or the subordinating conjunction in subordinate clauses). The c-structure of a main clause where the main verb is non-finite – the sentence in example (1) – is illustrated in figure 1 below.[1]

(1)   Därför   har   Ellis förstås   inte gett Síle lammet.
      That's-why have-PRS *Ellis of-course* NEG *give Síle lamb*-DEF
      'That's why Ellis hasn't given Síle the lamb.'

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[1] In main clauses where the main verb is finite, the clause does not have a VP, (see Börjars, Engdahl and Andreasson (2003) and Andréasson (2007)).

FP

AdvP △   F′

Därför   F   NP   AdvP   AdvP   VP
That's-why

har   Ellis   förstås   inte   IV   NP   NP
have   *of-course* NEG

gett   Síle   lammet
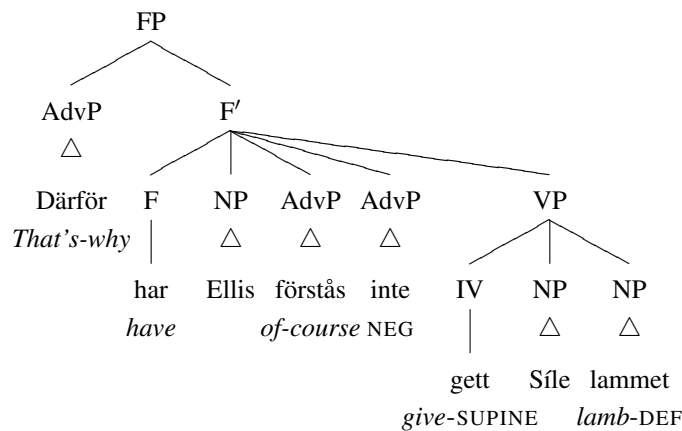*give*-SUPINE   *lamb*-DEF

FIGURE 1: *C-structure*

There are substantial possibilities for word order variation in the area of the clause following the finite verb/subordinating conjunction in Swedish, here called the F′ domain.[2] Most of the variation takes place in V2 or V1 clauses with a finite main verb, but there is also the possibility of word order variation between subjects and adverbials in the F′ domain regardless of whether there is a VP or not.

2   The terminology of information structure

A major factor that influences word order in many languages is information structure, or *information dynamics*, which is the term that I use. By information dynamics I understand the relation between on the one hand the speaker's assumptions and intentions and on the other hand the information packaging of the linguistic expression. The term *information dynamics* thus covers more than *information structure* which is sometimes used to denote only the packaging aspect.

The term *information structure* was introduced by Halliday (1967), and since this component of grammar relates to several other components, syntacticians, text linguists, and phoneticians have developed terminologies for this notion that are seemingly similar, but at a closer look are entirely different (for an elaborated discussion, see Vallduví and Engdahl 1996; see also, for example, O'Connor 2006).

When syntacticians use the notion 'topic' in terms like *topicalisation*, this means an element in the beginning of a clause, mostly a constituent with a canonical position elsewhere in the clause being moved to an initial position. For the text linguist the notion may relate information in several separate clauses, as is the case for the term *continuous topic*. The phonetician may use the term *focus* denoting a stress pattern for emphasised elements in a clause, while some grammarians use the

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[2]To avoid discussion on whether the functional projection headed by the finite verb/subordinating conjunction should be CP or IP, I employ the dummy F for *Functional*.

term for the very constituent that is emphasised and yet others employ the terms *topic* and *focus* for the partition of a clause in pragmatic relations (or discourse functions). For this reason the notions used in this article are defined explicitly in this section.

I make a distinction between **discourse functions** (DF) like RHEME, GROUND and SCENE, see figure 2 below and section 2.1, 2.2, and 3 below, and **discourse features** like FOCUS (cf. Rooth 1992; 1996) and ACTIVATION, see section 2.3 (Gundel, Hedberg and Zacharski 1993; Lambrecht 1996; O'Connor 2006). All these concepts are formalised in the LFG i-structure, see section 5.

Term	Definition
RHEME	the information in a statement that is intended to increase the listener's knowledge
GROUND	constituents that relate the rheme to questions the speaker assumes are under discussion
SCENE	constituents that relate the proposition to a temporal, spatial or circumstantial context, that is not under discussion

FIGURE 2: *Discourse functions in LFG i-structure*

A brief note is needed on my use of the term FOCUS. I adapt the notion of FOCUS of Rooth (1992, 1996), where its primary function is the evoking of alternatives. The focusing of a constituent raises the assumption of the existence of an alternate set to the one expressed. This alternate set may be overt in the context or presupposed.

Figure 3 is a simple overview of a production perspective of information dynamics. Given the meaning the speaker wants to express, her assumptions of the information state, and her intentions with the utterance, the information is partitioned in discourse functions and assigned discourse features that may be formalised in the LFG i-structure, here represented by an *i*. The partition leads to language specific mapping choices, choices that determine which information packaging (Vallduví 1992, Vallduví and Engdahl 1996; cf. Chafe 1976) is optimal for the communication of the speaker's intention to be felicitous. In felicitous communication, the discourse functions and features interpreted by the hearer matches those intended by the speaker.
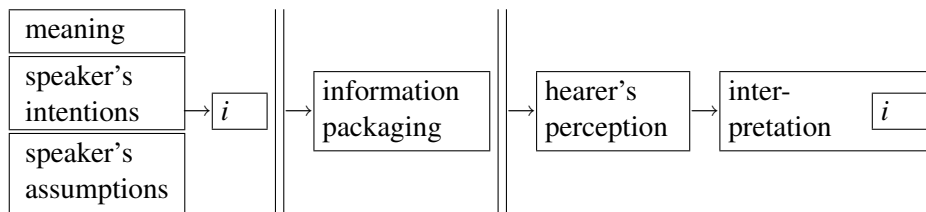
FIGURE 3: *Information dynamics: production perspective*

2.1 RHEME

In this article, the term RHEME (originally from the Prague school, cf. Firbas 1966) is defined as the information in a statement that is intended to increase the listener's knowledge. The definition coincides with the notion FOCUS in, for example, Vallduví (1992), Vallduví and Engdahl (1996) and Lambrecht (1996).

In a question-answer pair like the one in (2), the question of the listener reading something is brought up for discussion and the speaker requests information about the name of the item read. The elliptical answer *Kranes konditori* supplies the only information needed, the RHEME.

(2) a. Vad läser   du?
         what read-PRS *you*
         'What are you reading?'
         QUD:$\langle$?λx (*read* (*you*, x))$\rangle$[3]
     b. [RHEME Kranes   konditori.]
         ...   *Krane*-GEN *café*
         'Krane's café'

In (3), the question of the listener's crying is brought up for discussion. Here the RHEME is not an elliptical answer, but consists of a full sentence: *Min undulat har dött*.

(3) a. Varför gråter   du?
         why   cry-PRS *you*
         'Why are you crying?'
         QUD:$\langle$?λY (*Y* (*cry* (*you*)))$\rangle$
     b. [RHEME Min undulat har   dött.]
         ...   *my budgie have*-PRS *die*-SUPINE
         'My budgie has died'

Which information is rhematic is not always a question about "old" vs. "new". Also information that is accessible in the context, and hence "old", may be part of the rhematic portion of a clause (cf. Vallduví and Engdahl 1996).

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[3] QUD, see section 2.2, below.

In (4) the speaker requests information about who is going to accompany David to the Museum of World Culture. In the answer, the rhematic portion consists of the pronoun *jag* referring to the speaker, information that must be considered accessible as the referent is appearing in the situational context.[4]

(4)   a.   Vem ska följa med David till Världskulturmuseet?
            who FUT *follow with David to Museum-of-World-Culture*-DEF
            'Who's coming with David to the Museum of World culture?'
            QUD:$\langle ?\lambda x$ (*följa med David till V-museet*(x))$\rangle$

      b.   [RHEME Jag].
            ...   *I*
            'I am.'

2.2 GROUND

As mentioned before, the answer to a question may consist only of a rheme, but it is also possible, and sometimes even necessary, to include some GROUND material, that is, constituents that relate the RHEME to questions that are under discussion, as in (5) and (6), below (for a more elaborate description of GROUND, see Vallduví 1992; Vallduví and Engdahl 1996; for the notion *under discussion* see Ginzburg 1996; forthc.).

(5)   a.   Vad läser du?
            what read-PRS *you*
            'What are you reading?'
            QUD:$\langle ?\lambda x$ (*read* (*you, x*))$\rangle$

      b.   [GROUND Jag läser] Kranes konditori.
            ...   *I read*-PRS *Krane*-GEN *café*
            'I am reading Krane's café'

(6)   a.   Varför gråter du?
            why cry-PRS *you*
            'Why are you crying?'
            QUD:$\langle ?\lambda Y$ (*Y* (*cry* (*you*)))$\rangle$

      b.   [GROUND Jag gråter för att] min undulat har dött.
            ...   *I cry*-PRS *for that my budgie have*-PRS *die*-SUPINE
            'I am crying because my budgie died'

When a speaker utters a sentence, this is done in relation to a context that she assumes is at least partly known to the listener. This context does not merely consist of the previous discourse, but comprises a wider range of circumstances as well as the actual words and sentences spoken previous to the utterance. World

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[4]Erteschik-Shir (2007:17f.) states that the speaker and listener may be seen as "permanently available topics". This is does not imply that speaker and hearer can never be included in or constitute the rhematic portion of a clause, but merely that they must be regarded as accessible, even if they have not been overtly mentioned in the previous written or spoken context.

knowledge, memories from previous conversations, concrete items and/or events connected to the situational context, in short, all things that the speaker assumes are mentally accessible to her and the listener, may be considered "known". In this accessible context there is some information the speaker assumes she and the listener agree is under discussion.

Ginzburg (to appear) formalises these assumptions in his Dialogue Game Board as mental lists of *Questions Under Discussion*, QUD. Such QUDs exist in the mind and describe the information state of the speaker and the listener. They are formalised as ordered sets that are updated with information from the most recent utterance.

When the speaker enters the room in (6) and finds the listener in tears, this brings up the crying on the QUD. The question in (6 a) adds the question of the reason for the crying, and the answer in (6 b) adds the budgie and its death as the reason to the QUD. The QUDs shown in this article are a very simplified version of the speaker's QUD, included only to show a formalisation of what is assumed to be under discussion and what is not.

Dialogues are often used to show what is under discussion. But it is equally possible to analyse other text types. In example (7) below, the fact that a man was putting on clothes is brought to the reader's attention in the first sentence. Because of this, the first part of the second sentence, *Han tog på sig*, must be regarded as GROUND, while *grå kostym och en blå skjorta* is the rhematic portion.

(7) Han gick   tillbaka till sovrummet   och lyckades   med viss möda
     he   go-PST *back   to bedroom*-DEF *and succeed*-PST *with some effort*
     klä   sig. [GROUND Han tog   på sig] [RHEME grå   kostym och
     dress REFL ...   *he   take*-PST *on* REFL ...   *grey suit   and*
     en blå   skjorta].
     a blue shirt
     'He went back to the bedroom and managed with some effort to get dressed.
     He put on a grey suit and a blue shirt.'

The GROUND portion of a clause consists of material that must be present in the clause for one or more reasons. They may be there to ensure that the RHEME is related to the right question under discussion. But sometimes there are also grammatical reasons for GROUND material not to be suppressed in a clause, like in Swedish, where clauses without a subject are mostly ungrammatical except in colloquial speech and in certain genres, such as diary and post-card writing (cf. Mörnsjö 2002, Magnusson 2007). In languages like Italian, on the other hand, it is a well known fact that GROUND subjects are generally left out, when not contrastive.

2.3 A brief note on accessibility

The page limit of this article does not allow more than a brief comment about accessibility and the activation of referents related to word order. The notion of accessibility or activation (cf. Gundel et al. 1993, Lambrecht 1996; on the discourse feature ACTVN, see O'Connor 2006) is closely related to the choice of linguistic expressions and to their positions in a clause, and elements with a high activation tend to appear early in a sentence.

Activation is nevertheless not inseparably connected to discourse functions, as we saw in example (4) above. Accessible information appearing early in a clause is hence not necessarily a consequence of accessible constituents being the GROUND of the sentence, even if GROUND by definition consists of accessible information.

In example (8) below, the referent of the pronoun is mentioned in the immediate context and thus accessible to the extent that it would be infelicitous to refer to her with a proper name. On the other hand, the pronoun is part of the rhematic portion of the clause. The information requested in the question is the reason for the listener not stopping, and the fact that Alma's waving is under discussion in the context does not make *her* part of the GROUND in the answer.

(8)   a.   Varför stannade du inte när Alma vinkade?
            why   *stop*-PST *you* NEG *when Alma wave*-PST
            'Why didn't you stop when Alma waved?'
      b.   Jag [RHEME såg   henne inte].
            I   ...   *see*-PST *her*   NEG
            'I didn't see her.'

On the other hand, the accessibility of the object *henne* (which may be formalised as an +ACTVN feature in the i-structure) requests that it be placed as early as possible in the clause, and the pronoun is consequently shifted from its canonical position after the negation.

In a context where the referent Alma is not accessible, neither in the spoken text nor in person standing waving on the pavement, see (9) below, the proper name *Alma* has the feature −ACTVN and appears in the canonical object position in Swedish after the negation.[5]

(9)   a.   Varför stannade du inte?
            why   *stop*-PST *you* NEG
            'Why didn't you stop?'
      b.   Jag [RHEME såg   inte Alma].
            I   ...   *see*-PST NEG *Alma.*
            'I didn't see Alma.'

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[5] For an object to appear before the negation in the F′ domain in Swedish (i.e. *object shift*), an accessibility level that allows use of a pronoun is requested. A more elaborate analysis of the information dynamics and impact of the object's activation state in object shift will be performed within the post doc project *Pronominal Object Shift in Swedish and Danish* 2007–2008, at the University of Aarhus, Denmark, see <http://maia.andreasson.googlepages.com/objektsskifte>.

3   The discourse function SCENE

It is, as mentioned above, well known that GROUND material in general precedes the rhematic portion of a clause, and this is mostly the case also for constituents which have the possibility for word order variation in the F′ domain in Swedish clauses. Interestingly, some constituents providing not previously mentioned but clearly not rhematic information show a somewhat different distribution. These are constituents that relate the proposition to a temporal, spatial, or circumstantial context, which is not under discussion. I call this discourse function SCENE (cf. Chafe 1976; Lambrecht 1996).

The corpus investigation in Andréasson (2007) shows that constituents denoting SCENE show a robust distributional pattern in relation to RHEME and GROUND in the F′ domain. They align to the right of any GROUND constituents, but to the left of rhematic constituents, see (10) below, where < means 'appears before'.

(10)   *F′ domain*: [finite verb[6]] < GROUND < SCENE < RHEME

Example (11) below is from an article where the runner Marian Jones is under discussion. In this sentence the subject *Jones* is GROUND and appears immediately before an adverbial describing the temporal frame of the proposition *den senaste tiden* 'lately'.

(11)   Enligt   Guardian har   [$_{SUBJ}$ Jones] den senaste tiden
        according-to Guardian have-PRS ...   *Jones* ART *latest   time*
        satts   under hård press   av sponsorn   Nike,
        put-SUPINE-PASSIVE *under hard pressure of sponsor*-DEF *Nike*
        som   betalar Jones runt   70 miljoner   kronor   för att hon
        REL-PRON *pay*-PRS *Jones around 70 million*-PL *crown*-PL *for that she*
        marknadsför företagets   produkter.
        market-PRS   *company*-DEF-GEN *product*-PL
        'According to the Guardian, Jones has lately been under hard pressure from the sponsor Nike, who pays Jones about 70 million Swedish crowns for marketing the company's products.'

In example (22 a), on the other hand, the same kind of information, denoted by the adverbial, *i höstas*, 'this autumn', instead appears immediately preceding a subject that is part of the rhematic portion of the clause.

(12)   På Åbro bryggeri fattades   i höstas [$_{SUBJ}$ beslutet   att lägga
        on Åbro Brewery take-PASSIVE *in autumn* ...   *decision*-DEF *to lay*
        ned   produktionen   med läsk i returglas].
        down production-DEF *with soda in returnable bottles*

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[6]The finite verb appears first in this domain of the clause for grammatical reasons, since Swedish is a V2 language.

'This autumn, a decision was made at Åbro brewery to close down the production of soda in returnable bottles'

Lambrecht (1996) categorises adverbials appearing initially in a sentence, "scene-setting adverbials", as part of his "topic" notion. In the discussion about example (13) (Lambrecht's 4.2 d), Lambrecht states that the scene setting topic *After the children went to school* supplies information about the temporal conditions for the rest of the sentence, that it is presupposed, and cannot be regarded as part of what is asserted (Lambrecht 1996:121, 125f., 219).

(13)   (John was very busy that morning.) After the children went to SCHOOL, he had to clean the house and go shopping for the party. (Lambrecht 1996:121)

If the event of the children's departure to school is presupposed, as suggested in Lambrecht (1996), it may be seen as accessible. On the other hand, this does not necessarily mean that the event must be under discussion.

Lambrecht's scene-setting adverbials are closely related to the notion of "stage topic" of Erteshik-Schir (2007:16f.). This notion builds on the spatio-temporal location always being a possible TOPIC, since it is indispensable for the evaluation of truth values. Both scene-setting and stage topics build on a TOPIC notion that differs from the concept of GROUND in this article. Even if SCENE material may be presupposed, it cannot be seen as a variety of GROUND since constituents of this category are by definition under discussion.

It is moreover not possible to define SCENE as a variety of RHEME either. Although SCENE material may be inaccessible, it does not really fill an informational gap. Yet another characteristic that separates SCENE from GROUND and RHEME is that it is not possible to focus constituents denoting SCENE.

Constituents that semantically denote the frame of a sentence may, but need not, be of the discourse function SCENE. In (14) below, the speaker puts the question of the listener's activities during the upcoming weekend on the QUD. The expression *till helgen* in the question represents a set of several points in time, for example the days during the weekend. And when the listener answers, the frame setting expressions *på lördag* and *på söndag* are focused GROUND (cf. Vallduví and Engdahl 1996: *link*; Choi 1999: *topic*).

(14)   a.   Vad ska du göra till helgen?
                 what FUT *you do   in   weekend*
                 'What will you do this weekend?'
         b.   [F-GROUND På lördag]   ska jag skriva klart min artikel och
                 ...   *on Saturday* FUT *I   write ready my   article and*
                 [F-GROUND på söndag] ska jag måla om i   sovrummet.
                 ...   *on Sunday* FUT *I   paint* PRT *in bedroom*-DEF
                 'On Saturday, I will finish writing my article, and on Sunday, I will repaint the bedroom'

In (15), on the other hand, the speaker requests information about the temporal frame for the event of the listener meeting with the mutual friend Alma. Here the rhematic portion of the clause is the constituent semantically denoting the frame: *På måndag klockan tre*. The answer may be elliptical or include reference to the event: *Det ska jag göra* [...].

(15)   a.   När ska du träffa Alma?
            when FUT *you meet Alma*
            'When are you going to meet Alma?
      b.   (Det ska jag göra) [RHEME På måndag klockan tre]
            that FUT *I do ... on Monday clock*-DEF *three*
            '(I will do that) On Monday at three.'

3.1   Setting the SCENE in a cleft construction

Expressions denoting SCENE are often placed early in a sentence. In the F′ domain they appear before the RHEME and another common position is in the first position of the clause immediately before the finite verb (cf. Chafe 1976: 50f.; Lambrecht 1994:118; Teleman, Hellberg and Andersson 3:446, 3:492f., 4:432[7]). In news reports, constituents denoting a SCENE often appear in matrix clauses of cleft constructions; see example (16) below.

(16)   Det var   *sent på lördagskvällen*   som ett gäng ungdomar
          it be-PST *late in Saturday-night*-DEF *that a band young people*
          enligt   vittnesuppgifter   helt   oprovocerat attackerade
          according to witness information totally unprovoked attack-PST
          gående   vid Stigbergstorget.
          pedestrian-PL *by Stigbergstorget*
          'It was *late Saturday evening* that, according to a witness, a band of young people made an unprovoked assault on pedestrians at Stigbergstorget.'

Cleft constructions are often otherwise used to mark a focused constituent. In this example, on the other hand, the frame setting adverbial *sent på lördagskvällen* is clefted, but not focused. The non-clefted portion of the clause in turn contains new information about an assault that is brought up for discussion in the preceding text and is not presupposed, as is the case when focused constituents are clefted (Rooth 1992, 1996).

4   Sentence adverbials and prominent information

Sentence adverbials (SADVL) are traditionally defined as 'clausal modifiers', that is modifiers of the proposition including the subject, as opposed to so called VP-adverbials, which modify only the verb and its complements. For an account of the

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[7]Swedish SCENE may also be placed as the last and necessarily non-stressed adverbial in a clause.

differences between these two categories, see Dalrymple 2001:269–274.

It is, however, not unknown that adverbials that relate the proposition to a temporal, spatial, and circumstantial frame also modify the entire proposition, rather than only the verb phrase, even if these are not usually referred to as "sentence modifiers" (Nikula 1986). These adverbials are semantically comparable to some of the traditional sentence adverbials, namely those that affect the truth values of the sentence, since both these categories set the conditions under which the proposition is true.

What is it then that distinguishes sentence adverbials from other sentence modifiers? In the following, I will show that the defining characteristic for sentence adverbials seems to be their ability to function as information dynamic FOCUS operators.

In examples (17) and (18), sentence adverbials are used as FOCUS operators. The context of example (17) is a discussion about a violent handball game where the player Anders Franzén got beat up. In this sentence the SADVL *också*, 'also', serves as a focus operator, highlighting the rhematic constituent, *Mikael Franzén*.

(17)   Inne på linjen   fick   *också Mikael Franzén ta   emot*
         in   on line-DEF *get*-PST *also   Mikael Franzén take*-INF *towards*
         mycket stryk
         much   beating
         'On the line, Mikael Franzén was also beaten up'

The context of the example in (18) is a dietician giving advice on infant diets. Here the pronoun *jag* referring to the writer is focused GROUND; by placing the pronoun after the SADVL, the writer aims to evoke the presupposition that there exists an alternate set of persons that are not of the same opinion.

(18)   Om barnet   går   upp i vikt,   ser   i alla   fall *inte jag*
         if   child-DEF *go*-PRS *up   in weight see*-PRS *in all*-PL *case* NEG *I*
         det som några   problem om barnet   äter   vegetariskt.
         that as   any-PL *problem if   child*-DEF *eat*-PRS *vegetarian*
         'As long as the child is gaining weight, there is no apparent problem – in my opinion – if the child follows a vegetarian diet.'

It is not unknown that there are adverbs, like *only* and *even*, that function as focus operators (cf. Rooth 1996). These adverbs often appear in places where other SADVLs may not, for instance in NP:s, structurally adjoined to a focused element: *Even Alma sometime cooks*. But other SADVLs also relate to the focused part of a sentence and may function as FOCUS operators.

In example (19) the subject *Alma* is placed after the sentence adverbial *faktiskt*, 'actually', in the F′ domain. *Faktiskt* is syntactically restricted to appear only in propositional contexts. In this sentence, it modifies the sentence and is syntactically a sister to the subject in the F′ domain. The placement of *Alma* after *faktiskt* in (19) nevertheless evokes an interpretation where it is unexpected that Alma cooks and

that an alternative set of one or several persons normally does the cooking.

(19)   Ikväll   lagade   faktiskt Alma maten.
        tonight cook-PST *actually Alma food*-DEF
        'Tonight, it was actually Alma that cooked the meal.'

A clear indication of the FOCUS operator function of sentence adverbials is that in Swedish these, but not other adverbial categories, may be clefted with another constituent of a clause, as in (20) below (Andréasson 2007). This example shows that it is possible to cleft a constituent preceded by a sentence adverbial, like *faktiskt* 'actually', while this is not possible with a manner adverbial, *långsamt* 'slowly', or a frame adverbial, *igår* 'yesterday'.

(20)   It is SADVL [focus domain] that [rest of sentence]

      a.   Det var   *faktiskt* Alma som lagade   maten.
              it   be-PST *actually Alma that cook*-PST *food*-DEF
              'It was actually Alma that cooked the meal.'
      b.   *Det var *långsamt* Alma som lagade maten.
              'It was *slowly* Alma that cooked the meal'
      c.   *Det var *igår* Alma som lagade maten.
              'It was *yesterday* Alma that cooked the meal'

Interestingly, the English translations of (20 b) and (20 c) are also bad, even though a thorough investigation of the possibilities in English has not been carried out. An investigation of several languages is needed to decide whether the possibility to appear in a cleft construction with another constituent is a characteristic of sentence adverbials in other languages too.

    A constituent that is clefted with a sentence adverbial, as in (20 a), is always interpreted as focused and can never be interpreted as the SCENE of the sentence, which it is in the cleft construction in (16) above. If an adverbial denoting a temporal frame, like *igår* in (20 c), is clefted with a sentence adverbial, the non-clefted portion of the clause is interpreted as presupposed and the frame adverbial as focused; see (21) below.

(21)   Det var   *faktiskt* igår   som Alma lagade   maten.
        it   be-PST *actually yesterday that Alma cook*-PST *food*-DEF
        'It was actually yesterday that Alma cooked the meal'.

The construction in (20), *It is* SADVL *[focus domain] that [rest of sentence]*, serves as a test for sentence adverbials in Swedish and distinguishes this category from other propositional modifiers (Andréasson 2007).

5   The architecture of i-structure

To sum up, the attributes relevant for the i-structure in Swedish are on the one hand the discourse functions RHEME, GROUND, and SCENE and on the other hand the discourse features FOCUS and ACTIVATION. The DF:s have various possibilities of being focused; the DF SCENE is singled out from the other discourse functions by not being possible to focus. Furthermore, the discourse function GROUND is singled out from the others since it necessarily consists of information that is under discussion and hence active.

	FOCUS	ACTIVATION
RHEME	±	±
GROUND	±	+
SCENE	−	±

TABLE 1: *Discourse functions and discourse features*

In this section I will turn to the question of what consequences the conclusions in this article will have for the architecture of a separate i-structure in LFG.

5.1   Integrating SCENE

As discussed in section 3 above, there are reasons to believe that SCENE should be treated as a discourse function distinct from GROUND and RHEME. One consequence for the architecture of i-structure is then to integrate SCENE as an attribute with a possible value, as outlined in (22) below, where the sentence in example (22 a) is repeated. Here the SCENE of the sentence, the PP *i höstas*, is the value of the DF attribute SCENE in the i-structure.

(22)   a.   På Åbro bryggeri fattades   i höstas [SUBJ beslutet   att
        *on Åbro Brewery take-*PASSIVE *in autumn ...   decision-*DEF *to*
        lägga ned   produktionen   med läsk i returglas].
        *lay   down production-*DEF *with soda in returnable bottles*
        'This autumn, a decision was made at Åbro brewery to close down the production of soda in returnable bottles'

   b. $\begin{bmatrix} \text{GROUND} & \left\{ \begin{bmatrix} på\ Åbro\ bryggeri \end{bmatrix} \right\} \\ \text{RHEME} & \left\{ \begin{bmatrix} fattades\ beslutet\ att\ lägga\ ner \\ produktionen\ med\ läsk\ i\ reurglas \end{bmatrix} \right\} \\ \text{SCENE} & \left\{ \begin{bmatrix} i\ höstas \end{bmatrix} \right\} \end{bmatrix}$

5.2 Integrating focused elements

FOCUS is a feature that may affect only part of the RHEME or GROUND of a sentence. A FOCUS attribute with a ± value within the attribute-value matrices representing the various discourse functions would hence not be a satisfactory solution to formalising FOCUS in the i-structure.

It is furthermore necessary to find a way to formalise the FOCUS operators in the i-structure. I propose that the FOCUS attribute of the i-structure take a FOCUS DOMAIN and a FOCUS OPERATOR as values. The value of the domain may be linked to one of the members in the GROUND or RHEME sets by structure sharing. The value of the operator in its turn may be linked to a sentence adverbial in some cases in, for example, Swedish. It may also be linked to the prosodic structure in speech, to information packaging constructions or c-structure positions, or to the morphological structure in languages that mark focus with morphemes.

In examples (23) and (24) the i-structures of examples (17) and (18) are outlined. In these i-structures the FOCUS domains and operators are linked to GROUND or FOCUS elements by structure sharing, marked with coindexation.

(23) Inne på linjen   fick   *också Mikael Franzén* ta   emot
     in   on line-DEF *get*-PST *also   Mikael Franzén take*-INF *towards*
     mycket stryk
     much   beating
     'On the line, Mikael Franzén was also beaten up'

$$
\begin{bmatrix}
\text{GROUND} & \left\{ \textit{fick ta emot mycket stryk} \right\} \\
\text{RHEME} & \left\{ \begin{array}{l} \textit{också}_i \\ \textit{Mikael Franzén}_j \end{array} \right\} \\
\text{SCENE} & \left\{ \textit{inne på linjen} \right\} \\
\text{FOCUS} & \begin{bmatrix} \text{OPERATOR} & i \\ \text{DOMAIN} & j \end{bmatrix}
\end{bmatrix}
$$

(24) Om barnet   går   upp i vikt,   ser   i alla   fall *inte jag*
     if   child-DEF *go*-PRS *up   in weight see*-PRS *in all*-PL *case* NEG *I*
     det som några   problem om barnet   äter   vegetariskt.
     that as   any-PL *problem if   child*-DEF *eat*-PRS *vegetarian*
     'As long as the child is gaining weight, there is no apparent problem – in my opinion – if the child follows a vegetarian diet.'

$$
\begin{bmatrix}
\text{GROUND} & \left\{ jag_j \right\} \\
\text{RHEME} & \left\{ \begin{array}{l} \textit{i alla fall} \\ \textit{inte}_i \\ \textit{ser det som några problem om...} \end{array} \right\} \\
\text{SCENE} & \left\{ \textit{om barnet går upp i vikt} \right\} \\
\text{FOCUS} & \begin{bmatrix} \text{OPERATOR} & i \\ \text{DOMAIN} & j \end{bmatrix}
\end{bmatrix}
$$

6 Conclusion

On the basis of Swedish data I have argued that the discourse function SCENE needs to be distinguished from RHEME and GROUND. I have furthermore proposed, following Andréasson (2007), that a characteristic that singles out sentence adverbials from other clausal modifiers is their ability to function as focus operators. Lastly, I have proposed a sketch for an LFG i-structure that makes use of these notions.

Most LFG-analyses of information dynamics so far have dealt with individual languages, making generalisations and proposing machinery based on these. This article is no exception. I have based my proposal on the information dynamics of Swedish, and – I might add – of a limited subset of Swedish, namely declarative main clauses and only concerning the constituent order in the F′ domain. The analysis of Swedish in this article is hence only one contribution to the jigsaw puzzle of the architecture of i-structure.

It is not clear to what extent the analysis in this article fits in with Cook and Paynes' (2006) recent analysis of information dynamics in German. Especially their notion of TOPIC infers an aboutness that is not directly related to information that is under discussion and hence not comparable to the QUD notion used in this article. O'Connor's (2006) analysis of spoken Serbo-Croatian makes use of the notion ACTIVATION that I have not yet included for Swedish, and he also proposes a mapping between i-structure (his *d-structure*) and the prosodic component of the grammar, the p-structure. Mycock (2007) discusses the notions of interrogative and non-interrogative FOCUS in her analysis of constituent questions, a distinction that has not been included here since I analyse declarative clauses.

Information dynamics is becoming more and more important today, having impact on analyses both in non-derivational and derivational frameworks. In my view, information dynamics is a field where it would be fruitful to see even more joint work in the future. The architecture of the LFG i-structure is still an open question and will probably remain so until several researchers with thorough and detailed insights in the information dynamics of various languages work together.

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