

can be observed in the distribution of focal accents in Swedish, a relational type of focus prominence is employed, whenever the absolute type of focus expression has been put out of the running.¹⁸

Any analysis of focus prominence is likely to be influenced by the language studied, even when the aim is to arrive at a universalist account. No doubt, the theory of focus phonology is primarily based on observations made in English and some other Germanic languages (e.g. Jackendoff 1972; Reinhart 1995; Truckenbrodt 1995; Zubizarreta 1998; Gussenhoven 2008; Büring 2010). Looking at Swedish, we have found a number of points of divergence with analyses of English, leading us to assume, provisionally, that there may be fundamental differences in how the two languages establish focus prominence. For Swedish, at least, we have argued that the categories of the prosodic hierarchy play an important role in the expression of focus, although a relational notion of focus prominence does seem to exist alongside it. In general terms, focus appears to be expressed in a more categorical fashion in Swedish than in English.

¹⁸ One could explore other solutions to this situation than a phonological mismatch. Féry and Ishihara (2009) suggest that there may be phonetic factors that affect the realization of particular prosodic prominences, possibly without implications for the prosodic hierarchy or the metrical grid.

CHAPTER 23

FOCUS, INTONATION, AND TONAL HEIGHT

HUBERT TRUCKENBRODT

23.1 INTRODUCTION

THIS chapter discusses the effects of F-marking (focus) on intonation and, in more detail, on the tonal height in intonation. The discussion concentrates on German and Mandarin Chinese, with some remarks about Japanese and English. The view defended here is that focus affects stress and stress affects tonal height. Working this out leads to improvements of our understanding of how stress affects tonal height.

Section 23.2 addresses the role of stress in the sentence melody and shows how focus leads to changes in the stress pattern that affect the sentence melody. Section 23.3 discusses effects of focus on tonal height and argues that they are really effects of stress on tonal height, triggered because focus attracts stress. Section 23.4 addresses an upstep-triggering effect of focus in German reported by Féry and Kügler (2008).

23.2 STRESS AND FOCUS IN THE SENTENCE MELODY

This section illustrates how the prosodic structure, including stress, carries the sentence melody, and how focus typically changes the prosodic structure, and thereby changes the sentence melody.

The role of the syntactic structure in stress assignment and its interaction with focus have been analysed in terms of the syntax defining a cycle on which one or more stress assignment rules operate in Chomsky and Halle (1968) and Cinque (1993), in terms of focus feature percolation along syntactic lines by Selkirk (1984, 1995a), in terms of the

syntax giving rise to prosodic constituents that in turn are domains of stress assignment (Nespor and Vogel 1986), in terms of the syntax putting demands on both prosodic constituents and on their prosodic heads in Truckenbrodt (1995, 2006), in terms of a link of cyclic phases to a prosodic domain in them as the locus of stress assignment in Kratzer and Selkirk (2007), and in terms of stress assignment in recursive prosodic structures that result from the identification of syntactic constituents with prosodic ones in Féry (2011). Different approaches are discussed in the current volume in the chapters by Arregi, Myrberg and Riad, Samek-Lodovici, and Zubizarreta. Focus feature percolation apart, the approaches all share, or are compatible with, the point of departure adopted here. This is that there is a default-pattern of prosody and stress that is defined relative to the syntax and without reference to focus. The contributions of the focus to the sentence melody are analysed relative to this default. An account of the stress default is introduced in the following Section 23.2.1, along with an example of how it plays a role in shaping the sentence melody. The role of the focus is discussed in Sections 23.2.2 and 23.2.3.

23.2.1 Default stress and the sentence melody

The sentence in (1), in a default rendition in which its content is new and nothing is highlighted, contains a number of beats of stress. The last one of these is felt to be the strongest stress of the sentence. The notions *i-phrase* (intonation phrase, I) and *p-phrase* (phonological phrase, P) are employed here for the two prosodic levels.

- (1) (x)_I i-phrase
x x x x p-phrase
 Die [_{NP} Lena] will der [_{NP} Lola] im [_{NP} Januar] [_{VP} ein [_{NP} Lama] malen]
 the Lena wants the Lola in January a llama paint
 'Lena wants to paint a llama for Lola in January.'

If the final object is pronominal, the verb will receive the last and strongest stress, as in (2).

- (2) (x)_I i-phrase
x x x x p-phrase
 Die [_{NP} Lena] will der [_{NP} Lola] im [_{NP} Januar] [_{VP} etwas malen]
 the Lena wants the Lola in January something paint
 'Lena wants to paint something for Lola in January.'

The lower level of stress is here accounted for in terms of the simple requirement STRESS-XP in (3) from Truckenbrodt (1995, 2006, 2007a). The suggestion builds on earlier

accounts including Gussenhoven (1983, 1992), Jacobs (1988, 1993), Uhmann (1991), and integrates the reference to XPs in the prosody of other languages from Selkirk (1986, 1995b), Chen (1987), and others in prosodic phonology.¹ The notion *p-stress* is employed here in the sense of 'stress on the level of the p-phrase'. The notion *i-stress* will later also be employed in the sense of 'stress on the level of the i-phrase'.

- (3) STRESS-XP: Each lexical XP must carry a grid-mark of p-stress.

While this was suggested as part of a non-cyclic account in optimality theory, it is here discussed as though applying to each XP from the bottom up (cyclically, if you will) and adding the required grid-mark if it is not already present from lower XPs.

The constraint in (3) will ensure that each lexical NP in (1) and (2) will receive a beat of p-stress, that is [Lena], [Lola], [Januar], and [Lama]. The VP in (1) will not require additional p-stress since it contains p-stress on [Lama]. The VP in (2) does not contain a lexical NP that is independently stressed. Stress-XP requires p-stress in this VP, which is assigned to the verb (the pronoun being stress rejecting, see Kratzer and Selkirk (2007: 110)).

The upper level of stress is assigned by the rule of rightmost strengthening in (4). The rule is adapted from Uhmann (1991), who builds on Gussenhoven (1983). It strengthens the rightmost p-stress to the strongest one of the intonation phrase.

- (4) Strengthen the rightmost p-stress in the intonation phrase to i-stress.

It thus strengthens *Lama* in (1) and *malen* in (2), as required.

The prosodic structure provides the anchor points for the sentence melody. This combination also does not require reference to focus. Many speakers from the South of Germany and parts of Austria would employ a default melody for the sentence in (1) that is similar to the one shown in Figure 23.1. Here each non-final p-stress triggers a clear rise in the sentence melody. The final p-stress (and i-stress) is realized with a final fall.

The sentence melody is analysed in terms of phonological H(igh) and L(ow) tones in autosegmental-metrical analyses (Pierrehumbert (1980), Gussenhoven (2004), Ladd (2008); for the intonation pattern in Figure 23.1, see Truckenbrodt (2002, 2004, 2007b)). The H and L tones are shown below the prosodic structure in Figure 23.1. The non-final rising movements are analysed as L*+H. The L* tone defines a low point that lies in the stressed syllable and the +H tone defines a high point that follows shortly after the low point. The final falling accent is analysed as H+L*, again a low point on the stressed

¹ Another current suggestion, due to Kratzer and Selkirk (2007), who build on Kahnemuyipour (2004), is that the highest XP in each phase is made into a major phrase (comparable to the current p-phrases) and that phrasal stress is located in this major phrase. The more complex rule is designed to capture that a class of preverbal locative and directional PPs do not need to carry phrasal stress. The current account must assume that the special prosody of these cases comes from a special syntactic structure of these elements.

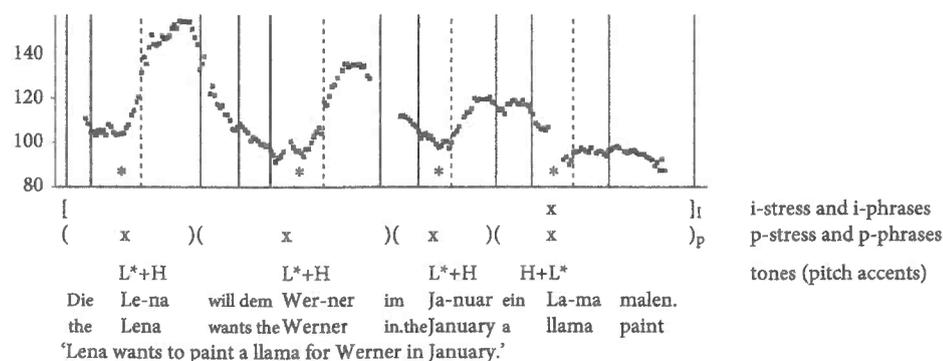


FIGURE 23.1 Pitch-track and analysis of a German recording. The solid lines mark word boundaries, the dashed lines additionally delimit syllables with p-stress.

(Adapted from Truckenbrodt (2007b: 353)).

syllable, but this time preceded by an H point. Each phonological tone, associated directly or indirectly with a stressed syllable, thus defines a phonetic point of the sentence melody in this account. The actual melody is obtained by linear interpolation, that is, by connecting the phonetic points. Tonal patterns like L*+H or H+L* that associate with stressed syllables are called *pitch accents*. In Section 23.3, we will also see examples of *edge tones* that associate with the edge of prosodic constituents. Note also that Northern and Standard German may employ the non-final rising L*+H accents from Figure 23.1 as well, but more typical in these varieties is an H* accent on new elements (Grice et al. 2005; Peters 2009).

It can also be seen in Figure 23.1 that each non-final rise is lower than the preceding one. This will be discussed in Section 23.3.2.

23.2.2 Focus attracts the strongest stress

The effects of focus on the sentence melody can be described relative to the default that was introduced in the preceding section. Effects of focus on the prosodic structure are discussed in the following sections 23.2.2 and 23.2.3. Effects of focus on tonal height are discussed in sections 23.3 and 23.4.

Early accounts of focus in its relation to stress are due to Chomsky (1970) and Jackendoff (1972). The prosodic effect of focus, when stated separately, is formulated in (5).

(5) PROSODIC EFFECT OF F

The focus of a sentence must carry the strongest stress in the sentence.

In this formulation, the effect must be taken to override the default. For example, given the default in (6), assignment of narrow focus to the first object as in (7) will lead to retraction of the strongest stress as shown there.

(6) [A: What were people talking about after the class? B: Nothing special. ...]

((x) (x) (x) (x))_I
 Eine [_{NP} Kollegin] hat einem [_{NP} Studenten] [_{VP} ein [_{NP} Buch] empfohlen].
 a colleague has a student a book recommended
 'A colleague recommended a book to a student.'

(7) [A: Who did a colleague recommend a book to?]

((x) (x))_I
 Eine [_{NP} Kollegin] hat [_F einem [_{NP} Studenten]] [_{VP} ein [_{NP} Buch] empfohlen].
 a colleague has a student a book recommended
 'A colleague recommended a book to a student.'

The assignment of narrow focus will often entail other adjustments in the prosodic structure. In (7) stress retraction to the focus is not the only effect. In addition, the last beat of stress on *Buch* is no longer assigned and the initial beat on *Kollegin* is optional. This reduction of stress in the non-focused parts of the sentence is addressed in the following section.

23.2.3 Focus leads to destressing in non-focused parts of the sentence

Two sources of stress reduction on the elements outside of a narrow focus have been discussed.

For one thing, it has been argued on independent grounds that next to the prosodic effects of F, the grammar must include an additional factor by which contextually given constituents reject stress (Ladd 1983). While Schwarzschild (1999) tried to unify these two effects, Féry and Samek-Lodovici (2006) argued that next to F-marking the grammar includes G-marking for contextually given constituents, with the prosodic effect of stress rejection. This perspective is adopted by (Selkirk 2008) and others. Now, in all typical cases, focus assignment will go hand in hand with the contextual givenness of the elements surrounding the focus. This was realized early on by Jacobs (1991) who referred to the material surrounding the focus as 'old information'. In (7), for example, a colleague having recommended a book is old information in the focused answer since it is contextually given by the context question that triggers the focus. If, therefore, the constituents surrounding the focus are all G-marked, this will have the effect that they

reject stress because of the G-feature. This assumption is employed in the analysis of Féry and Samek-Lodovici (2006). This line of analysis is strengthened by the results of Katz and Selkirk (2011), which suggest that it may be possible to have non-given constituents outside of a narrow focus, and that these will then not show the destressing effect of givenness. Katz and Selkirk argue that these new elements can still be prosodically distinguished from narrowly focused constituents that have explicit contextual alternatives (Rooth 1992).

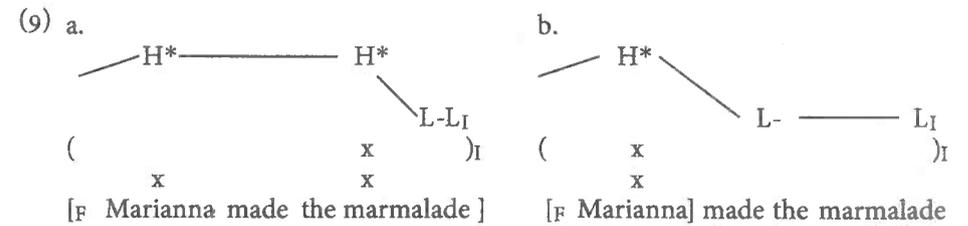
Another conceivable source for destressing in the environment of focus was introduced by Uhmann (1991) and is explored in Truckenbrodt (1995), Büring (2009), and Katz and Selkirk (2011). It concerns the constituents following the focus. If the rule of rightmost strengthening in (4) is formulated as a surface constraint, it takes the form that *the rightmost p-stress must be the strongest stress*. This will now interact with stress retraction due to focus. To discuss the effect, let us assume that an element after the focus would retain its p-stress, like the word *Buch* in (8). This would violate the requirement that the rightmost stress is the strongest.

- (8) ((x) x)_I
 Eine [_{NP} Kollegin] hat [_F einem [_{NP} Studenten]] [_{VP} ein [_{NP} Buch] empfohlen].

The actual stress pattern in (7) does not assign this rightmost stress. It is therefore not only compatible with stress attraction by focus, but also with the rightmost stress requirement. The stress on the focused element *Studenten* is also the rightmost p-stress if later p-stresses are deleted. Thus, satisfaction of the rightmost stress requirement is a conceivable motivation for not assigning stress after the focus.

The attraction of sentence stress by focus can change the sentence melody and the accompanying deletion of stressed beats will normally affect the sentence melody. Consider the two schematic English contours in (9), based on similar recordings in Beckman and Elam (1993). Example (9a) is a possible all-new rendition of this sentence (e.g. in answer to a question like ‘What happened while I was out?’). By STRESS-XP the subject and the object obtain p-stress; by rightmost strengthening the object is strengthened. A simple assertive sentence melody in English will employ H* pitch accents followed by final L- and L_I edge tones, as shown.² Example (9b) shows the same sentence with narrow focus on the subject (e.g. in answer to the question ‘Who made the marmalade?’). There is no p-stress on the object any more, therefore no H* tone on the object, and the sentence melody therefore shows a different shape.

² The subscript ‘I’ is used here for edge tones of the intonation phrase. For discussion of intonational meanings of the elements of English intonation contours, see Pierrehumbert and Hirschberg (1990), Truckenbrodt (2012), and references there.



Thus, destressing around the focus, whether be it as an effect of givenness or as a secondary prosodic effect of stress retraction, will also change the sentence melody in cases of typical assignment of narrow focus.

In summary, a default prosodic pattern is derived from the syntactic structure. It includes stress and constitutes the ‘frame’ on which the tones are assigned that constitute the sentence melody. Narrow focus attracts stress and often leads to destressing of elements outside of the focus. These changes in stress often change the sentence melody.

23.3 FOCUS AND TONAL HEIGHT

Section 23.3.1 introduces cross-linguistic effects of focus on tonal height. It is argued that these are connected to the stress that the focus attracts. This perspective is strengthened in Section 23.3.2 with evidence that downstep in German is due to the same stress effect, which is not connected to focus. Section 23.3.3 provides a further argument that the height-effects of focus are stress related.

23.3.1 Focus affects the tonal height

Xu (1999) studied in detail the effects of focus on tonal height in the tone language Mandarin Chinese. Xu shows for different tonal combinations that the phonetic consequences of non-final focus are raising of the Fo range in the focused element and lowering and compression of the Fo range following the focused element. The results are illustrated with a plot of the results for the all-H-tone sentence in Figure 23.2. In the figure caption and in later Mandarin sentences, the macrons above the vowels are pinyin transcription of the H tones.

In the absence of narrow focus, the five H-toned syllables lead to a nearly horizontal plateau across the utterance (thin solid line). Narrow focus on the subject (thick dotted line) raises the Fo in the focused subject and lowers and compresses it after the subject. Narrow focus on the verb (thick solid line) has a comparable effect. Notice also that focus on the final verb does not lead to a similarly clear effect of raising on the verb.

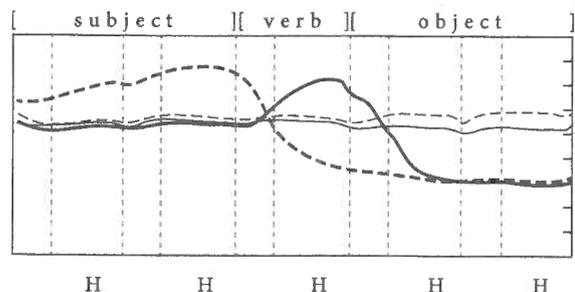


FIGURE 23.2 Plot from Xu (1999: 64) with structure added at the top. Sentence *māomī mō māomī*, ‘Kitty touches kitty’, with five lexical H tones. The conditions are: no narrow focus (thin solid line), narrow focus on the subject (thick dotted line), narrow focus on the verb (thick solid line), and narrow focus on the object (thin dotted line).

(The plot is reproduced with permission from Elsevier.)

It seems that raising and lowering/compression are tied to each other: Where there is nothing to lower/compress, the focused constituent does not show a clear rise. The ‘target’ of the Fo-effect thus seems to be a height difference between the focused (stressed) Fo-height and the following Fo-height.

The investigation of this focus effect on other lexical tones in Xu (1999) shows that the effect is one that manipulates the tonal range: lexical tonal distinctions are intact both in the boosted area and in the lowered/compressed area, although the height of the realization of the tones varies in the direction that can be seen in the all-H-tone cases in Figure 23.2. In a reasonable approximation, the H-tone lines in Figure 23.2 trace the upper bound of the tonal space into which the tones are mapped.

Similar effects of focus (and wh-phrases with focus prosody) are reported for Japanese in Ishihara (2003, 2007) and Féry and Ishihara (2010). Renewed height of a focused constituent in Japanese is also shown in Pierrehumbert and Beckman (1988) and attributed there to the insertion of a major phrase boundary to the left of the focus. Ishihara (2007) develops the analysis further and argues on the basis of his experimental findings that the raising in the focus is independent of major phrase boundaries. He formulates a rule that expands the pitch register of the focused phrase and another rule that compresses the pitch register of the post-focal material (Ishihara 2007: 157).

Katz and Selkirk (2011), in their study of English, seek to distinguish focus that has contextual alternatives from new constituents. Here the former is taken to be focus in the sense used here. In these terms Katz and Selkirk observe an effect of raising of the Fo-height in focus and compression of the Fo-height following focus.

Xu (1999), Ishihara (2007), and Féry and Ishihara (2010) follow a descriptive standard practice and formulate these Fo-height-effects as effects of focus. On the other hand, Katz and Selkirk (2011) as well as Kabagema-Bilan et al. (2011) raise the issue of whether it is the syntactic feature F that triggers these Fo-effects or whether the

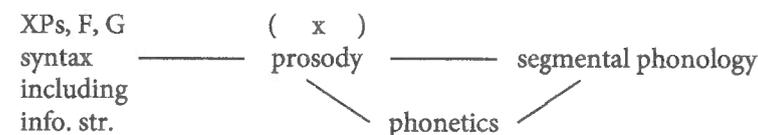
phonological grid-marks of prominence (which focus attracts by (5)) trigger these Fo-effects.

Katz and Selkirk (2011) point out that their data does not distinguish these possibilities. However, they attribute the effect to the grid-marks, that is, the stress that the F-feature attracts. They argue for this on principled grounds: Attributing Fo-effects to the syntactic F-feature would fail to draw a connection between these phonetic effects that would be attributed to F and the phonetic effects attributed to the stress that the focus attracts.

Kabagema-Bilan et al. (2011) provide an empirical argument for attributing the effects to grid-marks rather than to the F-feature. This relates to a follow-up experiment in Mandarin Chinese that they conducted. It is reviewed in Section 23.3.3.

Kabagema-Bilan et al. (2011) also argue for this on principled grounds, and the argument is essentially parallel to a further argument given by Katz and Selkirk (2011): the indirect reference hypothesis (Inkelas 1989) has served as a useful guide in prosodic phonology. It maintains that phonological rules (or, later, constraints) do not make reference to syntactic structure, though they may of course make reference to prosodic structure. It would be odd if phonetics could ‘skip’ the phonology entirely and have the powers to refer to the syntax (here: the syntactic feature F) if this is not allowed to phonology. Kabagema-Bilan et al. (2011) formulate the *extended indirect reference hypothesis*, which includes syntactic features such as F and possible reference-points for phonetics. The ideas are the same in the discussion of Katz and Selkirk (2011) and so the model is here credited to both papers. The lines in (10) show possible direct connections by rules/constraints of grammar or rules/constraints of phonetic implementation/perceptual recovery under this model.

(10) THE EXTENDED INDIRECT REFERENCE HYPOTHESIS
Katz and Selkirk (2011) and Kabagema-Bilan et al. (2011)



It can be seen that the model does not allow a rule or constraint that connects the syntactic F-feature to phonetic height effects or other phonetic effects. However, F may attract stress as in (5) and stress may in turn have phonetic consequences on Fo-height.

The remainder of section 23.3 provides two arguments for this view and a more specific formulation of the Fo-height effects of stress.

23.3.2 Independent motivation for a similar effect based on stress without focus

In the German recording in Figure 23.1 each rise is lower than the preceding rise. This is analysed as *downstep*, that is, successive lowering of the register in which the tones

are realized. See also Liberman and Pierrehumbert (1984) on downstep in English, Pierrehumbert and Beckman (1988) on downstep in Japanese, Prieto (1998) on downstep in Spanish and Grabe (1998) on downstep in German.

Downstep in German was also studied in Truckenbrodt (2004). The case is interesting for the current discussion because the F_0 -effects that we see for Mandarin focus in Figure 23.2 appear in a configuration in which they can be connected to stress, but cannot be connected to focus. However, the shape in which these effects are visible is superficially different, since it occurs in a sequence of downstepping tones. Consider the plots in Figure 23.3. These show the peak height of downstepping sequences as in Figure 23.1. The sentences in which these peaks were measured included a further, upstepped, pitch accent in the same intonation phrase. This upstepped peak is not plotted in Figure 23.3. (The phenomenon of upstep will be illustrated further in section 23.4.2.) The different series (a), (b), (c), and (d) in Figure 23.3 show measurements of the peaks in a sequence of rises of different length. The important result is that at points H1, H2, and H3, the value that represents the end of a sequence is lower than the other points. For example, at point H1, series (a), which has only this one value, has a lower point than the other series at point H1. Descriptively, the point in series (a) is not followed by downstep and it is thus lower than the points of the other series, which are followed by downstep after H1. Similarly at point H2: the value of series (b), which is not followed by further downstep, is lower than the values in the other series (c) and (d), which are followed by downstep. At point H3, the value for series (c), not followed by downstep, is lower than the value of series (d), which is followed by downstep.

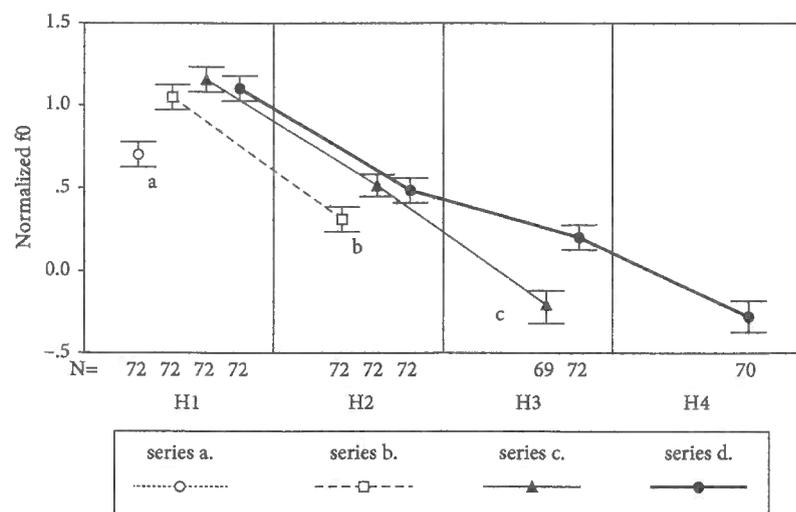


FIGURE 23.3 Averages and 95 per cent confidence intervals for pitch peaks in sequences with different numbers of pitch accents, each followed by an upstepped pitch accent that is not plotted. The plot is based on the data of the four recorded speakers that showed upstep on the nuclear pitch accent.

(Reproduced from Truckenbrodt (2004: 330) with permission from Elsevier.)

The analysis suggested in Truckenbrodt (2004) is that downstep is coupled with a boosting effect on the F_0 -value that precedes downstep. For example, at point H1, the height of series (a) represents the height one obtains without this boosting effect. The values of the other series at point H1 are boosted relative to this height because they are followed by downstep. Similarly at later points: All non-final values in all series are boosted because they are followed by downstep.

It is important that the effect is found in a non-final position of an intonation phrase. It could otherwise also be analysed as final lowering in the sense of Liberman and Pierrehumbert (1984): an effect of lowering the last member of a sequence of downstepping accents in a position that is final in some domain. However, in the German case, the chains plotted in Figure 23.3 do not end at the end of a larger prosodic or syntactic constituent in which they are final and that could serve as a trigger for such an effect of lowering.

Truckenbrodt (2007b) suggests that boosting and following downstep in the cases plotted in Figure 23.3 are effects of stress. To illustrate, the plot and the structure of Figure 23.1 are repeated here as Figure 23.4. Additional lines in Figure 23.4 illustrate the analysis and the parallel to the focus effects that were seen in Mandarin Chinese. The dashed horizontal line is an estimated default for the height of the first peak. It corresponds to the height of the point of series (a) at H1 in Figure 23.3. Relative to this height, the first peak in Figure 23.4 is raised and the following tonal space is lowered and compressed. The second peak is therefore downstepped. The second peak is nevertheless itself raised a bit and it further lowers the following tonal space, since it is itself also associated with stress. (The raising is seen at point H2 in Figure 23.3 in the difference between (b) and the other series. The lowering/compression, as in the first step, is the downstep among the pitch accents.)

While the case looks different on the surface, it provides a model for the height effects associated with focus in Mandarin Chinese and in other languages: raising in the position of the stressed element and lowering/compression of the tonal height that follows.

In the German case, these effects can be attributed to stress but not to focus, since there is no narrow focus in the renditions that were investigated. (They were elicited as

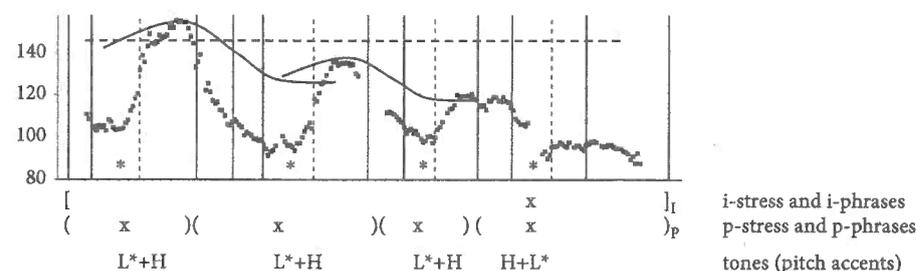


FIGURE 23.4 Repetition of the structure and plot of the German recording in Figure 23.1. Lines are added to illustrate the analysis of downstep in terms of raising in the stressed position and following lowering/compression.

(Adapted from Truckenbrodt (2007b: 353).)

conditions are virtually indistinguishable from each other. They show raising on the focus about two-thirds of the way into the utterance, and strong subsequent lowering. One of these three conditions (plotted with white plotting points, often hidden in the plots) employed a single focus on the object modifier. The other two of the three indistinguishable conditions (plotted with black plotting points) are from multiple focus on the subject and on the object modifier (once in an answer to a multiple-wh-question, once in a context with multiple contrast). Importantly, there is no significant F_0 -effect of the first focus in the multiple-focus conditions.

This finding supports the stress analysis of the relation between focus and tonal height. If each F-feature would directly trigger F_0 -raising and later lowering, we would expect the F_0 effect of the first focus to be comparable to the F_0 effect of the second focus. On the other hand, an intervening prosodic structure leads to a natural account of these results, as was seen in connection with (13).

In the experiment, we happened to come across supporting evidence for this conclusion. The focus effect occurred on the second syllable in *wūyā* 'raven' and on the first syllable in *dōngguā* 'wintermelon'. The difference can plausibly be analysed in terms of different positions of the prosodic head within the different bisyllabic modifier words. The crucial grid-mark for i-stress would then be placed on top of this word-internal prosodic head. On the other hand, the modifiers must be assumed to be F-marked in their entirety in both cases. A direct phonetic effect of F would be expected to be independent of the internal make-up of the modifier.

In summary, the experiment on multiple focus in Mandarin Chinese reported in Kabagema-Bilan et al. (2011) supports an indirect relation between the F-feature and the tonal height, mediated by a stress representation of abstract prominence (e.g. a grid-mark). It seems to be that i-stress is assigned to a narrowly focused element in Mandarin Chinese and that it triggers raising and later lowering and compression of the tonal range. In multiple focus, only the second F-marked constituent carries i-stress and triggers F_0 -raising with subsequent lowering and compression.

The statement in (14) formulates what seems to be the effect of stress on tonal height, generalizing across stress due to focus and stress independent of focus.

(14) HEIGHT-SUBORDINATION BY STRESS

A grid-mark of prosodic level n will raise the tonal space for tones associated with the grid-mark and lower/compress the tonal space for following tones, provided that there is tonal material following the grid-mark that shows the effect of the lowering/compression.

This defines raising in the stressed position and following lowering/compression as a phonetic F_0 -effects of grid-marks. Notice that the provision at the end of the formulation is important. In the Mandarin case in Figure 23.2 there is no clear raising of the focused final object in the absence of following material to show the effect of lowering/compression. Similarly in the German case in Figure 23.3, there is no boosting effect on

the last pitch-accent in each series because there is no following pitch accent that would show the lowering/compression effect. In both cases boosting crucially does not occur where lowering/compression cannot have a visible effect.

23.4 FOCUS AND UPSTEP IN GERMAN

In this section, the results of Féry and Kügler (2008) are discussed, which suggest that focus can have yet another height-effect in German, namely the cancellation of height-subordination that comes from stresses that precede the focus ('upstep'). The discussion relates this to results from Truckenbrodt (2002, 2007b) concerning upstep. However, it will also be shown that this account is preliminary insofar as it cannot be clarified whether the different effects of focus on tonal height in Grice et al. (2009) are compatible with it.

23.4.1 Focus and tonal height in German: the results of Féry and Kügler (2008)

Féry and Kügler (2008) report the results of a large experiment. Sentences were investigated in which a final verb was preceded by one, two, or three arguments. Two central conditions were an all-new condition and a condition with narrow focus. In the all-new condition, downstep among the accents on the arguments was the normal case. The nuclear (last) accent was downstepped in 46 per cent of the cases and upstepped in the other 54 per cent of the cases. As in Truckenbrodt (2002, 2007b), upstep is described as targeting a fairly constant height that does not depend on the preceding downstep. Generally speaking, it is in the vicinity of the utterance-initial height of all-new sentences.

Furthermore, Féry and Kügler (2008) report that a narrowly focused argument or a narrowly focused verb consistently shows upstep. Their plots illustrating this are reproduced in Figure 23.6 below. Féry and Kügler (2008) show that the height of these focused peaks is not a function of the height that precedes them.

These results suggest that focus may have yet another effect on tonal height, namely the cancellation of height-subordination (14) that comes from stressed elements that precede the focus. This hypothesis is developed in the following section.

23.4.2 Upstep

Upstep with Southern German speakers is investigated in utterance-medial position in Truckenbrodt (2002, 2007b). Upstep at the end of the first i-phrase was

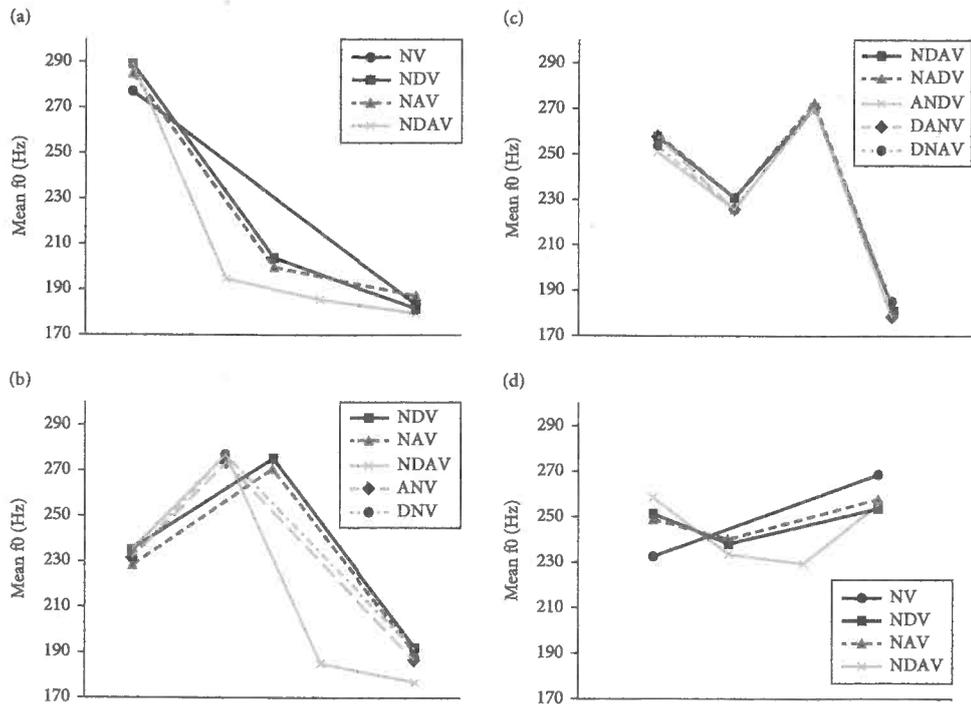


FIGURE 23.6 Mean F₀ of narrow focus on different constituents. (a) Narrow focus on the first argument. (b) Narrow focus on the second argument. (c) Narrow focus on the third argument. (d) Narrow focus on the verb.

(Reproduced from Féry and Kügler (2008: 689) with permission from Elsevier.)

regularly found with eight speakers in a set of 72 recordings for each speaker. Each speaker showed the upstep either on the nuclear pitch accent of the first i-phrase or on the boundary tone at the end of the first i-phrase, or on both, as can be seen for speaker TL in Figure 23.7. The reader is referred to Truckenbrodt (2002, 2007a) for details.

A typical pattern is illustrated in Figure 23.7. The full example, consisting of two intonation phrases, is given in (15). As in Figure 23.1, the initial sequence of pitch accents (here L*+H) in Figure 23.7 is downstepped. This downstep is now attributed to the successive lowering effects of the non-final p-stresses on the tonal height by rule (14). The breath-pause marks the division between the two i-phrases. At the end of the first i-phrase (circled) the nuclear pitch accent (L*+H) and a following H₁ boundary tone are upstepped: the tonal height returns to approximately the utterance-initial height. The suggestion developed in Truckenbrodt (2007b) for this and the other patterns of upstep is that upstep occurs before the end of the

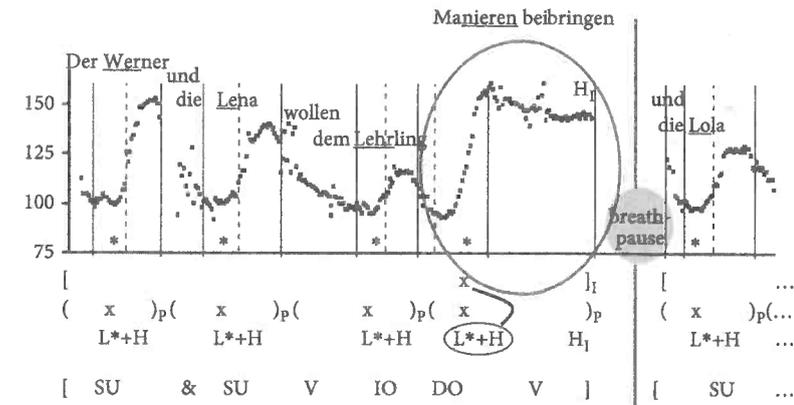


FIGURE 23.7 Plot of a recording of the first part of example (15). Solid lines delimit accented words. Dashed lines additionally delimit accented syllables, which are marked by a star. Speaker TL.

(Adapted from Truckenbrodt (2007b).)

intonation phrase on H tones related to the i-phrase. In Figure 23.7, the L*+H pitch accent is associated with the strongest stress of the i-phrase and thus upstepped. It is followed by a high boundary tone H₁ of the intonation phrase that is likewise upstepped.

(15) [(x) (x) (x) (x)]_I
 L*+H L*+H L*+H L*+H

Der Werner und die Lola wollen der Lehrerin Manieren beibringen,
 the Werner and the Lola want the teacher.FEM manners teach
 ‘Werner and Lola want to teach manners to the teacher.’

[(x) (x) (x)]_p
 L*+H L*+H H+L*

und die Lola will dem Manuel eine Warnung geben
 and the Lola wants the Manual a warning give
 ‘and Lola wants to give Manuel a warning.’

Let us then translate this suggestion to the current understanding of downstep as height-subordination due to p-stress:

(16) HYPOTHESIS ON THE CANCELLATION OF THE HEIGHT-SUBORDINATING EFFECT OF STRESS IN (14)

Given an application of (14) at the prosodic level *n*, the lowering/compressing effect carries over to all later tones that are associated with the same prosodic level *n* or with lower prosodic levels; however, the lowering/compressing effect is cancelled when a tone that is associated with a higher prosodic level than *n* is encountered. The effect is then cancelled for this tone and for all following tones.

In Figure 23.7, the height-subordinating effect visible in the initial steps of downstep is cancelled with the encounter of the (circled) L*+H pitch accent on the i-stress of the first intonation phrase. We may assume that the tonal height then employs the default that is also employed in assigning the utterance-initial height.

Let us then see how hypothesis (16) carries over to the central results of Féry and Kügler (2008). A not unreasonable understanding of their results is that utterances without narrow focus are assigned i-stress optionally, as in (17a). A related suggestion, by which i-stress need not be assigned in the default case in English, is made by Katz and Selkirk (2011). Where i-stress is not assigned in the recordings of Féry and Kügler, downstep on the last accent results by (16). This is because the last accent is not associated to a higher prosodic level than the preceding accents, and it is therefore height-subordinated to the preceding accents. Where optional i-stress is assigned, the nuclear accent is associated to a higher prosodic level, and is therefore not height-subordinated but upstepped. This is a sensible way of representing the optionality of upstep in utterances without narrow focus.

The focus cases can then be analysed as in (17b). By (5), the assignment of F requires that the F-marked constituent have greater prosodic height than preceding constituents. Its accent is then associated to a higher grid-column than preceding accents. It is therefore regularly upstepped, that is not height-subordinated by preceding stresses.

(17) a. all-new sentences:				b. narrow focus: always upstep;			
downstep		or	upstep	higher grid-mark required by (5)			
			x	x	i-stress		
x	x	x	x	x	p-stress		
H	H	H	H	H	H		
				[]F		

In summary, it seems to be plausible that the upstepping effect of focus in Féry and Kügler (2008) is also related to stress assignment: Since focus requires greater stress than preceding elements by (5), it may naturally lead to the cancellation of height-subordinating effects of preceding elements carrying p-stress by hypothesis (16).

23.4.3 Focus and tonal height in German: the results of Grice et al. (2009)

The preceding analysis is presented with some caution, since it is not currently clear whether it is compatible with the results of a focus experiment on German reported in Baumann et al. (2007) and Grice et al. (2009). The stimulus sentence is *Marlene will eine Banane schälen* 'Marlene wants to peel a banana.' There are crucial Fo peaks on the subject and on the object. A distinction was made between wide focus, regular narrow focus on the object and contrastive narrow focus on the object. Phonetically the results were classified in terms of lowering of the second peak ('downstep'), a second peak of comparable height to the first ('unmodified'), and a higher second peak than the first ('upstep'). The assignment was perceptually based. Post-hoc analysis showed thresholds of about 1.5 semitones in both directions in the perceptual assignment. The authors obtained the distribution of the height-relations across the three conditions that is shown in the plot in Figure 23.8, reproduced from Grice et al. (2009).

It can be seen that downstep is most frequent in broad focus, but that it also occurs in narrow focus and, still less frequently, with contrastive narrow focus.

Of particular relevance here is that downstep, though less frequent with narrow focus, nevertheless occurs in about 50 per cent of the cases with narrow (non-contrastive) focus in this data. It seems to be conceivable to us that the experimental set-up of Grice et al. (2009) allowed the deployment of a downstepping pitch accent in which the downstep signifies inferential accessibility likewise described in Grice et al. (2009). The contexts that Grice et al. (2009) employed in their focus experiment do not encourage this, but they may be said to allow it. The source of the difference from the results from Féry and Kügler (2008) cannot be resolved here with any certainty. It seems, for now, that (16)

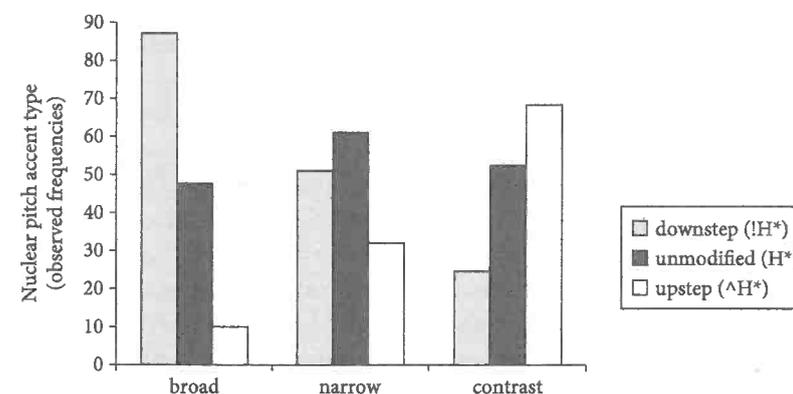


FIGURE 23.8 Height-relations among two accents depending on broad focus, narrow focus on the object and contrastive focus on the object.

(Reproduced from Grice et al. (2009: 897) with permission from Elsevier.)

is a promising hypothesis, but that further research is required to clarify the empirical situation.

23.5 SUMMARY

Focus attracts stress. In addition, the assignment of focus will often also lead to the suppression of stress outside of the focus. Since stressed elements carry pitch accents, which shape the sentence melody, the assignment of focus will often change the sentence melody.

Focus can also raise the tonal height of the focused elements and lower/compress the tonal height of following elements. It was argued that this seems to be a more general effect of stress and that it occurs with focus because focus attracts stress. German downstep between pitch accents is arguably another instance of this effect.

Finally, focus in German led to obligatory upstep in the results of Féry and Kügler (2008). This may also be an effect of the stress attraction by focus. Modifying Truckenbrodt (2007), the hypothesis was formulated that upstep is the cancellation of preceding height-subordination which occurs due to the association of a tone with a higher prosodic level.

CHAPTER 24

SECOND OCCURRENCE FOCUS

STEFAN BAUMANN

24.1 INTRODUCTION

A whole range of slightly different but related structures have been discussed under the notion of 'Second Occurrence Focus' (SOF). Taking the traditional view as a point of departure, we may conceive SOF as a specific type of focus, which is indicated morpho-syntactically by a focus-sensitive operator (such as *only* or *even*), and which is at the same time contextually given—in contrast to 'First Occurrence Focus' (FOF), which is contextually new.¹ An often cited example by Partee (1999: 215) is shown in (1), where *vegetables* occurs as an FOF element in (a) and as an overtly repeated SOF element in (b).²

- (1) a. Everyone knew that Mary *only* eats [VEgetables]_{FOF}.
 b. If even [PAUL]_{FOF} knew that Mary *only* eats [vegetables]_{SOF}, then he should have suggested a different restaurant.

This combination of 'focusedness' on the one hand and 'givenness' on the other causes a problem in terms of the expected prosodic marking of SOF elements, which can be described as follows: According to (direct) 'association with focus' theories (e.g. Jackendoff 1972; Rooth 1985; von Stechow 1990; Krifka 1992), a focus-sensitive operator like *only* has to be associated with a focus in its syntactic constituent which is indicated by prosodic prominence. Note that 'prosodic prominence' has often been equated with the concept of 'pitch accent', in particular '*nuclear* pitch accent', which is defined as the last and structurally strongest prominence in an intonation unit (cf. also Zubizarreta,

¹ Throughout this chapter, we will indicate a focus associated with a focus-sensitive operator by FOF and SOF, and a free focus (which is not associated with a focus-sensitive operator) just by F (unless the conventions used by specific theories are reported).

² Capital letters indicate the presence of a pitch accent.