# **3.1** General information about the project A1

### 3.1.1 Title:

Phonologie und Syntax der Fokussierung und Topikalisierung/ Phonology and Syntax of Focusing and Topicalization

### **3.1.2** Research areas:

Syntax, Phonology

# **3.1.3 Principal investigator(s):**

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#### 3.2 Summary

The purpose of A1 is the identification of an optimal model for the interaction of syntax and phonology in the context of the expression of information structure. Ideally, this will allow us to understand the way syntax influences the prosodic component of grammar and vice versa, as well as the actual composition of the means of expressing information structure both universally and in a given language.

In its first period, the project emphasized the expression of focus, with a few excursions into general aspects of prosodic organization and the expression of topicality, and the main languages of investigation were German and Japanese. Our results have led us to question certain assumptions of standard grammatical models. For example, several phenomena were identified and described in which syntactic structure and operations seem influenced by prosody, which is quite unexpected in the traditional Y-model, in which syntax always feeds phonology but not vice versa. Ample evidence for recursion in prosodic structure raises the question as to the validity of the Strict Layer Hypothesis for prosodic phrasing. In order to account for these problems, some theoretical proposals were made.

Based on such findings from the first period, the project's emphasis in the second period will be laid on hierarchical aspects of information structure. To achieve the goals to be described below, the project will continue the systematic examination of the prosodic structure (pitch range, integration, etc.), as well as investigate several entirely new questions. Special attention will be paid to the recursion and embedding of information structure. Relevant questions include, among others: whether and how far information structure can be embedded; how prosodic and syntactic recursions are related, what the best grammatical model that explains the syntactic and prosodic recursions in a parallel manner is; and how such a model explains the recursion of information structure (if any).

## **3.3 Project development report**

## 3.3.1 Report

Project A1's goal is the identification of a model of the role played by information structure in the syntax-prosody interface. For the first phase, we had identified the following four theoretical subtopics of our research:

- T1 Architecture and other design features of the pertinent model of grammar
- T2 Sentence accents
- T3 IS-related word order phenomena
- T4 Clarifications of the notion 'focus'

## T1 Architecture and design features of the grammatical model

The bulk of our research was concerned with the basic design features of the prosodysyntax interaction. The results may be categorized into three groups: a. prosody-scope correspondence; b. prosodic phrasing and focus intonation; c. focus types and realization. Due to the cut in the size of the project, the further issues listed for subgoal T1 in the last proposal could not be addressed.

a. Prosody-scope correspondence:

A first series of results addresses the phonetic correlates of prosody (most of all fundamental frequency  $F_0$  and duration) as it relates to semantic scope and syntactic structure. Ishihara (2004, 2005) investigated the focus intonation found in wh-questions in Japanese, and showed that the prosodic domain of focus intonation corresponds to the semantic scope of wh-question. The post-focus  $F_0$ -compression continues until the end of the matrix clause in a matrix wh-questions, while the compression is limited to within the embedded clause in an indirect wh-question. Ishihara (2004, 2005) proposed a phase-based Minimalist account of this prosody-semantics correspondence. The embedded phrase is submitted to Spellout first, and the matrix clause only in a second step, when the first Spellout cannot be manipulated any longer. This model derives the prosody-scope correspondence as a result of cyclic syntactic computation, instead of stipulating a principle (cf. Hirotani 2003). Furthermore, Ishihara (2006b) experimentally showed that a Negative Polarity Item (NPI) in Japanese also triggers a focus intonation, and shows the prosody-scope correspondence in terms of the scope of negation. This result provides support for the claims by Lee & Tomioka (2001) and Hirotani (2003) that the so-called LF intervention effect in NPI sentences (cf. Beck 1996) is due to the interaction with the focus intonation triggered by a wh-question and the one triggered by an NPI.

b. Prosodic phrasing and focus intonation

The second series of studies in the first phase deals with the relationship between prosodic phrasing and focus intonation. Various results from these studies revealed that IS-related notions, such as focus and givenness, appear to have an effect on raising and/or lowering *reference lines* in the phonetic representation, and that, contrary to a long tradition in the literature on the subject, focus does not change the prosodic

phrasing structure. *Reference lines* (or 'top lines') are the upper limits of the speaker's pitch range at a particular point of an utterance, i.e., the highest point of the high tones of a particular domain. A focus intonation in Japanese, for example, can be characterized by three phenomena that affect reference lines in the following way: an expansion of pitch range on the focus, i.e. wh-phrase (focal  $F_0$ -rise), a compression of pitch range on the post-focal material (post-focal  $F_0$ -compression), and an  $F_0$ -reset after the semantic scope of a wh-question to the non-compressed pitch range after the givenness domain.

Ishihara (2004) showed experimentally that focus intonation can be embedded within another focus intonation, which suggests the cyclic nature of prosodic computation. This fact cannot be explained under the Strict Layer Hypothesis, which prohibits recursion of a certain level of prosodic phrasing. Furthermore, Ishihara (2006b) showed the independence of prosodic phenomena related to focus intonation from those related to prosodic Major Phases. Although, at first sight, the post-NPI downtrend and the subsequent pitch reset look similar to the downstep effect observed within Major Phrases (Poser 1984, Pierrehumbert & Beckman 1988, Kubozono 1993), it is shown that these phonetic effects associated to the focus intonation can be observed independently of downstep. This result indicates that the phonetic effects driven by focus do not change the prosodic phrasing structure, and function independently. Ishihara (2006a) proposes to separate prosodic phrasing from focus intonation and claims that the prosodic phrasing results from a direct syntax-prosody mapping of (multiple) Spellout domains, while the focus intonation involves focus feature agreement, which triggers the manipulation of reference lines. Ishihara (2007) systematically investigates the phonetic effects of focus intonation and (Major Phrase dependent) downstep, and further confirms the findings shown above: focus-related prosodic phenomena and Major Phrase-related phenomena behave guite differently.

Another area of studies on reference lines concerns the relation between reference lines and syntactic structure. Féry & Truckenbrodt (2005) studied a related issue in German and showed that reference lines, indicating register interactions, clearly reflect the syntactic structure of a sentence. In this work, 'A while (B and C)' was compared with '(A and B) while C,' where A, B, and C were clauses. This study shows that the difference in syntactic structure is reflected in the prosodic structure in the following way: the downstep between the two sentences separated by 'and' is steeper than the one between the clauses separated by 'while.' This difference is explained by multiply embedded reference lines corresponding to the hierarchical prosodic structure, multiply embedded in the same way. In Féry & Kügler (2006), the influence of reference lines was observed for smaller constituents, as well. This paper investigates extensively the importance of reference lines in the phonological realization of sentences, by comparing the phonetic output of sentences with different IS-status (focus and givenness). A large number of sentences with similar and very simple syntactic structure, namely embedded sentences with one, two or three arguments, were compared to each other. In this study, phrasing is not affected by IS either, but only the relative height of pitch accents. In addition to the result that the information structure has an influence on the height of the high tones, it was shown that tones influence each other, which renders an intonation language like German more similar to a tone language.

In the same line of experimental work on the relationship between tone height and other parts of the grammar, Ishihara & Féry (2006) and Féry & Ishihara (2006)

investigated the so-called Second Occurrence Focus (SOF) phenomenon in German. Together with the typical examples that have been discussed in the literature, in which the SOF is always located in a post-nuclear position, they examined the prosody of prenuclear SOF examples. The result of this investigation shows that SOF is to be analyzed both as a focused and as a given constituent. This result has an influence on the representation of the prosodic structure in the grammar in general, and, in particular, on the kind of influence exerted by information structure on the high tones. This study proves once more that the effect of syntactic structure and the effect of information structure have to be kept apart in the prosodic representation, and thus that the usual representation in terms of prosodic phrases is not sufficient.

Both Ishihara's and Féry's work on reference lines is summed up in Féry & Ishihara (2007) which presents a new model of the relationship between syntax and prosody, taking not only the import of the syntax into account, in the form of prosodic phrases, but also the import of information structure, in the form of the height of reference lines. The height of individual tones is thus the result of both the prosodic phrasing and the concomitant downstep between constituents of the same category.

c. Focus types and realization

Féry & Samek-Lodovici (2006) examined various types of constructions in which a contrastive focus is embedded into a presentational focus and, as a consequence, triggers conflicting accents. They claimed that accent placement is not as simple as has been entertained by some authors who always predict a simple relation between F-marking and accent (Selkirk 1995, Schwarzschild 1999, Rooth 1992): Focus types (contrastive vs. new) must be distinguished; and also givenness plays a crucial role in determining the right prosodic realization. Based on the Optimality Theoretical analysis, the phonological output that optimally satisfies the various constraints (focus types, syntactic, phonological, and information structural conditions) is chosen as an actual output.

## T2 Sentence Accents

The predictability of sentence accents and the nature of focus projection/integration were the two major goals of subtopic T2. Féry & Herbst (2004) and Féry (2007) investigated prosodic integration in German. Syntactic sister material (for instance [XP V]VP) typically exhibits integration, while information structure also triggers it, sometimes integrating a verb with an adjacent subject or adverb. The experimental results of Féry and Herbst show that the phenomenon is gradient in nature, casting doubt on the fairly categorical explanations often found in the literature (see for instance Gussenhoven 1992 for a categorical approach to integration). Additional experiments are being conducted which complement the results of Féry & Herbst.

Analyzing sentences with a fronted object in a wide focus context from the prosodic perspective, Féry (2007) examines the prosodic characteristics of a unique prosodic phrase, thus exhibiting prosodic integration, and observes that focus fronting can be understood as movement of an accent in order to obtain a perceptually better accent pattern: the final falling accent is at the same time sentence-initial, thus in a perceptually optimal position (see, among others, Beckman 1997, as well as Alber 2001 for this view). But the content of the prosodic phrase is not changed.

Ishihara & Féry (in prep) will report an extensive study, the elaboration and execution of which has taken several years, due to false starts and errors in the construction of the sentences, plus the difficulty of obtaining reliable recordings for Hungarian. In this study, integration phenomena in German, Japanese and Hungarian are compared. The starting point is the question of the difference in integration between object-verb and subject-verb sequences in these three languages. Roughly, it can be said that German does distinguish sequences of an object-verb from sequences of a subject-verb: an object-verb construction possesses only one accent (on the object), while a subject-verb construction often has two accents (on both elements), whereas Japanese shows no distinction. The distinction in Hungarian is more subtle due to the very marked prosodic pattern of this language: the preverbal position has a falling accent which induces a radical compression of the remaining material in the same focus domain (see Truckenbrodt (1995) for a definition of focus domain). Postverbally, accents are possible (see É. Kiss 1998, Szendrői 2003), but they are very much reduced.

# T3 IS-related word order phenomena

The aim of subtopic T3 was to deepen our understanding of how prosody interacts with syntax in the licensing of movement operations. Originally, Fanselow (2002, 2003) had postulated that some instances of movement to the German *Vorfeld* position were triggered purely formally or prosodically, while others were analyzed as involving pragmatically defined features such as 'focus' or 'topic'. Fanselow (2004) was able to show, however, that all instances of focus fronting to Spec, CP can and must be reanalyzed as processes that move accented categories to Spec, CP, so that reference to a focus feature is unnecessary. In a detailed analysis of Czech and German focus fronting, Fanselow & Lenertová (2006) present a large variety of arguments for this prosodic reinterpretation of focus fronting, they identify the pertinent locality restriction and show that similar analyses are mandatory not only for many other Indo-European languages, but also for Hungarian, Basque and Somali.

Féry (2006a) suggests that at least some cases of topical XPs fronted to Spec, CP are triggered by the need of an accented constituent to escape the adjacency of another accented constituent, as well as by the need to acquire the right type of accent (rising tone as opposed to falling tone).

Fanselow (2004, 2006a) addresses the plausibility of the idea (Frey 2004) that there is a special sentence-medial topic position. He shows that the empirical foundations of Frey's claim are less convincing than normally assumed, and argues for a reinterpretation of Frey's data based on insights of Engels (2005) in terms of (prosodically governed) rules for the distribution of focus sensitive operators. A series of acceptability rating experiments concerned with prosodic and linear aspects of topic placement in German, that was meant to test the predictions of Frey (2004) in detail, had very disappointing results: none of the factors we had tested had any significant effect on acceptability.

While our research on focus covered a wide variety of languages, the scope of our research on topics was more modest. Together with Masako Hirotani, Ishihara conducted a production study concerned with the prosodic realization of Japanese topics as a function of the presence of the wa-marker, but, so far, the results are not very revealing. Ingo Feldhausen's dissertation will analyse the prosody-syntax-interaction in Catalan topic structures in an OT framework and will be completed in

2007. The reduction in the scope of our program in the area of topicalisation is mainly due to the fact that only one researcher position was granted rather than the 1.5 positions we had designed our program for. Similar cuts were necessary in further areas, as discussed below.

Summing up, we can say that project A1 has already collected and interpreted a considerable bulk of evidence for the claim that prosody is the mediator in the licensing of syntactic reordering for the expression of information structure.

## T4 Clarifications of the Notion 'Focus'

Many of our results make a contribution to the fourth subgoal, viz. clarifications of the notion of focus. The articles by Féry and Fanselow in Féry et al. (2007) take a very formal look at the definition and role of focus in phonology and syntax. The cross-linguistic survey described in the previous proposal also fell victim to the cut in size of the project.

#### Collaborations

During the first period, various collaborations were carried out for various topics, many of which resulted in publications: Fanselow & Lenertová (2006); Féry & Samek-Lodovici (2006); Féry & Truckenbrodt (2005); Féry et al. (to appear); Féry & Kügler(2006). Experiments were also conducted in collaboration with A2 (see A2 report) and with C1 (see below). Ishihara has been closely working with Yoshihisa Kitagawa (Indiana), Haruo Kubozono (Kobe), and Satoshi Tomioka (Delaware) on the IS-related issues regarding wh-questions in Japanese. Following the 1st Workshop on Prosody, Syntax, and Information Structure (WPSI) organized by Kitagawa in April/May, 2004, the A1 project organized the 2nd meeting of WPSI in March 2005 at University of Potsdam. The proceedings of WPSI2 are to appear in 2007.

## • Experimental Program

The major goals of the experimental program have been met. Most of the experiments directly fit into the theoretical subgoals, and have thus already been described above. In collaboration with Elsi Kaiser (USA), and with project C1, an eye-tracking study was conducted to check the well-foundedness of the following claims: a listener who hears a falling accent early in a sentence does not expect a second accent later on in the same sentence. Because of the accent pattern of a German Intonation Phrase, in which nonfinal accents are rising and the final accent is falling, the listener knows that this accent is the last one. Consequently, this constituent is the only one being focused, and all potentially following constituents are given. By contrast, in a sentence with an early rising accent, this accent is interpreted as a topic, and the listener expects a following falling accent to signal the focused constituent of the sentence. The visual world experiment was designed in such a way as to test this hypothesis (see Féry et al. in press). This experiment was couched in a larger experiment which also tested the effect of word order (Weskott et al., 2006). In collaboration with Hönig (C1), a production experiment was conducted on locational propositions plus information structure in the form of new and given animal toys located in different ways (Hönig & Féry 2006). This cooperation will continue in the next phase, the emphasis being laid on a crosslinguistic comparison of how spatial orientation of objects is expressed in different languages when information structure is added.

A1 Féry & Fanselow

# **3.3.2** List of publications resulting from the project since the last proposal

### I. Peer-reviewed publications

### a) in scientific journals

- Féry, Caroline & Vieri Samek-Lodovici. 2006. Focus projection and prosodic prominence in nested foci. *Language* 82.1: 131–150.
- Féry, Caroline & Hubert Truckenbrodt. 2005. Sisterhood and tonal scaling. *Studia Linguistica*, special issues "Boundaries in intonational phonology" 59.2/3: 223–243.
- Ishihara, Shinichiro. 2005. Prosody-scope match and mismatch in Japanese wh-questions. *English Linguistics* 22.2: 347–379. Tokyo: English Linguistic Society of Japan.
- Ishihara, Shinichiro. 2006a. Major Phrase, Focus Intonation, Multiple Spell-Out (MaP, FI, MSO). To appear in *The Linguistic Review*, special issues on prosodic phrasing.

### b) at major scientific conferences

Ishihara, Shinichiro & Caroline Féry. 2006. Phonetic correlates of second occurrence focus. In the Proceedings of the 36th North-Eastern Linguistics Society (NELS36). Amherst, Mass: GLSA.

#### c) in monographs

- Fanselow, Gisbert. 2006a. On pure syntax (Uncontaminated by information structure). In Brandt, Patrick & Eric Fuss (eds.) Form, Structure and Grammar. Berlin: Akademie Verlag.
- Féry, Caroline. 2006a. The prosodic basis of topicalization. In Schwabe, Kerstin & Susanne Winkler (eds.) On Information Structure, Meaning and Form. Amsterdam: Benjamins.
- Féry, Caroline, Elsi Kaiser, Robin Hörnig, Thomas Weskott & Reinhold Kliegl. to appear. Perception of intonation in a completion and an eye movement experiment. In Boersma, Paul & Silke Hamann (eds.) Perception in Phonology. Berlin/New York: Mouton De Gruyter.

## II. Non peer-reviewed publications

a) in scientific journals

## b) at major scientific conferences

- Kügler, Frank, Caroline Féry, & Ruben van de Vijver. 2003. Pitch accent realization in German. In Solé, Maria-Josep et al. (eds.) Proceedings of the 15th International Congress of Phonetic Sciences. Barcelona, Spain, S: 1261–64.
- Ishihara, Shinichiro. 2006b. Intonation of sentences with an NPI. To appear in S. Ishihara (ed.) The Proceedings of the 2nd Workshop on Prosody, Syntax, and Information Structure (WPSI 2), ISIS 7. Potsdam: University of Potsdam.

## c) in monographs

- Fanselow, Gisbert. 2004. Cyclic Phonology-Syntax Interaction: Movement to First Position in German. In S. Ishihara, M. Schmitz &A. Schwarz (eds.) ISIS 1: 1 42
- Fanselow, Gisbert. 2006b. The Restricted Access of Information Structure to Syntax A Minority Report. In Féry et al. (2007).
- Féry, Caroline. 2006b. The fallacy of invariant phonological correlates of information structural notions. In Féry et al. (2007).

- Féry, Caroline. 2007. Wide Focus Object Fronting. To appear in S. Ishihara, S. Jannedy & A. Schwarz (eds.) ISIS 8. Potsdam: University of Potsdam.
- Féry, Caroline, Gisbert Fanselow & Manfred Krifka (eds.) 2007. Notions of information structure, ISIS 6. Potsdam: University of Potsdam.
- Ishihara, Shinichiro. 2004. Prosody by phase: Evidence from focus intonation-wh-scope correspondence in Japanese. In S. Ishihara, M. Schmitz & A. Schwarz (eds.) ISIS 1: 77– 119. Potsdam: University of Potsdam.

#### d) Submitted/Online

- Fanselow, Gisbert & Denisa Lenertová. 2006. Left Peripheral Focus. Mismatches between Syntax and Information Structure. Ms., under revision (NLLT).
- Féry, Caroline: Postponed auch (A puzzle for Manfred Krifka). Also to appear in Snippets, a special volume ed. by H.-M. Gärtner, B. Stiebels, R. Eckhardt & S. Beck. Between 40 and 60 Puzzles for Manfred Krifka.
- Féry, Caroline & Laura Herbst. 2004. German accent revisited. In Ishihara, S., M. Schmitz & A. Schwarz (eds.) ISIS 1: 43–75. Submitted.
- Féry, Caroline & Shinichiro Ishihara. 2006. The prosody and semantics of second occurrence focus. Resubmitted to Journal of Linguistics.
- Féry, Caroline & Shinichiro Ishihara 2007. How Information Structure Shape Prosody. To appear in Zimmermann, Malte & Caroline Féry (eds.) Information Structure from different Perspectives. Oxford University Press. (to be obtained from the authors)
- Féry, Caroline & Frank Kügler. 2006. German as a tone language. Submitted to Journal of Phonetics.
- Hörnig, Robin & Caroline Féry. 2006. Describing Altered Spatial Layouts. Ms. Potsdam. (to be obtained from the authors)
- Weskott, T., Hörnig, R., Kaiser, E., Féry, C., Kern, S., Fanselow, G., & Kliegl, R. (submitted). Information structure and the anticipation of discourse referents. [Cognition].

#### **3.4** Planned continuation of the project (goals, methods, work programme)

### 3.4.1. Goals

The primary aim of our project, viz. the identification of a model of the prosody-syntax interface under consideration of information structure, will be kept for the second period of funding, but there will be a slight shift of emphasis. Specifically, three goals can be described as follows.

#### G1 Prosodic correlates of information structure

In the first period, a number of our studies helped to disentangle the impact of syntax and of information structure on prosody. We were able to show that assuming a flat, non-cyclic and non-recursive prosodic hierarchy is not sufficient, since these imports have different effects: syntax has a significant effect on the phrasing, and information structure, as well as syntax, have an influence the height of reference lines. This line of research will be continued in the second period, and more attention will be dedicated to the recursivity of prosodic structure, especially under the influence of information structure. Specifically, we intend to examine two prosodic aspects: first, the relation between reference lines and prosodic phrasing, and second, integration phenomena. We also plan to apply our findings on prosody in the first phase to the languages studied by the other projects of the SFB, in particular the African languages studied by B1 and B2, Hindi (C6), as well as the languages documented in D2.

## G2 Recursivity of information structure

Information structure has been thoroughly studied in many respects, but, surprisingly, hierarchical aspects have not received the attention they deserve. Some remarks supporting a hierarchical organization of information structure can be found in Rooth (1992, 2006) and Krifka (1999) among others, while others are inclined to assume a non-recursive model for information structure (see Tomioka 2006 for relevant discussion). It is an important research question whether a grammatical model should assume a hierarchical and recursive information 'structure' or a flat, non-recursive information 'partition'.

Our studies in the first phase of the project revealed several IS-related phenomena that are closely tied with recursivity in prosody and syntax (e.g. focus intonation embedding, second occurrence focus, multiple foci with conflicting accent requirement). In order to understand the relationship between recursivity in syntax/phonology and information structure, additional questions need to be addressed, which include the following:

First, does information structure have a recursive and cyclic component? Given that syntax, as well as phonology, is truly recursive in different ways, it is particularly important to examine whether information structure is recursive as well.

Second, how do recursion and cyclicity in syntax and prosody relate to each other? Recursivity has long been considered to be one of the core properties of syntax. As for prosody, the Strict Layer Hypothesis states that prosodic structure has a limited number of layers, and that recursivity is either excluded entirely from the prosodic component or that it is strictly limited (see Selkirk 2000 for instance). In the first phase of the project, however, new evidence was found for the recursive nature of prosody. Study of prosodic phrasing and its correlation with syntax will be continued in the second phase as well, which will serve as the basis for the study of the correlation between information structure and the other modules of grammar.

#### G3 Syntax-prosody interaction in derivational and constraint-based approaches

The main goal of the project is to develop a grammatical model for the articulation of information structure in language, both from a syntactic and from a phonological perspective. This goal was partially achieved in the first period. Féry & Ishihara (2007) provide a model of prosody which keeps apart the import of syntax and of information structure. Our results need validation as well as an extension to further phenomena and understanding additional languages. Furthermore, better of to а the recursive/hierarchical nature of prosody (as a result of the achievement of G1 above) should allow us to verify whether prosodic and syntactic representations are built up in parallel, as proposed by constraint-based models of grammar, or whether this happens preferably in a way fundamentally similar to the cyclic Spellout idea of the minimalist program. Given that most of the literature on prosody seems to presuppose a representational concept of the prosody-syntax interaction, the issue is non-trivial. Yet, the idea of a very close fit between syntactic and prosodic computation maximizes the empirical constraints on model construction for the prosody-syntax interface, and is

therefore a welcome guideline for research into the hierarchical organization of the realization of information structure, as it also allows us to precisely locate the place where prosody can influence syntactic computations.

In a constraint-based model such as Optimality Theory (Prince and Smolensky 1993/2004), syntactic effects and phonological effects are handled in a parallel fashion, so that effects or operations in syntax and in phonology may interact at the same level to derive the final output. The notion of "what happens first?" or "what triggers what?" is reduced to the question of how the constraints interact. In a derivation-based model such as Minimalism (Chomsky 1995, 2000, 2001), on the other hand, grammatical modules are clearly separated. The autonomy of each module is maintained, and the information flow needs to be clearly stated.

A priori, the minimalist program has difficulties in integrating the need of information structure into the grammar (see Samek-Lodovici 2006 for some relevant remarks), since Spellout always comes after the effect of syntax, which cannot be changed or even influenced by information structure. On the other hand, the expressive power of OT could be too large, and the difficulty may stem from its lack of limitation of the effects of information structure. A property shared both by derivational and by constraint-based grammar is that the exact syntactic and prosodic structure expressed in a particular information structural context could be selected outside of the syntax or prosody proper, at a component situated after the decision in OT or the derivation in Minimalism has taken place. In order to achieve the goal of the project, it will be necessary to study how the mechanisms of information structure are to be captured and formulated in such grammatical models. The following questions will be addressed:

How are recursion and cyclicity explained in different grammatical models? The comparison of the derivational and constraint-based frameworks in terms of cyclicity leads us to the question of how information structure (the cyclic nature of which is still in question) must be captured in the grammatical framework.

And finally, what is the best account of prosody? If it turns out to be true that prosody also needs a cyclic module, the question of the best model of prosody will be open again. There is not much competition in the representation of prosody up to now, and the Prosodic Hierarchy, which predicts only one level of representation both for syntax and for information structure will need some revision.

#### 3.4.2. Program, Methods

In order to answer the theoretical questions presented above, various empirical issues will be investigated in the second period of the project. Each research point (P1–P14) is briefly described below. The project's investigations bear on a number of languages, some of which are to be be conducted in collaboration with other projects.

#### **3.4.2.1** Prosodic correlates of information structure (G1)

G1 is articulated in the following research points (P1–P5).

#### P1 Theoretical model of reference lines and Prosodic Phrasing

The study of reference lines and prosodic phrasing has been extremely revealing in the first phase of the project. We need to continue our study in order to build a more concrete grammatical model that explains our findings and makes further predictions for other languages. We will assume a prosodic model as developed in Ishihara (2006a) and Féry & Ishihara (2006, 2007), in which the import of syntax and the import of information structure are clearly separated. Syntax leads to the creation of prosodic phrases, the reference lines of which are automatically downstepped, but information structure has the power to change the height of these reference lines. When a sentence contains a narrow or contrastive focus, the pitch contour of the post-focal material is radically reduced in most languages which use intonation to express information structure. This theoretical framework will be tested in various languages for various IS-related phenomena, through the series of experiments to be conducted in the various research plans described below.

# P2 De-phrasing effects of givenness

Although phonetic effects of focus and topic have often been discussed in the literature, the effects of givenness have not been systematically studied, albeit with a few exceptions (see Baumann 2005 and Baumann & Grice 2006 for the kind of pitch accents used, and Sugahara 2003 and Féry & Samek-Lodovici 2006 for pitch accent scaling issues). Further research is essential for a precise prosodic model of information structure.

More experiments are necessary to understand the pitch accent scaling associated with givenness. Sugahara (2003) claims that the given post-focal material is subject to prosodic de-phrasing, while new material is not. This means that the post-focal compression may or may not be accompanied by re-phrasing or de-phrasing of the prosodic phrases. In Japanese, the existence of the de-phrasing effect triggered by givenness is still under question because, in the pre-focal region, given material usually exhibits a lowered  $F_0$  but does not seem to show any de-phrasing. A more systematic investigation of the prosodic effects of givenness and post-focal material needs to be carried out. Experiments will be conducted for Japanese, German, and Hungarian (Exp 1–3).

## P3 Post-focal compression

Related to P2, a question arises when we consider the realization of the post-focal compression, which seems to vary to a certain degree from language to language. Japanese exhibits much less compression than German, for instance, and Hungarian exhibits more compression than both German and Japanese, even when all material is new. In addition to the experiments in P2, we extend the production experiments for a few more languages, which we will choose from the languages collected by the D2 project: French, Swedish (as an example of a pitch accent language), and Mandarin (as a tone language) (Exp 4–6).

All of the research topics above will be conducted with special attention to reference lines and prosodic phrasing. The next two research points focus on prosodic integration phenomena.

## P4 Gradient nature of integration: information structure

Integration refers to the presence of a unique accent for two adjacent syntactic constituents (see Jacobs 1993). It is considered an indication that the two constituents are contained in a single prosodic phrase. Given the assumption that prosodic phrasing is based on the syntactic structure, integration phenomena can tell us about the syntactic structure of the phrases in question: if integration is observed between two phrases, they are expected to be contained in the same syntactic projection. It must also be noted, however, that integration is gradient in nature, as Féry and Herbst (2004) reports. This may indicate that not only syntactic structure, but also information structure affects integration (as Gussenhoven 1992 shows). Systematic investigation of integration will be required in order to specify the source of gradation in integration. Checking the integration behavior between a verb and various types of phrases (subject, direct/indirect object, adverbials, etc) under various information structural conditions (broad/narrow focus, with/without contrastive, etc) will be necessary (Exp 7-8).

## P5 Categorical nature of integration: syntactic structure

Integration can potentially indicate the syntactic position of the material being or not being integrated. We will test the hypothesis that cross-linguistic differences concerning the integration potential of subjects relate to different syntactic positions of the subject in TP or vP. In line with what we note below, this could indicate that the syntactic *phases* (vP, CP) are the upper bounds of integration, meaning that subjects in Spec,TP can never integrate with the verb (see, among others, Gussenhoven 1992 and Wagner 2005 for this view). It must be tested whether this can be upheld even in situations of massive information structure bias. As for the subject-object difference, it remains to be seen if the different degrees to which the predicate may be inferred from the subject/object influence integrability in a different way with subjects and with objects. We expect that 2 experiments in addition to those for P4 will also provide us with enough information to answer the question raised here (Exp 9–10).

#### 3.4.2.2 Recursivity in syntax, prosody, and information structure (G2)

The next 5 research topics (P6–P9) deal with the second goal of the project, namely, the recursivity issues.

#### P6 Prosody of embedded information structure

The variation of reference lines and concomitant phrasing has not yet been investigated syntactically in complex sentences comprising embedded sentences with embedded information structure. German will be used to examine the reference lines and prosodic phrasing of sentences containing embedded information structure. Sentences like (1), in which a focus is embedded into another one will be investigated.

(1) Auch die Abgeordneten haben dieses Jahr nur wenige Kürzungen erlitten.

It is expected that the relative scope of focus operators – the scope of the second one is embedded into the scope of the first one – should be reflected in the prosodic structure. Variation in the kind of information structure, on a scale from contrastive to given (see Baumann & Grice 2006), and in the placement of foci and topics at different positions in the sentence will complete the picture (Exp 10-11).

## P7 Prosody of embedded material

Recursivity of center-embedded structures, as exemplified in (2a), will be tested experimentally, both in production and in perception (Exp 12–13). Hunyadi (2006) suggests for Hungarian that it is possible to cut out the embedded clauses in order to obtain a well-formed main clause. As a comparison, sentences with a parenthetical clause, like the one in (2b), will be tested as well.

- (2) a. Die Birnen, die am Baum, der grüist, hägen, sind sauer.
  - b. Die Summe, wie du weißt, wird sich verdoppeln.

The production experiment will compare the realization of such sentences with and without embedded clauses. We speculate that the melodic pattern *of the main clause* of a sentence with embedded clauses is identical or nearly identical to the one of the same sentence without embedding. The acceptability of the sentences from which the embedded clauses have been cut out and the acceptability of the sentences without embedded sentences should be the same. In a second step, the same material, using different kinds of information structure, will be tested. As an example, (2a) will be uttered as the answer to a question like 'What about the pears that are hanging from the green tree?' Similar experiments will be conducted with Ishihara's (2004) material in Japanese (Exp14–15), and with a Romance language, such as French (Exp16–17).

# P8 Syntax and prosody of *that*-complements and relative clauses

There is an interesting asymmetry in the placement of relative clauses and thatcomplements in German. That-complements mostly appear to the right of their governing verbs (3a), whereas relative clauses may be located to the right or to the left of the verb (3b-c) (see among many others Bayer 1996, Haider 2001 and Inaba 2006).

- (3) a. Marie wollte den Leuten erzälen, dass ein Tiger ausgebrochen war.
  - b. \*Marie wollte den Leuten, dass ein Tiger ausgebrochen war, erzälen.
  - c. Marie wollte Lieder, die einfache Geschichten erzälen, komponieren
  - d. Marie wollte Lieder komponieren, die einfache Geschichten erzälen.

In the context of the project's orientation, two questions will be investigated. First, Truckenbrodt (2003) finds a difference in the prosodic structure of similar constructions. He finds that the end of the embedded relative clause in (3c) is the only place where upstep is induced. This means that a sentence located to the right of a main clause (3a, 3d), in the post-field, is always included into the same larger intonation phrase as the main clause, a paradoxical result since one could expect that a relative clause is extraposed in order to form an independent intonation phrase. However, he only looked at one speaker and a small number of sentences. Clearly, more production experiments are needed to confirm or disconfirm his observations (Exp 18). Related to the prosodic issue, there is also a syntactic question. According to Inaba (2006), a *that*-complement is a Spellout domain on its own, while non-sentential complements need their head and the selecting verb in order to be linearized (OV or VO).

Second, a question arises about the factors responsible for the placement of the relative clause in the middle field or in the post-field, in addition to the well-investigated length factor. An issue which we will verify in cooperation with D4 is whether there is a principled difference in information structure (Exp 19). A first hypothesis is that *that*-complements are expected to be new, whereas a relative clause may be new or given. In the same way as parts of nominal phrases may appear at different places due to

accent strategies (see Féry 2006a), the placement of relative clauses may be sensitive to their information content. A comparison with Hindi, displaying the same freedom in the placement of the relative clause, has started in collaboration with Shravan Vasishth (Vasishth, Fernandez & Féry, in prep) (Exp 20–21).

## P9 Topic and Focus in embedded clauses

In spite of the fact that topic and focus refer to the common ground of an utterance and are as such main clause phenomena, elements bearing the expressive characteristics of topics and foci appear in embedded clauses (Frey 2004, Rooth 1992, 2006, Krifka 1997). Tomioka (2006) suggests that second occurrence focus constructions and examples such as (4) could be cases in point.

 (4) (What did Ken say?)
 Ken-wa [Erika-wa baka-da]-to itta Ken-TOP Erika-TOP fool-cop-COMP said
 'Ken said Erika is a fool.'

If these observations argue for complex hierarchical relations among the elements bearing markers of information structure, the question is how these relations are encoded prosodically, what roles accent and phrasing play in this respect, how registers are employed and whether their use in complex information structure is different from simple recursive structure, and how various  $F_0$ -compression operations are integrated into such a model (Exp 22-25).

Syntactically, the question arises as to what extent embedded topics and foci are merely placed in a subordinate clause while they in fact relate to the main clause (assertion). "Partial" focus movement (what is pragmatically the matrix clause focus appears in the focus position of an embedded clause) occurs at least in Bahasa Indonesia (Saddy 1991), Passamaquoddy (Bruening 2001) and, perhaps, German (Fanselow 2006b). Topics in embedded clauses may also be understood in terms of the matrix assertion: English embedded topicalisation is fine only in those clauses that are transparent for extraction (Ross 1967). This suggests that the embedded topic moves to the matrix at LF, and that this movement induces the island effect. We want to establish for a variety of languages (languages with embedded V2 phenomena such as German, Yiddish, Swedish, Kashmiri; Indonesian, and Basque because of partial focus movement) whether island phenomena for embedded topics and foci occur in general and what other syntactic side-effects are present.

Since there is evidence against covert focus movement (see Fanselow & Lenertová 2006), we need to look for non-movement explanations for the restrictions of the distribution of embedded topics and foci. A straightforward alternative that we will investigate is the logophoric interpretation of topics and foci: a topic or focus is either construed relative to the current common ground, or to the common ground assumed by the person whose propositional attitudes are reported in the embedded sentence.

If not all embedded topics and foci can be reconstructed as being linked to the matrix clause, one needs to work with structured propositions as interpretations of embedded clauses. It will be interesting to see whether there are formal differences between embedded topics/foci which are linked to the root clause and those which are not. We will collaborate with projects A2 and A5 for the semantic aspects of this enterprise.

## 3.4.2.3 Syntax-Prosody interaction in derivational and constraint-based approaches (G3)

For the last and main goal of the project, several research topics will investigate which grammatical model is more apt to account for information structure. An important subissue involves the notion of *phase* in the Minimalist framework in the syntax-prosodyinformation structure interface. As a comparison, various phenomena discussed above will be analysed in terms of Optimality Theory, a constraint-based approach.

## P10 Phase and Spellout in the Minimalist Program

Recently, many proposals have been made as to the syntax-phonology interaction based on the notions of the phase and Spellout from the Minimalist framework (Kahnemuyipour 2004, Fox & Pesetsky 2005, Adger 2006, Selkirk & Kratzer 2006, Ishihara 2006a, among others). These notions are particularly interesting for the study of the syntax-prosody interface. If multiple instances of Spellout really exist, where the syntactic derivation is transferred to the phonological component, we expect phonological substance that indicates this access point.

One possible piece of evidence for Spellout domains is prosodic phrasing. Selkirk & Kratzer (2006) and Ishihara (2006a) both propose that a Spellout domain is manifested as a Major Phrase in the prosodic hierarchy. In order to prove this hypothesis, several points must be systematically examined (Exp 26–27). One is the prosodic behavior of high- and low-attachment adverbs. If we assume that vP is a phase, and that the high-attachment adverbs adjoin to vP, while low-attachment adverbs adjoin to VP, then we would expect different prosodic behavior of these two types of adverbs. High-attachment adverbs would be outside the Spellout domain, and hence there would be a prosodic boundary after it. Low-attachment adverbs, on the other hand, should be included within the Spellout domain. As a result, they will be included in the Major Phrase created at Spellout.

Selkirk & Kratzer (2006) proposed that the leftmost element in the Spellout domain constitutes a Major Phrase in German. One question is whether this left-edge requirement is universal in nature, or whether the edge is subject to parametric variation. In the standard assumption of phase-based theories, the 'phase edge' position (the specifier of vP, CP) refers to the left edge of the phase. If we compare a head-final language like German and a head-initial language like English, the stress position as well as the direction of integration, is different. If the mechanism of the phase is responsible for stress assignment, both cases should be explained in a principled manner. We need first to establish an analysis that is compatible with both cases, and it needs to be tested by examining data from various languages (Exp 28–29).

# **P11** Multiple Articulations of Information Structure in the Clause

In Japanese, a topic may occupy two positions in a clause: it may follow the subject, as in (5a), or occupy the sentence initial position (5b). In German, topics show up in different slots, as well. Unexceptionally, German places foci either in a preverbal or in a clause-initial position. These multiple options raise the issue of whether slots related to information structure are present both in CP and in vP, the two derivational phases proposed by Chomsky (2005). This idea leads to a number of empirical issues that we want to investigate:

(5)	a.	Dare-mo-ga	kudamono-wa	ringo-o		tabeta
		everyone-NOM	fruit-TOP	apple-ACC	eat	
	b.	kudamono-wa	dare-mo-ga	ringo-o		tabeta
		'As for fruit, everyone eats apples'				

If information structure related positions are defined in terms of prosody in (most) intonation languages, do we also find a difference in terms of the tonal and prosodic realization? Is there a syntactic difference between the two layers of IS in a clause? Can these options be realized at the same time? German may be more flexible in the positioning of topics than suggested by Frey (2004), so that the latter view need not be fundamentally misguided. The questions related to topics can probably be best studied with Japanese since it has a clear overt marking for topics. First results concerning the quantificational status of the subject in (5a) and its binding potential suggest that the second topic is fully integrated into the clause, but more evidence, e.g. concerning the licensing of polarity items, must be considered. Furthermore, we plan to study possible prosodic differences between the two topic positions, and the combinatorial potential with expression of focus and prosodic consequences of focusing. We also plan to continue with our research on the distribution of topics in German clauses, where our purely syntactic results need to be complemented by prosodic studies (Exp 30). Exactly the same enterprise must be undertaken for focus. Here, we will collaborate with project D2 which will collect data on preverbal and sentence initial focus positions for a wide range of languages.

### P12 The phase as the attachment site of IS-related elements

Is it only the phases, that IS-related categories may adjoin to? If so, why do phases have such a privileged status? Is this property related to their status as domains of Spellout? This is a theory-internal issue, but an answer will certainly sharpen our understanding of grammar and information structure in general. In particular, if the edge-bound realization of topics and foci is tied to syntactic phases, we could learn more about what syntactic Spellout really means. Whether *v*P and CP should have such a privileged status is, however, not clear. For German, Haider & Rosengren (2003) show that scrambling may place XPs in *any* position of the verb phrase, and scrambling is linked to information structure. Free word order can be observed in the postverbal domain of Hungarian as well, although É. Kiss (2006) claims that this domain is not related to information structure, a position that needs to be compared with German. In general, we will have to look at other scrambling languages and languages that allow adjunction to IP, and check whether the placement rules there could not be reinterpreted as topic and focus placement in a stricter sense.

At the same time, and, perhaps, more importantly, we need to compare the evidence for a special derivational status of the phases *v*P and CP independently of the realization of information structure. In unpublished work presented at the 2005 DEAL conference, Heck and Müller argue that *all* derivational steps have the derivational properties of phases.

One particular issue is the status of DP as a phase, and whether it also has an articulated information structure, both syntactically and prosodically. There is good evidence for reordering within the DP in languages such as Greek, the Slavic languages, and many others. It will be one of the tasks of the project to investigate the principled reasons why German may be more restrictive in this respect.

## P13 Comparison of OT and Minimalism

Finally, an interesting issue is the investigation of recursion or cyclicity as observed in syntax, phonology, and information structure using different frameworks. Interpretation and explanation of recursive phenomena might appear quite different when looked at from representational models or from derivational models. Therefore it is important to study various phenomena involving recursion, and to try to account for them in different frameworks.

A conceptual question regarding the notions of the phase and Spellout that we hope to answer at the end of the second period is what kind of operation Spellout exactly is. The original idea of Chomsky (2001), is to consider Spellout as the complete transfer of the outcome of a syntactic derivation to the phonological (and semantic) component, after which syntax no longer has any access to the material. Such a view leads to two kinds of problems which we intend to study. First, we have found evidence that focus placement is indeed sensitive to accents rather than to the pragmatic property of focality, and there are further examples of movement operations that are sensitive to prosodic properties. In a natural interpretation of the terms, accentuation is established in the Spellout process, so that we have to solve the non-trivial problem of making the prosodic sensitivity of movement compatible with the freezing by Spellout idea. Fox and Pesetsky's (2005) proposal may help us here: in their model, Spellout is reinterpreted as those points of a derivation where phonological relations (such as linear order relations among words) are established, and we can add the establishment of prosodic strength relations to this component. In their model, Spellout is not really an operation of actual phonetic output. We will attempt to identify more syntactic evidence that bears on the issue.

Alternatively, a constraint-based model, such as OT, could be more straightforward to account for the direct interaction between syntax and prosody.

If Spellout really is an operation that produces actual phonetic forms of constituents such as DPs or CPs, we face a second difficulty. Such a category can move as a whole, and at least some of its acoustic properties must be accommodated to the environment a category is merged in or moved to. By reviewing the literature, we will get an impression of what properties are potentially context-sensitive, and we will find out whether such adjustment processes can be applied to fairly concrete phonetic objects in a meaningful way. If this enterprise fails, the original Spellout idea will have to be modified (Exp 31–32).

# 3.4.3. Timetable

- 2007 Paper on downstep and focus intonation in Japanese [P1]
  Paper on integration in object-verb and subject-verb sequences (German, Japanese, Hungarian) [P4, P5]
  Experiments on givenness [P2]
  Experiments post-focal compression [P3]
  Experiments on embedded material [P7]
  Experiment on adverbs [P10]
  Experiment on German: scrambled DPs [P10]
  Research on German & other Germanic languages & Basque: embedded focus/topic [P9]
- Experiments on Japanese (continued from 2007) [P2, P3, P7, P10]
  Experiments on German (continued from 2007) [P2, P3, P7, P10]
  Experiment on Hungarian: givenness, post-focal compression [P2, P3]
  Research on Japanese: embedded focus/topic (emphasis on logophoricity) [P9]
  Research on embedded focus/topic in Malay languages, in Kashmiri; comparison of different types of embedded focus/topic [P9]
  Papers on scrambled DPs [P10], adverbs [P10] and post-focal compression [P3]
  Localization of new and given referents in a cross-linguistic perspective (with C1)
- 2009 Experiments on German: that-clause, relative clause [P8]
  Experiments on embedded IS, phase [P6, P12]
  Research on German: Clause internal topics [P9]
  Research on Hungarian: word order in postverbal field [P3, P9]
  Comparison of various theories of phases; motivation for a choice among them; comparison of that choice to set of phrases that allow articulation of information structure [P10–12]
- 2010 Experiments on embedded IS, phase (continued from 2009) [P6, P12] Theoretical comparison of OT and Minimalism [P13] Theory of spell-out and prosodic phrasing [P10] Research on the prosody of information structure in the DP [P12] Papers on Japanese: embedded IS, phase [P6, P12]
- 2011 Theoretical reflections on the nature of Spellout [P10–13] Papers

# 3.5 Role within the Collaborative Research Centre

A1 occupies a central position in the SFB. It provides theoretical elements of comparison between languages in unifying models of prosody, syntax and information structure. Results of the first period have been influential for a number of projects which will investigate questions related to the prosody-syntax interactions (especially B2 and C1, but also C3 and B4).

There is a natural connection with the other A projects, which will provide definitions of 'focus' and 'topic' from a semantic perspective. With the B projects, we will continue the cooperation, and intensify it in the case of B1 and B2. In the first period, the cooperation with C1 has been very fruitful, and it is our intention to continue the joint research. Some common points of research binds A1 with C6 (relative clauses). A whole series of joint projects are planned with the D projects: Data and experiments with D2, corpus research with D4 on relative sentences, prosody and phonetics with D5. A1 also cooperates with a number of external researchers, especially with Lisa Selkirk (Amherst), Hubert Truckenbrodt (Tübingen), Yoshihisa Kitagawa and Satoshi Tomioka (NSF Grant Project "Wh-interrogatives at the Prosody-Syntax-Pragmatics Crossroad").

# **3.6** Demarcation from other funded projects of the principal investigator(s)

(a) Demarcation from D2

Project D2 is gathering typological data with the help of the questionnaire QUIS. The aim of D2 is to compare the expression of information structure in a cross-linguistic database. D2 and A1 can complement each other, but their aims are clearly distinct: grammatical for A1, typological for D2.

(b) Demarcation from C1

Projects A1 and C1 share an interest in the licensing and/or triggering of marked structures, but A1 approaches markedness from a grammatical point of view, while C1 aims at identifying factors that can make marked structures at least as easy to process as unmarked ones. C1's attempt at disentangling the processing effects of word order variation and those of marking information structure explicitly helps to assess the role of information structure in grammar.

(c) Demarcation from the other projects directed by Gisbert Fanselow

Fanselow is the PI of a project on the foundations of acceptability judgments. This project is unrelated to the goals of A1. Fanselow & Féry applied recently for the continuation of FA 255, a project concentrating on the grammar of discontinuous noun phrases. FA 255 focuses on quite a different construction type, and it is interested in the prosodic and morpho-syntactic conditions for the licensing of noun phrase discontinuity.

(d) Demarcation from the other projects directed by Caroline Féry

Together with Frank Kügler and Shravan Vasishth, Caroline Féry is a principal investigator of a project called "Prosody in Parsing" (DFG Schwerpunkt 1234) which has the aim of investigating the role of prosody in the comprehension of oral language. This project does not investigate information structure.

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