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INTONATION CONTOURS AND STRESS GROUP PATTERNS IN DECLARATIVE SENTENCES OF VARYING LENGTH IN ASC DANISH

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1. INTRODUCTION

The relationship between stress and fundamental frequency (Fo) and the intonation contours of various types of short sentences in Advanced Standard Copenhagen (ASC) Danish have been described elsewhere (Thorsen 1978, 1980b). For the purpose of the present paper only a few points need be repeated: Stress in ASC Danish is signalled mainly by Fo. In neutral speech a stressed syllable will be (relatively) low and followed by a high-falling tail of post-tonic syllables, i.e. the stressed syllable is one that is jumped or glided up from, depending on the segmental composition, cf. fig. 1 (full lines). The unit which carries this Fo pattern consists of the stressed syllable plus all succeeding secondary- and unstressed ones, irrespective of intervening syntactic boundaries within the same intonation contour. It is termed a stress group (SG). (A detailed account of the stress group and its tonal properties can be found in Thorsen 1980b.)

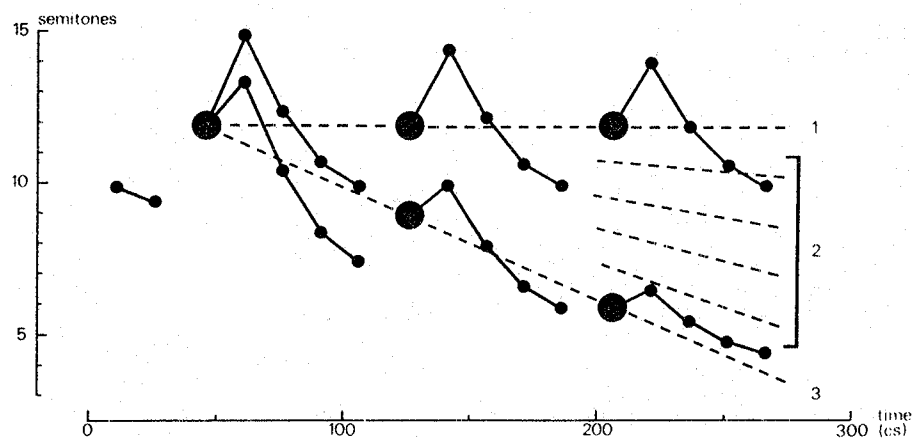

Figure 1 A model for the course of Fo in short sentences in ASC Danish. (1) syntactically unmarked questions, (2) interrogative sentences with word order inversion and/or interrogative particle and non-final periods (variable), (3) declarative sentences. The large dots represent stressed syllables, the small dots unstressed ones. The full lines represent the Fo pattern associated with stress groups, and the broken lines denote the intonation contours. Zero on the logarithmic frequency scale corresponds to 100 Hz.

The Fo patterns of SGs are predictable and recurrent entities (though allowing for certain context dependent modifications), wherefore the intonation contour may be defined solely in terms of the stressed syllables. (This does not necessarily mean that the course of the unstressed syllables is irrelevant, e.g. for the perception of intonation contours, but it is, strictly speaking, redundant, cf. Thorsen 1980a.) This concept of intonation contour is different from the current 'topline' or 'baseline' concepts: To Bruce (1979) and Gårding (1979) (Swedish) the overall contour of an utterance is determined by a topline (connecting local Fo maxima) as well as a baseline (connecting local Fo minima), with the topline declining more rapidly than the baseline. Maeda (1977 - American English) and Fujisaki et al. (1979 - Japanese) attribute the downdrift in declarative sentences to a baseline, but Fujisaki et al.'s baseline (termed the 'voicing component') is an abstraction in the sense that it need have no direct physical representation in the Fo course which is the combined result of the voicing and accent control mechanisms. 't Hart and Collier (1975 - Dutch) have the baseline (connecting Fo minima) as determinant of the declination in declarative sentences. Breckenridge and Liberman (1977), Pierrehumbert (1979), and Sorensen and Cooper (1980) (American English) let the topline (connecting local Fo maxima) determine the downdrift (but, apparently, the maxima always coincide with the stressed syllables of the utterance). Sternberg et al. (1980 - American English) define the downdrift in terms of the stressed syllables, but presumably this would be identical to a topline (their material contained no unstressed syllables). Neither a topline nor a baseline will serve as useful determinants of the overall contours in ASC Danish because they are both highly dependent upon the stress group composition, i.e. on the number of post-tonic syllables (if any) in the SG, cf. fig. 1: The baseline may be but is not invariably coincident with a connection of the stressed syllables (if, e.g., the first SG contains more than two post-tonics); the topline may be but is not invariably coincident with a connection of the first post-tonic syllables (if, e.g., the second SG contains no post-tonic): in both instances the base- and toplines would steer a zig-zag course downwards. A line connecting the stressed syllables, however, will always exhibit a smooth and gradual course (at least in short utterances, cf. below). Furthermore, in an experiment where subjects had to identify utterances as interrogative, non-final, or declarative, solely on the basis of their Fo course, it turned out that the distribution of subjects' responses was more closely correlated with the stressed syllables in the stimuli (Thorsen, 1980a).

In simple sentences in ASC having no more than three SGs, the intonation contours were found to approach straight lines whose slopes varied according to sentence type. Declarative sentences have the most steeply falling contours at one extreme and syntactically unmarked questions have level contours at the other. In between are found various syntactically marked questions as well as non-final clauses, with a tendency for a trade-off relationship between syntax and intonation contour: The more syntactic information is contained in the sentence about its interrogative or non-final function, the more declarative-like is its intonation contour, and vice versa, cf. fig. 1.

The literature on intonation contours in sentences of varying length is generally only concerned with declarative utterances. There seems to be consensus on an overall downdrift being characteristic of such utterances, i.e. downdrift is a global rather than local phenomenon, but descriptions vary with respect to the extent and shape of the declination. A majority of the authors quoted above adhere to the simplest possible model where range is constant over utterances of different length and consequently the rate of the downdrift is inversely proportional to the length of the utterance it spans. This is true of Bruce (1979) and Gårding (1979), the numerous works of Cohen, Collier, and 't Hart, explicited in 't Hart (1979), Weitzman (1970 - Japanese, quoted from Ohala 1978), Hirose (1971 - Japanese, quoted from Ohala 1978), Silverstein (1976 - Hausa, quoted from Ohala 1978), Sternberg et al. (1980), and Maeda (1977); Pierrehumbert (1979) finds support for this model in perceptual experiments. McAllister (1971) and Sorensen and Cooper (1980) find that range increases with increased length: the longer utterances start higher than the shorter ones, whereas the lower limit is nearly constant. (An examination of Sorensen and Cooper's data reveals, however, that in addition to the range variation, there is also a slope variation: the longer utterances have less steep slopes than the shorter ones.)

McAllister (1971), Fujisaki et al. (1979), and Sorensen and Cooper (1980) deviate from most other writers on the subject who describe the downdrift in terms of straight lines. Common to their description is a more rapid decline in the early part of the utterance.

For ASC Danish I have previously hypothesized (1979b) that range would be constant over utterances of different length, and that slope would vary inversely with length, and that the stressed syllables between the first and last ones would be equidistantly spaced on the (logarithmic) frequency scale. The experiments reported below were designed to test this hypothesis.

2. MATERIAL, SUBJECTS, AND PROCEDURES

Since declarative sentences have the widest range (cf. fig. 1), differences in slope would be most easily detected in them. Accordingly, eight simple statements were made up, containing from one to eight stress groups, all variations on the same theme (ˉ denotes the stressed vowels and the vertical bar denotes the boundaries between noun phrase and verb phrase, between verb phrase and (compound) complement and between the two complements):

1. Til Thīsted.
2. Tūkke | skal til Thīsted.
3. Būster | skal med būssen | til Thīsted.
4. Kīsser | skal med būssen | til "Kīlden" i Thīsted.
5. Līssi | skal med būssen | til fēsten | på "Kīlden" i Thīsted.
6. Anīta | skal med būssen | til fēsten for Kīsser | på "Kīlden" i Thīsted.
7. Hūtters | skal med būssen | til fēsten for Kīsser og Līssi | på "Kīlden" i Thīsted.
8. Knūdsen og Bītten | skal med būssen | til fēsten for Kīsser og Līssi | på "Kīlden" i Thīsted.

(Sentence no. 8 translates as follows: Knudsen and Bitten are taking a bus to the party for Kisser and Lissi at "Kilden" in Thisted.) The stressed vowels are all short, high (except [ɛ] in 'festen'), and surrounded by unvoiced obstruents (except [l] in 'Kilden' and 'Lissi', and [n] in 'Anita' and 'Knudsen') in order to facilitate the subsequent interpretation of the tracings (cf. Thorsen 1979a). - Note that the syntactic boundaries all occur after the first post-tonic syllable in the stress groups. - The sentences were mixed with a material recorded for a different purpose, being evenly distributed over two full pages of recording material, which appeared in three different randomizations, each being read twice (on two separate occasions), giving a total of six recordings of each sentence by each speaker.

Four phoneticians recorded the material, three ASC speakers (one male, two females) and one male with a slightly more conservative pronunciation.

The recordings were made with semi-professional equipment (Revox A-77 tape recorder, Sennheiser MD21 microphone, larynx microphone) in a quasi-damped room at the Institute of Phonetics. The tapes were processed by hard-ware intensity and pitch meters (F-J Electronics) and registered on a Mingograph (Elema 800). Fo of each of the vowels and syllabic consonants was measured at 2/3 of the distance from the onset (cf. Rossi 1971, 1978) which was an uncontroversial procedure since the vowels/consonants all had monotonically

falling movements, excepting a few instances where the first post-tonic was rising-falling and was measured at its maximum. The average Fo measurements were converted to semitones (re 100 Hz) and a correction made for intrinsic Fo level differences between stressed [ˈu], [ˈɛ], and [ˈi], in accordance with Reinholt Petersen's (1978) results: [ˈɛ] is raised by 1.2 semitones; [ˈu] is lowered by 0.5 semitones with the females and by 0.25 semitones with the males. No correction was attempted for the unstressed vowels or syllabic consonants, cf. Reinholt Petersen (1979). The distance in time of each Fo measuring point from the onset of the first stressed vowel was also measured. The standard deviations on the mean Fo values are generally small, on the average they range between 2.5% and 3.5% of the mean for the stressed vowels and between 3% and 4% of the mean for the unstressed vowels/syllabic consonants. This means that production stability is rather great. Since, further, subjects do not exhibit differences of a qualitative kind, a grand mean (mean of means) will not obscure the data. (For reasons of space, individual subjects are not treated here - the reader is referred to Thorsen 1980c.)

3. RESULTS

Stylized tracings of the eight sentences (mean of four subjects) are depicted in fig. 2. - It is immediately apparent that range is not constant over the utterances, nor are the stressed syllables equidistantly spaced on the frequency scale.

3.1 Range

Fig. 3(a) depicts the variation in range as defined by the interval between the first and the last stressed vowel. Although there is an overall trend for range to increase with increased number of SG's, range does not increase monotonically with length. Combining this information with the fact that the longer utterances seem to be composed of two and three gradients, respectively, with partial resettings between them (located at the broken lines in fig. 2 - see further section 4.2 below), a relationship between range variation and number of partial resettings of the intonation contour suggests itself: introducing a partial resetting might decrease the range. Sentences 2 and 3 contain no discontinuity, sentences 4-6 contain one, and sentences 7 and 8 contain two partial resettings. Range increases, as expected, from 2 to 3; it does not decrease from 3 to 4; it decreases from 4 through 6; it increases from 6 to 7, and decreases (as expected) from 7 to 8. - Concludingly it seems that (stressed vowel) range increases with increased number of

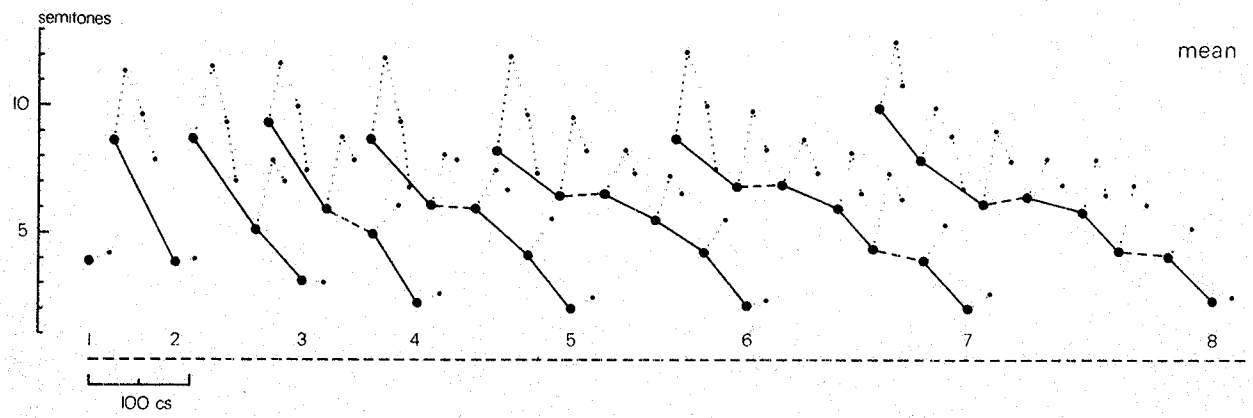

Figure 2 Intonation contours (full and broken lines) and stress group patterns (dotted lines) in declarative sentences containing from one to eight stress groups (mean of means of four subjects). The broken lines indicate partial resettings of the intonation contour (prosodic phrase group boundaries). Large dots represent stressed syllables, small dots unstressed syllables. Zero on the logarithmic frequency scale corresponds to 100 Hz.

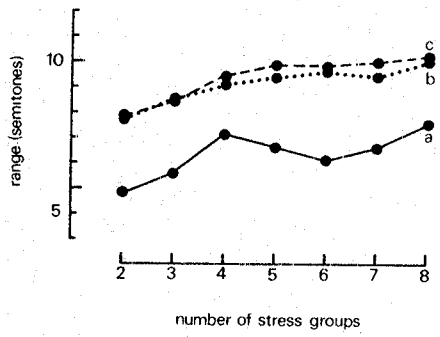

Figure 3 Range of fundamental frequency in seven declarative utterances, containing from two to eight stress groups, depicted as a function of the number of stress groups in the utterance. Mean of means of four subjects. In "a" (full line) range is defined as the interval between first and last stressed vowel measurement in each utterance; in "b" (dotted line) range is defined as the interval between the first post-tonic vowel/syllabic consonant in the first and last stress group in each utterance; in "c" (broken line) range is defined as the interval between the absolute Fo maximum (i.e. the first post-tonic vowel/syllabic consonant in the first stress group) and the absolute Fo minimum (i.e. the last stressed vowel in each utterance).

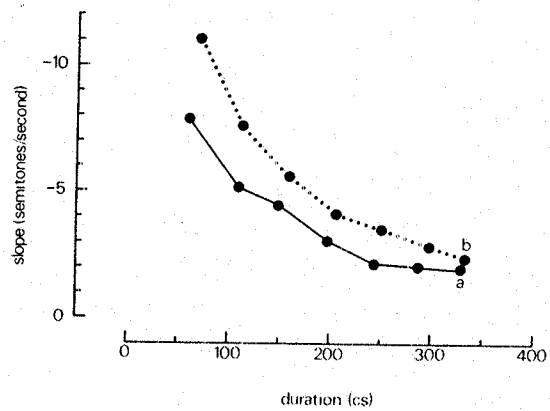

Figure 4 Slope of the overall fundamental frequency downdrift in seven declarative utterances, containing from two to eight stress groups, depicted as a function of the duration of the utterance (i.e. the time interval between first and last stressed vowel measurement in each utterance, and between first and last post-tonic vowel/syllabic consonant in each utterance, respectively). Mean of means of four subjects. In "a" (full line) downdrift is determined by the stressed vowels; in "b" (dotted line) downdrift is determined by the first post-tonic vowel/syllabic consonant in each stress group (the 'topline' - see further the text).

SG's, but in a non-linear and apparently random fashion. - The dispersion in range is 2.8 semitones, i.e. the largest (average) range is 2.8 semitones (corresponding to 58%) larger than the smallest one.

Fig. 3(b) depicts the variation in range as defined by the interval between the first post-tonic vowel in the first and last SGs, respectively. This curve is closer to a straight line than 3(b). Note that the range spanned by the post-tonics is greater than for the stressed vowels, which is a reflection of the fact that the rise from stressed to post-tonic decreases from the earlier to the later parts of the utterance, cf. fig. 1, a phenomenon similar to the commonly noted faster decrease of toplines than baselines, cf. Gårding (1979), Breckenridge and Liberman (1977), and Sorensen and Cooper (1980). Interestingly, this faster decrease is carried by the unstressed syllables in ASC Danish, but by the stressed syllables (the topline) in American English. The dispersion in range is 2.3 semitones, corresponding to 30% of the smallest one.

Fig. 3(c) depicts the variation in range as defined by the interval between the maximum, i.e. the first post-tonic vowel/consonant in the first SG, and the minimum, i.e. the last stressed vowel. 3(c) rather resembles 3(b). - The average dispersion in range is 2.5 semitones, corresponding to 31% of the smallest range.

The variation in range may be due to variation in starting and/or end points of the contours. If we disregard sentence no. 1 which obviously groups itself with the endpoints, we note a slight trend towards higher starting points with the longer utterances (this goes for the stressed as well as the first post-tonic syllable), but starting points are not monotonically rising (cf. fig. 2). Concomitant with higher starting points we find a (stronger) trend towards lower end points in sentences 2 through 4/5 whereafter end points stay constant, which is probably a reflection of a physiological constraint.

The hypothesized constancy of Fo range over utterances of varying length is thus refuted by the data. The largest average range is nearly 60% greater than the smallest one, if range is defined in terms of the stressed vowels, and about 30% if range is determined by the post-tonic vowels or by the absolute Fo maxima and minima. - The increase in range with longer utterances is brought about by a combination of higher starting and lower end points, and, contrary to the results of McAllister (1971) and Sorensen and Cooper

(1980), up to five stress groups the end points decrease more than the starting points increase. In fact, fig. 2 may be interpreted as follows: with the shorter utterances (sentence 2 to 5) increased range is brought about by a lowering of the end point, until its lower limit is reached, and the longer utterances (sentence 6 to 8) then increase their range by raising the starting point.

4. INTONATION CONTOURS

4.1 Overall downdrift

It is apparent from fig. 2 that the intonation contours are not straight lines, i.e. the medial stressed vowels do not occur with equal semitone intervals, and the irregularity seems to set in with four and more SGs. Nevertheless, when the least squares regression line slopes (which may be taken as an expression of the overall downdrift) are calculated for the data points constituted by the stressed and first post-tonic vowels/syllabic consonants, respectively, they come out with correlation coefficients at or above -.96, and any further statistical treatment will hardly disclose the regularities that can be observed in the intonation contours any more succinctly than mere visual inspection will do.

In fig. 4 the overall downdrift - stressed vowels (a) as well as first post-tonics (b) - is depicted as a function of the duration of the utterances (the time interval between first and last Fo measurement). Overall downdrift is seen to decrease asymptotically with increased length, approaching a value of -2 and -2.5 semitones per second, respectively. Presumably, this non-linear decrease in the steepness of the slope of the overall declination is a pertinent feature of longer utterances. A linear decrease would result in zero declination, which is incompatible with declarative sentences. The preservation of an overall downdrift is secured through a widening of the range. However, there are physiologically determined upper limits to a subject's total range, and theoretically we might envisage declarative utterances that are long enough to jeopardize the downdrift. But I think that this problem is purely academic: Spontaneous speech rarely contains utterances as long as, say, sentences 7 and 8 that do not have internal clause boundaries or breath group pauses, which presumably both could lead to a decomposition into what might be termed intonational phrases, each with its own intonation contour (downdrift). Even for read speech, sentences 7 and 8 are rather long and it is conceivable that if subjects were compelled to expand them even further, they would indeed introduce pauses at convenient spots.

4.2 Prosodic phrase group boundaries

If we term discontinuities those places in the contours where the slope of the line connecting two stressed vowels is less steep than the preceding as well as succeeding slopes, then sentences 2 and 3 contain no discontinuity, sentences 4, 5, and 6 contain one, and sentences 7 and 8 contain two discontinuities, denoted by the broken lines in fig. 2. Thus, the longer utterances seem to be composed of two and three, respectively, prosodic phrase groups, the boundaries between which coincide with major syntactical boundaries, viz. before the (compound) complement and between the purpose and place complements. Note that these prosodic phrase group boundaries are not accompanied by pauses but seem to be caused by the syntactic structure per se, as pointed out also by e.g. Cooper and Sorensen (1977) and Fujisaki et al. (1979). The degree of resetting of the intonation contour at these boundaries is slight, however (individuals vary in this respect - two subjects have clear rises and two do not, see further Thorsen 1980c).

Due to the particular behaviour of the post-tonic syllables (cf. section 5 below), the prosodic phrase group boundaries cannot be detected in the 'topline' in the same manner as in the intonation contour proper.

4.3 The shape of the downdrift

Even though straight lines are good approximations to the overall downdrift of the stressed syllables (i.e. the correlation coefficients are high, cf. section 4.1 above), it seems as if with sentence 8 the declination is steeper in the early part of the utterance (with some subjects this tendency is clear also for some of the other utterances, cf. Thorsen 1980c). This would be in line with the results of McAllister (1971) and Sorensen and Cooper (1980).

The 'topline' does not show the same trend, partly because pre-boundary post-tonics exhibit higher rises (cf. section 5 below), partly because the rise in the final stress group is considerably smaller than in preceding stress groups, and thus the steepest 'topline' declination is located towards the end of the utterances.

In order to compare the Danish to Fujisaki et al.'s Japanese data, we should look at individual gradients ('voicing components'): the second prosodic phrase group of sentences 5-7 and the first and second one of sentence 8 contain more than two stressed syllables and could thus exhibit an exponential decay: the only one which could lay some claim to such a decay is the first gradient in sentence 8 - with the others the tendency is quite the

reverse, i.e. the declination is steeper in the final part of the prosodic phrase group (there is some intersubject variation in this respect, cf. Thorsen 1980c). - Exponentially decaying 'toplines' are equally scarce.

4.4 Intonation contours - conclusion

The hypothesized simple inverse relationship between intonation contour declination and utterance length is not supported by the data. At and above four stress groups, the intonation contour, as defined by the stressed syllables, is decomposed into prosodic phrase groups, with partial resettings of the contour between them. However, an overall downdrift is preserved, which does become less steep with increased length (although the relationship is not a linear one), and which, further, may exhibit a tendency towards exponential decay, i.e. greater declination in the beginning of the utterance.

5. STRESS GROUP PATTERNS

On the basis of the 1978 analysis of ASC Danish, the stress group was defined as a stressed syllable plus all succeeding (secondary- and) unstressed syllables, irrespective of intervening syntactic boundaries within the non-compound sentence (or better: within the same intonation contour, or intonational phrase). Thorsen (1980b,d) corroborated this definition: word boundaries (which were simultaneously noun phrase/verb phrase boundaries) do indeed seem to be immaterial for the Fo patterns of stress groups in ASC Danish. However, the sentences for the 1978 and 1980b,d materials were comparatively short, containing three and four SGs, and they exhibited no intonation contour discontinuities. It is conceivable that syntactic boundaries, when they co-occur with prosodic phrase group boundaries, as in sentence 4 through 8 in the present investigation, will break up the regular Fo pattern.

The syntactic boundaries always occur after the first post-tonic syllable in the utterances; accordingly, we might expect the relationship between the first and second post-tonic in SGs before and after phrase group boundaries to be different. E.g., the fall from first to second post-tonic could be smaller before the boundary and thus the second post-tonic would be comparatively higher, in anticipation of the "rise" performed by the succeeding stressed syllable to which it is affiliated syntactically. Or the fall from first to second pre-boundary post-tonic could be (substantially) larger, bringing the second post-tonic below the level of the succeeding stressed syllable, in imitation of the way sentence initial unstressed syllables behave (cf. fig. 1). - No such differences appear: the fall from first to

second post-tonic seems completely unaffected by the discontinuities in the intonation contour and the syntactic boundary per se cannot be made responsible for any changes in stress group patterns. This is not to say that the phrase group boundary does not affect the stress group pattern: it does - only the variation is not located at the syntactic boundary. Fig. 2 reveals a consistent trend for the rise from stressed to post-tonic (which belong to the same word in all instances) to be greater in pre- than post-boundary position. In sentences 5 and 6, and at the first boundary in 7 and 8, the rises can be compared directly, since the post-tonic syllable is carried by a syllabic [n̩] in all cases ('... bússen til fésten ...' - [ˈbusn̩ ɡ̊ˢe ˈfɛsɡ̊n̩]). The average rise is 2.8 semitones before the boundary, as compared to a rise of 1.9 semitones after the boundary, i.e. a difference of nearly one semitone. - Now, greater pre- than post-boundary rises do not in themselves prove a boundary effect, because progressively decreasing magnitude of the rise to the post-tonic is a feature also of statements without any phrase group boundaries, cf. fig. 1. - Due to differences in the segmental composition of the post-tonic syllable in the stress groups (which entails possible differences in intrinsic Fo levels) part of the following argumentation is qualitative only. First of all, it does seem that a difference in the magnitude of the pre- and post-boundary rises of one semitone is rather more than one would expect between neighbouring stress groups in a long statement without any phrase group boundaries, cf. fig. 1. Secondly, the pre-boundary rises seem to be rather high also in comparison to the preceding rise: In sentence 8, the first prosodic phrase group's second and third stress groups both have syllabic nasals for post-tonics, and the pre-boundary rise is larger than the preceding rise by 0.8 semitones. In the second prosodic phrase group in sentences 7 and 8, the two stress groups under scrutiny both have vowels in their post-tonics, [i] in the pre-boundary SG, [ʌ] in the preceding one, and although an unstressed [i] may have an intrinsically higher Fo level than an unstressed [ʌ], this alone does not seem sufficient to explain the increase we get in the pre-boundary rise (in sentence 8 the pre-boundary rise is 0.5 semitones, in sentence 7 it is 0.8 semitones higher than the preceding one). In the first prosodic phrase group in sentences 6 and 7 the two rises are of very nearly the same magnitude. The first post-tonic is carried by a vowel, [a] and [ʌ], respectively, the second one by a syllabic nasal, and if we assume that an unstressed syllabic nasal has a lower intrinsic Fo level than unstressed vowels, then the pre-boundary rise is even more "excessive".

On the whole, it seems safe to conclude that the prosodic phrase group boundary results in a comparatively higher rise to the post-tonic in the preceding stress group. The cause of the greater pre-boundary rise may be sought in either of two processes (or in a combination of them): it is a signal for the prosodic phrase group boundary, and thus controlled by the speaker, or it is an automatic consequence of the higher position of the succeeding stressed syllable, i.e. the higher the following stressed vowel, the less of a fall must be executed by the preceding Fo pattern and, consequently, the higher the rise may be from the preceding stressed vowel. In Thorsen (1980b) I speculate, for a number of reasons, that under certain circumstances stress group patterns may be "maximally distinct" (i.e. may have higher rises), and if we assume that prosodic phrase group boundaries receive special attention on the part of the speaker (which does not seem unreasonable) then the higher pre-boundary rises may just be regarded as instances of such "maximally distinct" patterning (and not as a specific juncture phenomenon and/or an assimilation as suggested above).

In summary, if the results of the present investigation can be extended to cover simple sentences in general, they present an argument in favour of a hypothesis expounded in Selkirk (forthcoming) that prosodic categories (in casu: stress groups and prosodic phrase groups) are distinct entities in the phonology that do not have an isomorphous relation to syntactic structure. Rischel (1972) argues in a similar fashion: Danish stress is best represented in a hierarchy (a tree structure) which is not necessarily congruent with the syntactic structure. - The autonomy of prosodic structure does not, of course, deprive it of a relation to syntax (cf. the questions posed below), on the contrary, prosodic categories can be seen as reconciling the syntactic structure to the phonetic output (in casu: the course of fundamental frequency).

6. DISCUSSION

The purpose of the investigation was not to investigate the interplay between syntax and prosodic structure as such. Nevertheless, the tendencies that emerge raise some interesting questions concerning the hierarchy and domain of syntactic boundaries vs. the inherent features of declarative intonation. In this material, the syntactic boundary before the (compound) complement seems to be more manifest than the noun phrase/verb phrase boundary. The constituent which varied most in number of stress groups was the complement:

What would the contours have looked like if instead the noun phrase and/or verb phrase had varied? Is the tendency that we note in the longest utterance towards faster declination early in the utterance an inherent feature of declarative intonation or is it an artefact of the material that would disappear if the noun phrase or verb phrase were longer? With a short complement but a long noun phrase, would a prosodic phrase group boundary be introduced after the noun phrase, and would the verb phrase and complement merge into one prosodic phrase group? If the second of the two complements had consisted of only one stress group, would it have had to merge prosodically with the preceding complement in order to preserve a final declination? (And if the first complement contained four SGs, where would that be cut up then, if four SGs are the maximum in a prosodic phrase group - compare sentence 6 and 7?) Or is the final declination dispensable as long as there is an overall downdrift ? How do clause boundaries manifest themselves? When unaccompanied by pauses, will they exhibit greater amounts of resetting than do clause internal boundaries? And will they affect stress group patterns?

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