Focus projection between theory and evidence

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1 Introduction

Research over the past decade has established that the nature of the integration of a sentence into the discourse can provide explanations for constraints previously stipulated in syntax. For example, Cook (2001) explores information-structural conditions on syntactic coherence in German. De Kuthy (2002) and Fanselow & Ćavar (2002) relate the occurrence of discontinuous NPs in German to specific information-structural contexts. De Kuthy & Meurers (2003) show that the realization of subjects as part of fronted non-finite constituent and its constraints can be accounted for based on independent information-structure conditions, and Bildhauer & Cook (2010) show that sentences in which multiple elements have been fronted are directly linked to specific information structures.

To further explore and refine this line of research, it is essential to be able to refer to an explicit model of the interaction of syntax, information structure, and intonation as part of a formal linguistic architecture. Research investigating the interaction of syntax, information structure, and intonation has traditionally been theoretically driven, with the syntactic F-marking approach of Selkirk (1995) serving as one prominent foundation. At the same time, recent work mostly driven by pragmatic and semantic considerations has questioned the very foundation of such an approach. This includes the claim that focus projection as the fundamental syntactic means of connecting the focus exponent (the word carrying the nuclear pitch accent) and the semantically interpreted focus element is not needed at all (Roberts, 2006; Kadmon, 2006, 2009; Beaver & Velleman, 2011), or that it is not subject to syntactic constraints (Büring, 2006; Fanselow, 2008; Fanselow & Lenertová, 2011).

Importantly, the new approaches do not just differ in terms of their perspective and theoretical interpretation – they make claims about a fundamentally different empirical landscape. To replace focus projection with a general pragmatic condition building on *retrievable*[1] (Roberts, 2006) or *expectable*[2] (Kadmon, 2006), the authors must assume that there are significantly more pitch accents than have been assumed by previous approaches: they assume pitch accents on all elements which are part of the focus and are not retrievable/expectable.[3] And the proposal of Büring (2006) that focus projection is in principle always possible negates the empirical subcases delineated by focus projection constraints, which have been the hallmark of the long research tradition building on Selkirk's F-marking approach. The field thus is in a situation where drastically different perspectives and theoretical interpretations of the syntax-information structure interface are based on wildly different empirical assumptions.

In this paper, we want to bring together and compare the predictions of traditional focus projection on the one hand and the more recent pragmatics-only approaches (Roberts, 2006; Kadmon, 2006) on the other with two sources of empirical evidence, experimental and corpus-based. In essence, the paper is an empirical exploration of the evidence for focus projection, working out the empirical challenge that a pragmatics-only approach needs to find an alternative explanation for.

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[1] Referred to as *salient* in Roberts (2008).

[2] Renamed to *recoverable* in Kadmon (2009).

[3] Notions such as *retrievable* can be seen to stand in the tradition of *givenness* (Schwarzschild, 1999; Wagner, to appear) and earlier related notions such as construablity from the context (*c-construable*, Culicover & Rochemont, 1983) – though note that Schwarzschild's approach in addition includes syntactic F-marking.

The first source of evidence is experimental research, where we review the published experimental results relating to focus projection in English (Gussenhoven, 1983; Birch & Clifton, 1995; Welby, 2003) and in German (Féry, 1993; Féry & Herbst, 2004; Baumann, Grice & Steindamm, 2006; Féry & Kügler, 2008). Corpus data as the second source of evidence to be discussed in this paper is less prominent in the literature, possibly because linguistically annotated corpora of spoken language are not as widely available as written language corpora. We explore where annotated corpora can provide empirical evidence for or against the existence of focus projection.

The paper is organized as follows: In section 2 we introduce the background, including the core prosodic and pragmatic concepts, the relation between prosody and focus, and focus projection as a proposal for relating pitch accent placement and focus interpretation. Section 3 then sketches the recent pragmatics-only proposals, which eliminate focus projection. On this basis, in section 4 we then turn to the published experimental evidence which addresses the empirical reality of focus projection. While the bulk of the experiments deal with perception (section 4.1), section 4.2 also reports on some production studies. In section 5, we then complement the survey of experimental results from the literature with our own exploration of two spoken language corpora, the IMS Radionewscorpus (section 5.1) and a section of the Verbmobil corpus (section 5.3). Just as with the experimental evidence, the goal is to look for data which are relevant for choosing between a focus projection and a pragmatics-only approach. The empirical landscape emerging from this exploration is significantly more complex than predicted under either approach. In the final section 6 we thus argue for extending the empirical research and suggest that an empirically adequate approach will need to combine both perspectives in an architecture supporting both pragmatic and syntactic constraints on focus projection.

2 Background

Languages differ with respect to how the information structure of an utterance is encoded. Linguistic means of marking information structure include word order, morphology, and prosody. English and German are so-called intonation languages where information structuring is signaled by the intonation of an utterance.

2.1 Intonation

We here follow the autosegmental-metrical theory of phonology (Liberman, 1975; Pierrehumbert, 1980) in which a pitch accent is defined "as a local feature of a pitch contour – usually a pitch change, and often involving a local maximum or minimum – which signals that the syllable with which it is associated is prominent in the utterance." (Ladd, 2008, p. 48) The presence and nature of a pitch accent is argued to be an indicator of the discourse function of a particular part of a sentence (cf., e.g., Beckman & Pierrehumbert, 1986; Grice, Baumann & Benzmüller, 2005).

For the issue targeted by this paper, clarifying the empirical reality of focus projection, it turns out that a basic prosodic analysis in terms of the presence or absence of pitch accents is sufficient. Naturally, a more elaborate prosodic analysis distinguishing different types of phonological domains, pitch accents, and prenuclear accents will be important when going beyond the fundamental architectural issue targeted here.

2.2 Information structure

The most widely discussed discourse function is the focus, which has been characterized in a variety of ways as the "most important" or "new" information of an utterance (cf. Krifka, 2008). The focus can be defined to be the part of an answer that corresponds to the *wh*-part of a question.[4] This question-answer congruence is not always explicitly expressed in discourse. Instead, a number of theories assume that a coherent discourse is structured by implicit *Questions Under Discussion (QUD)* (cf., e.g., Roberts, 1996; Büring, 2003).

As a simple example with an explicit question, consider the question in (1a) asking for the object that John is renting.

(1) a. *What did John rent?*
     b. *He rented* ⟦*a* BICYCLE⟧$_F$.

The answer in (1b) provides the element asked for, the focus of the utterance: Out of the various alternative things John could have rented, he picked a bicycle. The word *bicycle* is shown in small caps to indicate that it contains a syllable bearing a nuclear pitch accent. In this most basic case, the focused material thus is marked by a pitch accent and consists of information that is new in the discourse.

The interesting questions arise when one considers situations in which the relation between focus, pitch accent, and new information is less direct. Let us first consider the **dissociation of focus and new information**. To explore this, let us add the context in (2) which introduces some conference participants, Bill, the rental of vehicles, and red and blue convertibles into the discourse. Based on this context, essentially following Schwarzschild (1999, p. 146), we then again consider the question (2a) asking for the object that John is renting as the focus.

(2) *The conference participants are renting all kind of vehicles. Yesterday, Bill came to the conference driving a red convertible and today he's arrived with a blue one.*
     a. *What did John rent?*
     b. *He rented* ⟦*a* GREEN *convertible*⟧$_F$.

One can now answer this question with sentence (2b), where *a green convertible* is the focus: Out of all the things John could have rented, he picked a green convertible. In this focus, only *green* is new to the discourse, whereas convertibles were already given in the context. That the focus is indeed the full expression *a* GREEN *convertible* can also be confirmed by adding the focus-sensitive expression *only* in front of the verb in (2b): In the context of (2a), *only* in the sentence *He only rented a green convertible.* clearly is interpreted as taking scope over the entire NP meaning.

Pushing the dissociation of focus and new information to the extreme, it is possible for the focus to consist entirely of material already given in the context, as illustrated by (3b).

(3) *In the rental lot, there were two bicycles and a motorcycle.*
     a. *What did John rent?*
     b. *He rented* ⟦*a* BICYCLE⟧$_F$.

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[4]We only use the term *focus* in this, formal pragmatic sense to avoid confusion with the prosodic notion, which we only refer to as focus exponent or pitch accent.

While focus and new information thus can be clearly dissociated, the distribution of new information in the focus has a direct impact on the realization of the prosodic indicators of focus, which we turn to next.

2.3 Relation between prosody and focus

For considering this relation, we need to take a closer look at the prosodic indicators of information structure. More specifically, we need to determine how focus is related to the occurrence of pitch accents. In the most simple case we saw in (1), every substantive[5] element of the focus contains a pitch accent, i.e., there is a one-to-one correspondence. Yet, this is not generally the case. The same prosodic realization of a sentence, with a single pitch accent on the object *bicycle*, is traditionally also assumed to be appropriate in a context with a broader focus. This is illustrated by (4), where three different questions are paired with the prosodically identical answer.

(4) a. *What did John rent?*
         John rented 〚*a* BICYCLE〛$_F$.   (narrow, NP focus)

     b. *What did John do?*
         John 〚*rented a* BICYCLE〛$_F$.   (wide, VP focus)

     c. *What happened yesterday?*
         〚*John rented a* BICYCLE〛$_F$.   (wide, S focus)

In (4a), we see the original question focusing on the object *a bicycle*. The question in (4b) requires an answer in which the VP *rented a bicycle* is the focus: Out of the alternative actions John could have performed, it is renting a bicycle that he did. And the question in (4c) puts the entire sentence *John rented a bicycle* into focus: Out of everything that could have happened yesterday, it asserts that John renting a bicycle is what happened. Crucially, the exact same realization of the answer, with a single pitch accent on *bicycle*, is traditionally assumed to be appropriate for either of the three focus realizations. This flexible relation between pitch accent placement and focus interpretation is referred to as **focus projection** when the relation is assumed to be mediated by syntax, and a number of lexical and syntactic conditions have been formulated in the literature to define when focus can project in this way (e.g., Gussenhoven, 1983; Selkirk, 1995; von Stechow & Uhmann, 1986; Uhmann, 1991; Jacobs, 1988, 1993), including the role of word order (e.g., Höhle, 1982). Conditions on whether the material that is projected over must have particular formal pragmatic properties (e.g., be given, new) in the discourse have traditionally not been discussed in this context. Specifically, it is generally not ruled out that focus projects over unaccented material that is new in the discourse – whereas we will see in the next section that the pragmatic approaches specify specific pragmatic requirements on any unaccented material included in the focus which rule out unaccented, new material as part of the focus.

In addition to such cases of focus projection, where the focus includes substantive material which does not bear a pitch accent, we should also revisit example (2b) under this perspective. It shows that the focus can also include unaccented substantive material when focused material is already given in the discourse, so-called **deaccenting of given material**. Since every focus must contain a pitch accent, in such cases of deaccenting the pitch accent must be realized on another, new word in the focus. For

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[5]Here and in the following, substantive elements is used to refer to the non-functional words contributing lexical content, e.g., nouns, verbs, adjectives.

sentences in a context where the focus contains no new information, as in the example (3b) we saw above, the pitch accent must exceptionally be realized on a given element.

Departing briefly from the general background discussion here, it seems clear to us that the information structural nature of the material projected over needs to be taken into account. Consider, for example, the following examples in (5a) and (5b) in the out of the blue context given.

(5) *John, what's going on? Why are you so pale?*

    a. $[\![I\ just\ saw\ a\ man\ with\ an\ \text{AXE}!]\!]_F$

    b. $[\![I\ just\ saw\ a\ chicken\ with\ an\ \text{AXE}!]\!]_F$

In such a wide focus context, sentence (5a) seems more appropriate than (5b). The intuitive explanation seems to be that seeing *chicken* is so unexpected that it needs its own accent, whereas *axes* are typically carried by men as in (5a). It remains to be explored whether the kind of non-accenting of material projected over is the same as the deaccenting of given material (as in (3b) in the background section) or whether the notion of givenness involved there is stricter. Last but not least, this intuitive observation needs to be experimentally tested. As we aim to show in this paper, the link between theoretical claims and empirical evidence needs to be strengthened further to resolve the current conflicting assumptions about focus projection – to which we now return.

3   Pragmatic proposals eliminating focus projection

Roberts (2006) proposes to eliminate focus projection entirely and instead presents a general approach deriving the relation between focus and prosody using a notion of retrievability. She defines the following notions:

Accentuation: Freely align pitch accents with words in independently generated prosodic and syntactic structures.

Retrievability presupposition: If a contentful constituent bears no accent, then its denotation is conventionally implicated to be *retrievable*.

Novelty implicature of pitch accents[6]: If a constituent bears an accent, then its denotation is not *retrievable*.

The central notion of *retrievability* is defined by Roberts as follows:

Retrievability: An expression η as part of an utterance U is *retrievable* iff

    1. η is not the focus[7] in a direct answer to the QUD at U (so η by itself cannot serve as a constituent answer) and

    2. η has a salient antecedent A and modulo $\exists$-type-shifting, A entails the Existential Accent-Closure of η.

    Existential Accent-Closure: Replace any maximal constituent such that all of its content words are accented with a variable, and existentially bind all such variables.

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[6]Roberts (2006) uses the term 'focus' in place of 'pitch accents' here since she uses focus for both the pragmatic and the prosodic notion. In this paper, we only use focus for the pragmatic notion.

[7]Roberts (2006) refers to 'rheme' here; for the issues discussed in this paper, Roberts' notion of rheme and focus seem to be equivalent.

Under this approach, any unaccented element must be retrievable. This encompasses two cases which traditionally were dealt with separately: i) unaccented elements which are part of the focus, such as *John* and *rented* in (4c), in what is called focus projection in the syntax-based approaches, and ii) unaccented elements such as *convertible* in (2b), which have been discussed as deaccenting of given material.

Pursuing a related perspective, Kadmon (2006) also proposes to eliminate focus projection and replace it with a formal pragmatic account, but for her the fundamental concept relating accent placement and focus interpretation is the notion of expectability. The core components of her approach are:

Interpretation of pitch accent placement: A word is interpreted as *expectable* iff it is unaccented.

Expectability: An expression B is *expectable* in an utterance U iff the following holds: Presented with the result of replacing B in U with a variable, it would be possible for the hearer to infer on the basis of prior context that the variable in the actual utterance is occupied by B.

Under Kadmon's approach, focused elements without nuclear pitch accents, which traditionally were analyzed as part of a projected focus, thus must be *expectable* – or they must turn out to actually be accented after all.

While there are some interesting differences between the two approaches, the claim that both the theories of Roberts (2006) and Kadmon (2006) have in common is that there is no focus projection, i.e., there is no single realization of a sentence with an accent placement that can have ambiguous interpretations with respect to the information structuring of the respective utterance. For every possible information structuring of a sentence, based on Robert's and Kadmon's approaches one expects to find different accent patterns.

Take, for example, the example in (6), where the question requires an answer with a VP focus.

(6)   *What did you do?*
    a. *I invited* BILL.
    b. *I* INVITED BILL.

The utterance in (6a), with a pitch accent on *Bill*, is traditionally assumed to be a felicitous answer to the VP focus question. In contrast, Kadmon and Roberts claim that this accent placement is not a possible answer to the question in a genuine out-of-the blue context. It only is an option in a context such as that at a party, where the unaccented verb *invited* is expectable/retrievable. According to their approaches, the only possible accent pattern in a genuine out-of-the-blue context is the one in (6b), where both the verb and the NP argument are accented.[8]

In sum, the empirical predictions of the reconceptualized interface between prosody and information structure as presented by Roberts and Kadmon (henceforth

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[8]As pointed out by a reviewer, RK's explanation does not carry over to German, where in the context of the wide focus question of (6), the verb clearly is unaccented in a sentence such as (1).

(1)   *Ich habe BILL eingeladen.*
    I   have Bill   invited

referred to as RK) differ in significant ways from those of the traditional focus projection approaches – yet, so far the different predictions have not yet been empirically explored or tested. In the next section, we thus compiled potentially relevant experimental results from the published literature and discuss it under this perspective. In section 5, we explore potentially relevant data from annotated corpora to investigate the empirical validity of the new approaches and to determine where more empirical evidence is needed to distinguish the competing theoretical proposals.

4   Exploring the experimental evidence

We start the discussion of experimental evidence with research studying the *perception* of spoken language and then turn to experiments investigating language *production* in such controlled, experimental settings. Experiments for English and for German are included, as both of these are intonation languages for which the relation between pitch accents and pragmatic focus has traditionally been assumed to involve focus projection. We here discuss only those studies presenting data that is relevant for the fundamental distinction between focus projection and a pragmatics-only approach as the topic of this paper. Some other experimental and corpus studies address orthogonal aspects of the prosody-information structure, such as Stolterfoht & Bader (2004) investigating the effect of word order variation on processing of focus structures, Baumann & Riester (to appear) the prosodic realization of *given* elements, and Féry & Ishihara (2009) the prosodic realization of *second occurrence focus*.

4.1   Perception experiments

4.1.1   Gussenhoven (1983)

Gussenhoven (1983) contains one of the earliest sets of experiments in which the relationship between accent placement and focus is studied. He investigates the hypothesis that a single accent on an argument is sufficient for so-called merged predicate-argument combinations to be focused, whereas this is not possible for other predicate argument combinations or when a predicate combines with an adjunct. The experiment thus directly addresses the empirical grounding of a particular subcase of focus projection: whether and when focus projection over an unaccented verbal head is possible.

For the purpose of our paper, the question whether Gussenhoven (1983) finds any evidence for focus projection is the crucial question here. The nature of the constraints on such focus projection, e.g., whether argument vs. adjunct and merging vs. non-merging predicates is the right distinction to make here, is an important question to tackle in future work once the fundamental question about the existence of focus projection has been settled.

The perception experiment conducted by Gussenhoven to test his hypothesis is a *context-retrievability experiment*: Participants in the experiment judge whether a question and an answer are from the same dialogue or whether the answer was given in response to another question. The experiment included two sets of data differing in the type of predicates occurring in the VP.

Experiment 1   The first set of data only contained so-called merging predicate-argument combinations, which according to Gussenhoven are combinations involving

regular, lexically filled argument NPs (in contrast to pronouns and quantifiers). The experiment included two types of questions and two types of answers as illustrated in (7) and (8):

(7)   a. *What does he do?*   (wide, VP focus)

        b. *What does he teach?*   (narrow, argument NP focus)

(8)   a. *He* TEACHES LINGUISTICS.   (accents on verb and argument NP)

        b. *He teaches* LINGUISTICS.   (accent on argument NP only)

Gussenhoven hypothesizes that in a sentence with a merging predicate-argument combination and an accent on the argument such as (8b) the entire VP can be the focus – just like for (8a), where both words in the VP are marked by an accent. For the experiment, he thus predicts that listeners should not be able to tell any difference between the answers (8a) and (8b) to question (7a).

This prediction was confirmed by the results of the experiment: Listeners performed no better than chance in judging whether questions and answers were matched. This finding supports the existence of focus projection: To focus the VP, it is sufficient to accent the object NP.

This finding is not expected under RK's theory, where the accent on *teach* and *linguistics* in (8a) indicates that neither is retrievable, whereas the sole accent on *linguistics* in (8b) requires *teach* to be retrievable. To save the approach without postulating exceptions, one apparently has to argue that when participants hear (8b) following the question (7a) they accommodate a context with different retrievability relations than when they hear (8a) following the same question. Even then it remains unclear, though, how *teach* in (8a) can be not retrievable in a context following the question (7b).

Experiment 2   The second set of data investigated by Gussenhoven consisted of sentences with predicate-adjunct combinations and non-merging predicate-argument combinations (involving pronouns and quantifiers). For such answers Gussenhoven hypothesizes that in the VP focus condition both the predicate and the adjunct or argument should receive an accent. In contrast to the first experiment, the listeners in the experiments should thus be able to match narrow and wide focus questions with the corresponding one or two accent answers.

For the adjunct case, Gussenhoven's experiment includes questions such as the ones in (9), where the wide focus question (9a) is identical to the one used for merging predicate-argument cases above (7a), but the narrow focus question (9b) focuses on the adjunct PP instead of the object. The answers are shown in (10), with (10a) including one accent on the verb and a second one on the adjunct, whereas (10b) only includes an accent on the adjunct.

(9)   a. *What does he do?*   (wide, VP focus)

        b. *Where does he teach?*   (narrow, adjunct PP focus)

(10)   a. *He* TEACHES *in* GHANA.   (accents on verb and PP adjunct)

        b. *He teaches in* GHANA.   (accent on PP adjunct only)

Examples (11) and (12) illustrate the questions and answers used in the experiment for a non-merging predicate-argument combinations, here involving a negative existential quantifier as argument.

(11)   a. *Please tell me what happened that night.*   (wide, VP focus)

       b. *What do you remember from the last lesson?*   (narrow, NP focus)

(12) a. *I* REMEMBER NOTHING.   (accent on V and NP)

       b. *I remember* NOTHING.   (accent on NP only)

The results of the perception experiment for this second data set, containing both predicate-adjunct and non-merging predicate-argument combinations confirms Gussenhoven's hypothesis: Listeners matched narrow focus questions (11b) with answers accenting only the NP (12b) and wide focus questions (11a) with answers accenting both the verb and the NP (12a) more frequently than expected by chance.

In sum, Gussenhoven's experiments show that merging predicates-argument combinations allow focus projection from an accented argument over the non-accented verb, whereas non-merging predicates and head-adjunct combinations are not among the syntactic patterns which allow focus projection. For these results to be compatible with RK's approach, any such difference would have to be shown to systematically arise from differences in retrievability/expectability.

4.1.2   Birch and Clifton (1995)

Birch & Clifton (1995) revisit the issues of Gussenhoven (1983) using two experimental tasks: a *make-sense judgement task* asking about the appropriateness of a dialogue in which the time to make a yes/no judgement is measured, and a *linguistic judgement task* in which subjects rate prosodic appropriateness on a Likert scale (1–5). Using those two tasks, they investigate focus projection for merging and non-merging predicate-argument combinations, resulting in a total of four experiments.

Experiments 1 and 2   The examples in (13) and (14) show the relevant question and answers used in dialogues in the first two experiment covering the merging predicate-argument combinations.

(13)   *Isn't Kerry pretty smart?*   (wide, VP focus)

(14) a. *Yes, she* TEACHES MATH.   (accents on V and NP)
       b. *Yes, she teaches* MATH.   (accent on NP only)

For the linguistic judgement task in experiment 1, for the broad VP focus question (13) subjects showed a small but significant preference for answers with accents on both V and NP (14a) over an accent only on the NP (14b). This result contrasts with Gussenhoven's result that subjects in a wide focus context were unable to distinguish between the two options, a sentence with two pitch accents and a sentence where focus projects from a single pitch accent on an argument.

For the make-sense judgement task in experiment 2, Birch and Clifton report that for the VP focus question (13) they observed the same reaction times for answers with accents on both V and NP (14a) as for answers in which only the NP is accented (14b). This supports the hypothesis that focus can project from a pitch accented argument.

In sum, Birch & Clifton (1995) interpret the results of these two experiments as indicating that for merging predicates accenting the verb of a focused VP is optional.

Experiments 3 and 4 The second set of experiments used questions supporting VP focus and answers with non-merging predicate-argument combinations, which Birch and Clifton refer to as "non-lexical" argument NPs. This is illustrated with negative quantifiers in (16), answering question (15).

(15) *What can you tell me about the math program at Cornell this year?*

(16) a. *They* ACCEPTED NO ONE.
      b. *They accepted* NO ONE.

The results for these two experiments surprisingly are the opposite of those obtained in the first two experiments. In the linguistic judgement task in experiment 3, the subjects showed no preference for answers with accents on V and NP (16a) over only on NP (16b). In the make-sense judgement task in experiment 4, Birch and Clifton received faster response times for answers with accents on both V and NP (16a) than for NP only (16b).

The overall conclusion that Birch and Clifton draw from these mixed results is that accented lexically filled argument NPs project focus, while non-lexically filled ones do not, which is supported by the results of experiment 1 (linguistic judgement task, lexically-filled) and experiment experiment 4 (make-sense judgement, non-lexically filled). This does not explain, however, why in experiment 2 (make-sense judgement task, lexically-filled) subjects preferred sentences with two accents in a wide VP focus context. And it leaves unexplained why in experiment 3 (linguistic judgement, non-lexically filled) no distinction between the single and the double accented answers was observed.

4.1.3 Welby (2003)

Welby (2003) investigates the influence of prosodic phrasing on focus projection. Gussenhoven (1983) and Birch & Clifton (1995) probed into the existence of focus projection by checking whether an accent on the verb is required or not to obtain a broad VP focus. Welby (2003) distinguishes two prosodic patterns with respect to the accented verb: one, where the verb has a prenuclear accent and occurs in the same prosodic phrase as the accented NP argument (a hat pattern), and one, where the accented verb contains a nuclear accent and both, the verb and the NP argument, form their own prosodic phrases (a two peak accent pattern). Similar to Gussenhoven (1983), Welby (2003) uses two types of questions in her experimental setup, one for VP focus as illustrated in (17a), and one for object-NP focus illustrated in (17b).

(17) a. *What's that terrible smell coming from the neighbors' yard?*
      b. *There's a terrible smell coming form the neighbors' yard. What are they burning?*

There are the four possible answer types, which are illustrated in (18). To make the relevant answer intonation patterns explicit, Welby (2003) uses the ToBI system (Beckman & Pierrehumbert, 1986), which based on the autosegmental-metrical approach to intonation describes the perceived intonation contour in terms of high (H) and low (L) targets in the local pitch range. For English, seven accents are distinguished, with the * marking the tone on the accented syllable: H*,L*, or bitonal: H*+L, H+L*, L*+H, L+H*, H*+H. Intonational boundaries are marked with a strength of 0–4, with the tones of intermediate boundary (0–3) being notated as H$^-$ or L$^-$ and that of full boundaries (4) as L% or H%.

(18) a. *They're* BURNING   *their garbage.*   (verb)
               H*   L-L%

     b. *They're burning*   *their* GARBAGE.   (obj-NP)
                          H*   L-L%

     c. *They're* BURNING   *their* GARBAGE.   ("hat")
               H*   H*   L-L%

     d. *They're* BURNING   *their* GARBAGE.   (two peak)
               H*   L-   H*   L-L%

Each of the two question types was matched with each of the four answer types and parallel to the *linguistic judgement task* of Birch & Clifton (1995) listeners were asked to rate the acceptability of the question-answer pairs using a Likert scale.

The results showed no significant difference between the two question types, the wide VP focus (17a) and the narrow object NP focus questions (17b). Answers with the "hat" pattern (18c) and the object-NP-only accent pattern (18b) were rated as equally appropriate for both question types. The two-peak pattern (18d), was rated as less acceptable. Answers with a single accent on the verb (18a) were rated the worst.

Welby (2003) interprets this as showing that a prenuclear pitch accent does not affect focus structure interpretation. Interestingly, this even holds for the narrow NP focus case, where a prenuclear accent on the verb (which is not part of the focus) did not affect the acceptability rating. This is not expected under Robert's approach, where the novelty implicature of focus requires accented material to be irretrievable.

For the issue discussed in this paper, the fact that broad and narrow focus contexts resulted in the same judgements provides clear support for focus projection. It is unclear how RK's approach could explain that the subjects assumed that the unaccented material is retrievable/expectable in one but not the other question context.

4.1.4 Féry (1993)

In one of the few perception experiments for German, Féry (1993) tested the hypothesis that the same early nuclear pitch accent can signal narrow focus or broad focus.

Féry conducted the following *context-retrievability experiment*: Minimal pairs of sentences with a pitch accent on the subject were recorded, once as the answer to a question inducing narrow focus as in (19a), and once as the answer to a question inducing broad focus as illustrated in (20a). The experiment thus seems to be parallel to the one conducted by Gussenhoven (1983) for English, but without his second answer type bearing two pitch accents.

(19) a. *Wer ist verhaftet worden?*   (narrow, NP focus)
        who has arrested been

     b. GORBATSCHOV *ist   verhaftet worden.*
        Gorbachev   has arrested been

(20) a. *Hast Du heute die Nachrichten gehört?*   (wide focus)
        have you today the news   heard

     b. GORBATSCHOV *ist   verhaftet worden.*
        Gorbachev   has arrested been

The two recorded questions then were randomly paired with the realizations of the answers to obtain the four pairs (19a)–(19b), (19a)–(20b), (20a)–(19b), (20a)–(20b) and the participants in the experiment had to judge whether a question and an answer are from the same or a different dialogue.

Féry (1993) reports that listeners decided at random whether the realizations of the answer, (19b) or (20b), was an answer to the question inducing narrow focus (19a) or to the one inducing broad focus (20a). She thus concludes that there is no difference in tonal realization between a narrow and a wide focus answer, i.e., the same pitch accent on the subject signals broad or narrow focus.

The result of the experiment is unexpected under RK's approach, where a single accent on *Gorbachev* should not be acceptable as an all-new utterance in answer to (20a). Even if one were to assume that (20b) in answer to (20a) does differ from the realization (19b) recorded in answer to (19a) by also including an accent on the verb, then Roberts (2006) would predict the sentence to only be acceptable as an answer to (20a) and not also to (19a). In either case, the result of the experiment showing that subjectless associated answers to questions by chance is not expected.

4.2 Production experiments

Complementing the perception experiments discussed above, there are two recent productions experiments that study the different prosodic means used to signal different focus structures, including broad, narrow and contrastive focus.

4.2.1 Baumann, Grice & Steindamm (2006)

Baumann et al. (2006) report on a production experiment testing the prosodic means that speakers use in German utterances with focus domains of various sizes.

When going from broad to narrow focus, on to contrastive focus examples, Baumann et al. (2006, sec 3.2) observe that speakers make use of one or more of the four strategies: i) increased duration of the focus exponent, ii) higher peak on the nuclear accent (marking the focus exponent), iii) greater pitch excursion to the peak of the nuclear accent, and iv) delay in the nuclear accent peak. However, there is significant variation in the use of those strategies. Some speakers make use of a categorical distinction downstepping vs. non-downstepping, using downstepping for broad focus and non-downstepping for narrow focus and contrastive focus. Other speakers do not use downstepping contours at all, i.e., all nuclear accents are of the same type regardless of a narrow or a broad focus domain.

4.2.2 Féry & Kügler (2008)

Féry & Kügler (2008) report on a related production experiment studying the prosodic means employed in focus domains of various sizes. They observe similar strategies as Baumann et al. (2006) in structures with narrow focus versus structures with broad focus. For example, the height of the nuclear pitch accent tends to be higher in narrow focus structures. They also observe a significant variation in the use of strategies, for example, with downstepping in broad focus structures: Not a single speaker uses a downstep pattern in every broad focus, but all speakers use it at least once.

The interesting question arising from both of the production studies (Baumann et al., 2006; Féry & Kügler, 2008) is what those gradient production tendencies mean for the perception of those contours. Does the use of these strategies lead to categorical

perception differences? Are there sentences which are realized in such a way that they can only be interpreted with a particular information structuring (i.e., narrow or broad focus)? What are *sufficient* strategies for appropriate information structure compatibility?

On the other hand, it is important to ask whether the use of one or more of these strategies is *required* to permit a sentence to occur in one focus context or another. Are there acceptable sentences which are considered as possible with a particular information structuring, yet do not include any of those strategies? What are *necessary* realizations for indicating a specific information structure realization?

Steindamm (2005) conducted perception experiments with examples generated using the production strategies identified by Baumann et al. (2006). She reports that the strategies identified in the productions do not transparently impact the judgements made by the listeners in a *linguistic judgement task* – highlighting the importance of further investigating the sufficient and necessary prosodic indicators of focus.

In sum, the observed variation raises the question of determining sufficient and required prosodic indicators for focus and how this can be theoretically captured. For a pragmatics-only theory with its strict linkage between prosodic realization and pragmatic effect without intervening relations such as focus projection, it seems particularly difficult to license such significant variation.

5   Exploring corpus evidence

The review of the experimental evidence, in particular that arising from the perception experiments, supports the existence of focus projection. Yet, we also discussed some contradictory results and a number of aspects which the experiments conducted so far have either not distinguished or have not investigated. And we discussed the significant range of prosodic strategies and variation in their use which was made explicit in recent production studies. To properly evaluate the claims made by the different theoretic approaches relating pitch accents and their information structure effects, more evidence thus is crucially needed. This is even more pressing when going beyond the fundamental architectural question about the existence of focus projection towards an answer to the more general question: In which constructions in which context can (or must) which kind of elements be accented with which type of accents to support focusing of which part of the sentence? While beyond the scope of this paper, the role of different types of syntactic constructions and different types of accents clearly is an important topic for future research.

Complementing experimental evidence testing concrete and specific experimental hypotheses, in this section we want to investigate a second source of empirical data: exploring linguistically annotated corpora. Before diving into the specifics of the corpus used, let us be clear that corpus data needs to be interpreted with care. The fact that a particular type of example was found in a corpus, does not necessarily mean that it is a systematic instance which needs to be licensed by linguistic theories. Similarly, the absence of a particular type of example in a corpus does not mean that it should not be licensed, given that following Zip's law (Zipf, 1936) most things will occur only rarely and corpora are limited in size. Nevertheless, corpus data can provide important empirical insights for theoretical linguistic analysis (cf., Meurers, 2005; Meurers & Müller, 2009).

5.1 The IMS Radionews Corpus

We base our first corpus exploration on the IMS Radionews Corpus (Rapp, 1998), one of the few intonationally annotated corpora of German. It includes recordings of radio broadcasts on the Deutschlandfunk for a total length of 1 hour and 26 minutes, amounting to 514 sentences. The corpus prepared by Rapp (1998) includes manual segmentation into news stories, orthographic transliteration, automatically word alignment, phonetic transcription, and manual prosodic labeling with the Stuttgart version of GToBI. The question whether such ToBI annotation represents all of the relevant aspects of prosody and does so in sufficient detail is an interesting one (cf., e.g., Breen, Dilley, Kraemer & Gibson, in press). While pointing to a relevant avenue for future research, for the research issue discussed in this paper, the exploration of evidence for focus projection in comparison to a pragmatics-only approach, the GToBI annotation provided with the corpus is sufficient to access and interpret relevant sets of data.

Searching for the relevant focus projection patterns in a corpus is made significantly easier if one can refer to constituents, yet the IMS Radionews Corpus is not syntactically annotated. We therefore parsed the corpus with the Berkeley parser (Petrov & Klein, 2007). While the resulting syntactic annotation is far from perfect, we found that it is of high enough quality to search for the relevant patterns with sufficient precision and recall. Following syntactic annotation, we converted the corpus into TIGER-XML format, so that it can be browsed and searched with the TIGERSearch tool (Lezius, 2002). The converted corpus includes the orthographic transcription, the phonetic transcription, the ToBI annotation, and the syntactic analysis.

5.2 Exploring focus projection in the IMS Radionews Corpus

To identify potential instances of focus projection, we used TIGERSearch to search the corpus for examples containing complex NPs or VPs with H* or H*L accents. These accents in German can signal focus (Féry, 1993; Grice et al., 2005), and sentences in which such an accented syllable is included in a complex NP or VP structure thus are potential candidates for focus projection.

Qualitatively evaluating the results thus obtained, the first observation is that one finds sentences which exemplify the traditional focus projection pattern. For example, in the example shown in (21)[9], the H*L accent falls on the last element (*Bosnia*) of the PP but the entire PP constituent is focused in this all-new utterance beginning this news item.

(21)   *Bundesinnenminister Kanther hat sich gegen   die Aufnahme weiterer*
      federal minister   Kanther has self against the acceptance further
      L*H   L*H   L*H
      Flüchtlinge aus   Bosnien ausgesprochen.
      refugees   from Bosnia   spoken
                 H*L   L%

Figure 1 shows the PP structure as it appears in the annotated corpus. Each token is annotated phonetically, with its part of speech, the GToBI break and tone indices.

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[9] Audio available at http://purl.org/dm/papers/dekuthy-meurers-11/np-ein-akzent.aiff

PP
NP
PP

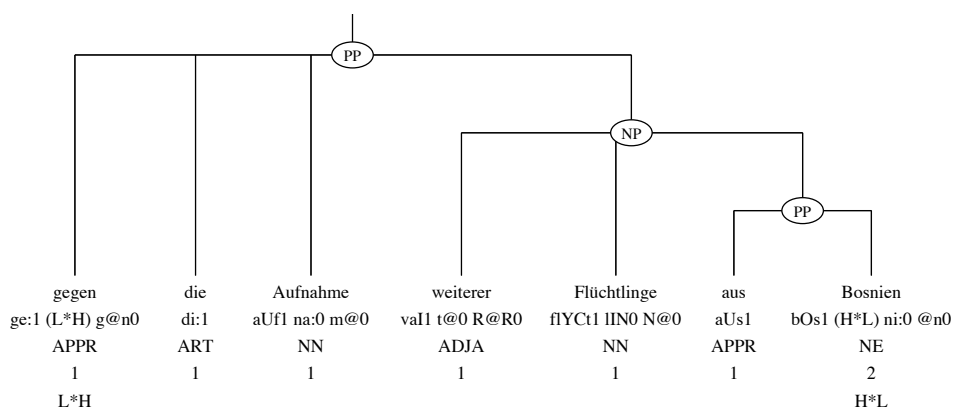| gegen	die	Aufnahme	weiterer	Flüchtlinge	aus	Bosnien
ge:1 (L*H) g@n0	di:1	aUf1 na:0 m@0	vaI1 t@0 R@R0	flYCt1 lIN0 N@0	aUs1	bOs1 (H*L) ni:0 @n0
APPR	ART	NN	ADJA	NN	APPR	NE
1	1	1	1	1	1	2
L*H						H*L

Figure 1: PP exemplifying focus projection

The automatically obtained syntactic annotation shows flat PP and NP structures, which are sufficient for searching for potentially relevant patterns which we can then analyze qualitatively. Here we were looking for a PP containing a single H*L pitch accent on the rightmost element.

The fact that one does find corpus examples such as (21), in which a single nuclear pitch accent seems to be sufficient to support focus of a much larger unit, lends support to the existence of some form of focus projection. Or viewed another way, such corpus examples provide concrete cases for which alternative explanations (such as missing accentuation due to retrievability/expectability) would have to hold up.

In exploring the corpus, we also found many examples with significantly more accents than are predicted by syntactic theories built on focus projection, with some examples carrying pitch accents on almost all of the words. Example (22)[10] shows an example with an NP including multiple pitch accents and (23)[11] shows an example with an accent on every part of an NP.

(22) Der nordrhein-westfälische   Ministerpräsident Rau   hat den
      the North Rhine Westphalian prime minister   Rau   has the
           H*L   !H*L   L*H L%
      Führungsstreit   bei   den Sozialdemokraten kritisiert.
      leadership dispute among the social democrats criticized
      H*L-   H*L   *? L%

(23) Außenminister de Charette versicherte in dem heute von der Zeitung Sydney
      Morning Herald veröffentlichten Schreiben,

      Foreign minister de Charette assured in a letter published by the newspaper
      Sydney Morning Herald today

      von   den Versuchen auf dem Mururoa-Atoll werde keinerlei Gefährdung der
      of   the testing   on the Mururoa atoll will   no   harm   the
      L*H? L*H- L*H   L*H   H*L   H*L
      Umwelt   ausgehen.
      environment emanate
      L*HL   H%

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We also found numerous examples such as (24)[12], with accents that occur in positions that are unexpected for current theories. In this all focus sentence, focus projection approaches would seem to predict a pitch accent *Menschen* (*people*), yet we find the H*L pitch accent further to the left on *Verunsicherung* (*uncertainty*). For RK's approach to work, it would be interesting to work out why *Menschen* would be analyzed as retrievable/expectable here.

(24)   *Der deutsche Sparkassen- und Giroverband hat davor gewarnt, die psychologischen und praktischen Probleme bei der Einführung einer gemeinsamen europäischen Währung zu unterschätzen. Die Konvergenzkriterien müßten unbedingt eingehalten werden, betonte Köhler in einem Interview. Bloße Tendenzen reichten dabei nicht aus,*

   The German banks warned that the psychological and practical problems with introducing the joint currency should not be underestimated. The convergence criteria must definitely be observed, said Köhler in an interview. Bare tendencies are not sufficient,

es dürfe	*nicht*	*zu einer*	*Verunsicherung*	*der*	*Menschen*	*kommen.*
it needs	*not*	*to a*	*uncertainty*	*of the*	*people*	*come*
	?		H*L			L%

Finally, there seems to be significant variation in the prosodic realization. This can be exemplified by comparing the realization of a news item which was repeated in several news broadcasts included in the corpus. In (25)[13] we see an example for such a repeated news item, with the two prosodic annotations showing the different ways the same sentence was realized.

(25)

Der	*Verband*	*südostasiatischer*	*Staaten,*	*ASEAN,*	*hat heute*	*auf seiner*
the	*organization*	*southeast Asian*	*nations*	*ASEAN*	*has today*	*on its*
L*H?				L*!H-	L*H H%	H*L?
L*H		H*L		L*H-	L*H%	L*H-

Jahrestagung	*im*	*Sultanat*	*Brunei*	*Vietnam*	*aufgenommen.*
annual meeting	*in the*	*sultanate*	*Brunei*	*Vietnam*	*affiliated*
L*!H-			L*H-	H*L	L%
L*H			L*H%	H*L	%

Focus projection theories typically do not include any predictions on prenuclear accents, but arguably would need to be extended to do so. At the same time, it is unclear how a theory such as RK's, requiring every accented word to be irretrievable or unexpectable and every unaccented word in the focus to be retrievable or expectable, can account for the exhibited prosodic variation.

While the examples discussed above shed some light on the nature and variability of the intonation found in real-life sentences spoken in context, some of their properties will also be related to the nature of the data collected in the IMS Radionews Corpus. Read news speech is a very specific genre, in which text is read to a heterogeneous audience for which some background knowledge is assumed. While a theory explaining the relation between pitch accent and pragmatic focus arguably also has to be able to explain this context of use, for a broad empirical basis and sound generalizations it is important to complement examples from the IMS Radionews Corpus with other corpora of authentic language arising in real-life tasks. Thus we next turn to the Verbmobil corpus as another potential source of corpus evidence.

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[12] Audio available at http://purl.org/dm/papers/dekuthy-meurers-11/verunsicherung.aiff

[13] Audio available for the first at http://purl.org/dm/papers/dekuthy-meurers-11/vietnam-1.aiff and for the second realization at http://purl.org/dm/papers/dekuthy-meurers-11/vietnam-2.aiff.

5.3 The German Verbmobil Corpus

Our second exploration of the focus projection issue is based on the German Verbmobil Corpus. The Verbmobil Corpus consists of spontaneous speech recorded in a dialog task in the domain of appointment scheduling.[14] The German corpus of the first phase (VM1) consists of 13.910 utterances (dialogue turns) with 317.142 words. A small portion of the corpus from the first phase of the project was annotated prosodically with GToBI. Selecting all dialogues which were GToBI labeled (all from the CDs VM1.1, VM2.1, VM3.1, VM4.1, and VM5.1), we obtained a subcorpus of 917 dialogues, consisting of 1.841 sentences (dialogue turns).

The GToBI annotation (Grice, Reyelt, Benzmüller, Mayer & Batliner, 1996; Reyelt, Grice, Benzmüller, Mayer & Batliner, 1996; Reyelt, 1996) used in the VM corpus[15] distinguishes L*, H*, H*?, and the bitonal L+H*, L*+H, H+L*, H+!H*, two intermediate phrase boundary tones H- and L-, and four IP boundary tones L-L%, L-H%, H-L%, H-H%. The German Verbmobil Treebank (Stegmann et al., 2000) corpus contains dialogue turns arbitrarily extracted from all data collected during both phases of the Verbmobil project, so that we cannot refer to it for the syntactic analyses of the prosodically annotated dialogues. We thus used the same procedure as with the IMS Radionews Corpus above and parsed the 1.841 GToBI annotated turns with the Berkeley parser (Petrov & Klein, 2007) to be able to search more efficiently for potentially relevant syntactic and prosodic patterns.

5.4 Exploring focus projection in the Verbmobil corpus

We used TIGERSearch to search the Verbmobil corpus for examples containing H* or H*L accents to identify potential instances of focus projection and manually evaluated the results. The utterances in the Verbmobil Corpus display a similar variability of accent patterns as the ones in the IMS Radionews corpus. We found many examples with significantly more accents than are traditionally assumed by syntactic theories of focus projection, with some examples carrying pitch accents on almost all of the words. In the dialogue in (26), the utterance (26b) illustrates a prosodic pattern where all content words in a broad focus structure carry an H* accent.

(26) a. *Wenn Sie mir noch kurz erklären, wie ich zu Ihnen komme.*
          Could you briefly explain how I can find you.

      b. *Sie   finden mich im   zweiten Stock in   Zimmer zweihundert drei*
          you find   me   on the second floor in   room   two hundred   three
                H*   L+H*   L+H*   H*   !H*   !H*

The example also shows a pattern discussed in the production study of Baumann et al. (2006) for broad focus: the downstepping of pitch accents towards the end of the focus domain. There is variation in the use of the downstepping pattern, as illustrated in (27).

(27) a. *Was kann ich für Sie tun?*
          What can I do for you?

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[14]A reviewer pointed out that the authenticity of the data may be viewed as limited by the fact that these are recordings of people who were told to schedule appointments, i.e., they were acting instead of satisfying genuine real-life needs. At the same time, it is unclear whether pursuing the extremes of authenticity would provide better evidence for research questions discussed here. Even for lab speech, Xu (2010) provides convincing arguments as to its validity and importance for studying the nature of human speech.

[15]Cf. http://www.bas.uni-muenchen.de/forschung/Bas/BasProsodie.html

    b. *In unserem Projekt ist unerwartet   ein Problem aufgetaucht.*
       in our   project is unexpectedly a   problem surfaced
                 L+H*   H*   L+H*

    c. *Wir müssen möglichst schnell eine Besprechung ansetzen.*
       we   must   preferably quick   a   meeting   arrange
                H*   !H*   !H*

In this dialogue, the sequence of utterances (27b) and (27c) answering the question in (27a) both show H* accents on most of the content words in the broad focus. But only in the second utterance, the speaker uses the downstepping pattern.

    We also found examples with fewer accents in a broad focus pattern. The example in (28) shows a VP focus with L+H* accents only on the arguments. Such unaccented verbal heads and unaccented adjuncts are commonly found in the corpus.

(28)   a. *Wie sieht das bei Ihnen am Donnerstag aus?*
         What does your Thursday look like?

        b. *Da   muß ich leider   zu einem Treffen nach Köln.*
          there must I   unfortunately to a   meeting in   Cologne
          H*   L+H*   L+!H*

And finally, the examples in (29) and (30) illustrate the typical focus projection pattern.

(29)   *Ich wollt' Dir gerade 'ne Mail schicken.*
       I   wanted you just   a   mail send
                               L*+H

(30)   *Ja, Frau Petz, dann lassen Sie uns doch einen Termin ausmachen.*
      yes Mrs Petz then let   you us still a   date   schedule
      H*   H*   H*

In (29), an all-new utterance at the beginning of a dialogue, the noun *Mail* carries the single pitch accent in this all-focus sentence. In (30), which also is the opening sentence of a dialogue, there is only one H* accent on the noun *Termin* in the focused *then* sentence.

    In sum, the exploration of the Verbmobil corpus confirms the patterns found for the IMS Radionews corpus, with some examples illustrating apparent focus projection patterns, others showing substantial additional accentuation, and a significant amount of variation in the realizations.

    There is an interesting similarity between the additional accentuation and variation in the realization we found and the results of Baumann & Riester (to appear), who report on a corpus study with two types of data, read speech and spontaneous speech. They investigate the accentuation of different types of *given* material and report significant additional accentuation running counter to their original expectations. In particular, they did not confirm the hypothesis that *given* noun phrases are generally deaccented. Instead, in many cases *given* NPs carried a nuclear pitch accent. They also found a clear difference between spontaneous and read speech: While in read speech there was a general tendency to deaccent given NPs, this was not observed in the spontaneous data.

6 Conclusion

In researching the interaction between intonation, information structure and syntax, the question whether focus projection exists and, if so, how it is constrained, plays a central role. In three decades of research, the different aspects which need to be taken into account at this interface, and the linguistic modeling it requires, has become more elaborate. Yet, recent theories proposing to eliminate focus projection showcase that the theoretical proposals deserve to be revisited and reconnected to sound empirical insights.

In this paper, we linked the discussion in theoretical linguistics around eliminating focus projection altogether (Roberts, 2006; Kadmon, 2006) to the empirical evidence which has been provided so far for focus projection in experimental studies. We found that the experimental evidence, in particular that arising from the perception experiments, supports the existence of focus projection. Yet, we also discussed some contradictory results and a number of aspects which the experiments conducted so far have either not distinguished or have not investigated, such as the role of additional accents in broad focus structures. And we reported on the significant range of prosodic strategies identified by the experiments, like increased duration of the focus exponent or higher peaks on the nuclear accents, and the variation in their use which was made explicit in recent production studies.

We complemented the experimental results with an exploration of evidence in annotated spoken language corpora illustrating the space of apparently acceptable realizations. In addition to confirming the existence of focus projection patterns, we also found intonation patterns with additional or unexpected accentuation under a focus projection perspective. In terms of theoretical interpretation, such significant variation goes against requiring particular intonational patterns for particular information structure uses. We can thus conclude that it is relevant and important to further investigate the nature of such sentences and contexts where variation in the realization is possible: Are there syntactic, semantic, or information structure restrictions on when such variability arises?

The corpus-based investigation essentially adds to the experimental evidence on production. But we only see what the speakers realized in a given linguistic context. In corpora we generally have limited information on the context and the questions under discussion, and we often have no evidence on how the sentences are interpreted by the hearers. One way to push the boundaries of what can be inferred based on corpus data is to collect task-based corpora making concrete what the speaker/writer wanted to do and what information was available to them. Following this line of thinking, we are collecting a corpus of answers to reading comprehension questions (Meurers, Ziai, Ott & Kopp, 2011). The written corpus provides access to the text that the questions are about as well as the actual question that was being answered, providing a more explicit basis on which to interpret the collected answers and investigate their information structure – though spoken answers would be needed to also investigate prosody with such a corpus. Task-based corpora bear some similarity to experimental research and one may want to view corpora and experiments as two sides of a continuum: from fully controlled, uncontextualized lab experiments at one end of the continuum to more ecological validity in natural experimental tasks and non-interfering online measurements (e.g., visual world paradigm) in the middle; from corpora as collections of whatever happens to exist (traditionally news corpora) at the other end of the continuum to corpora resulting from elicitation in controlled tasks (e.g., answering

reading comprehension questions asking for information in explicitly given in the reading texts) in the middle.

The notion of a continuum may also be relevant with respect to the overall topic of this paper. As we discussed, the literature on the prosody-pragmatics interface has been driven by the two extreme perspectives, the syntax-driven and the pragmatics-driven approach. These essentially are two distinct but not entirely incompatible perspectives: The first question is whether syntax plays a role in mediating between pitch accent placement and what is interpreted as focus in pragmatics. The second question is whether formal pragmatic aspects (retrievable, expectable) play a role in determining which elements can be part of the focus despite not bearing an accent. The traditional F-marking approach answers the first question with yes and makes concrete how the F-marking of syntactic structure proceeds; no particular pragmatic status of the material projected over is assumed, answering the second question with a no. The more recent pragmatics-only approaches answer the first question with no, negating the existence of focus projection and syntactic constraints on it. The second question is answered affirmatively, with the claim that all parts of the focus which do not bear an accent must be retrievable/expectable. While these two proposals mark the extremes, one can also subscribe to a position answering both answers with yes to include syntactic projection (including the possibility that lexical and/or syntactic constraints exist, i.e., have a direct impact on the mediation) together with some pragmatic factors constraining which material can be part of the focus without being accented (i.e., what can be projected over or be deaccented).

Any sustainable pragmatic account will need to revisit the lexical, word order, and other syntactic conditions which have been identified in the literature to capture when focus can project. If one wants to limit or rule out syntactic mediation between intonation and information structure, one needs to identify other, pragmatic conditions providing alternative explanations for the constraints traditionally derived from syntax. At the same time, it seems equally clear that for a syntactic focus projection approach to be sustained, an investigation of the formal pragmatic status of the material that can be projected over is needed to fill this important gap. As things stand, neither the syntactic nor the pragmatic perspective alone are sufficient to account for the complex empirical landscape.

Acknowledgements

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