Variability in the stress group pattern of Copenhagen Danish with a focus on the Copenhagen Multiethnolect

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ABSTRACT

This paper presents an acoustic analysis of the variability in stress group patterns, i.e. the fundamental frequency contour associated with stressed and following unstressed syllables, in Copenhagen Danish with a particular focus on the register known as the Copenhagen multiethnolect. This is a register of Danish spoken by multilingual adolescents. It is prosodically distinct from the register used by monolingual peers. Previous work has shown a difference in vowel durations between the two registers with a near-neutralisation of the vowel length contrast in the multiethnolect. Recordings with 4 speakers from a larger corpus of map tasks containing trisyllabic words with initial stress as place names have been analyzed. All speakers show an expected rise in pitch from the stressed to the first posttonic syllable, but the rise is significantly less steep for speakers of the multiethnolect, which may contribute to the impression of a more syllable-timed rhythm.

Keywords: pitch, multiethnolect, sociophonetic variation, rhythm.

1. INTRODUCTION

Multiethnolects are registers typically found among adolescent speakers in areas where people of several different ethnic minorities live in close contact, typically urban areas. Multiethnolects have been documented in several European cities such as Berlin [1], London [2], and Stockholm [3]. There is also a multiethnolect in Copenhagen, the capital of Denmark. It was first described in [4], where a number of phonetic characteristics were mentioned, notably prosodic features. Segmental characteristics have also been documented for the Copenhagen Multiethnolect, notably a fronting of /s/ and palatalization of /t/ [5]. Most previous studies of this register have relied exclusively on auditory analysis, mainly of sociolinguistic interviews. An exception is [6] which used a small corpus of recordings of map tasks with adolescents from Copenhagen to find acoustic correlates of what [4] describes as the staccato-like rhythm of the Copenhagen Multiethnolect. The present study is based on the same corpus which will therefore be described in more detail below. [6] measured durations of stressed and unstressed short and long vowels in the target words that were included on the maps used in the map task. [6] found that for the vowels /i a u/, there was no difference in duration between phonologically long and short vowels in stressed syllables in the Multiethnolect, whereas the durational distinction was maintained in the speech of monolingual peers. This pattern was mainly due to a shortening of phonological long vowels by the speakers of Copenhagen Multiethnolect. This difference between the two registers, the Copenhagen Multiethnolect and Modern Copenhagen, the register used by monolingual peers, partly explains why the Copenhagen Multiethnolect is perceived as more staccato: the durational contrast between short and long vowels is partly neutralized making consecutive syllables in running speech more similar in this register than in Modern Copenhagen.

The prosody of the Copenhagen Multiethnolect is not only relevant in terms of providing a detailed phonetic description of the register, it has also been shown to be particularly relevant to speakers and listeners of Danish in general. When listeners are asked to provide characteristics about speakers on the basis of short stimuli, examples of recordings with the prosody typical of the Copenhagen Multiethnolect are almost invariably classified with reference to the speaker having an immigrant background even in the absence of segmental, grammatical or lexical cues. The details of the prosody of this register therefore warrants further research.

In the present paper, I use the corpus from [6] for a qualitative study of pitch-stress relations in four male speakers. Specifically, I examine the shape of the tonal contour associated with the prosodic stress group as defined in [7]. In this superpositional model of Danish intonation, Grønnum, on the basis of extensive acoustic studies of fundamental frequency variation in read speech, posits a number of components that are hierarchically ordered in this model of Danish intonation. The smallest unit is the stress group, which is initiated by a stressed syllable and includes all following unstressed syllables until the next stressed syllable. The tonal contour associated with this unit has the same shape regardless of the degree of stress or position in the utterance, although the magnitude of the excursions may vary, according to [7]. In [6] the authors observe

that the stress group pattern in the Copenhagen Multiethnolect while similar in shape to the stress group pattern of Modern Copenhagen, i.e. with a relatively low tone on the stressed syllable followed by a rise to the first posttonic and then a subsequent fall, the rise to the posttonic was not as steep in Copenhagen Multiethnolect as in Modern Copenhagen. This paper provides a qualitative pilot study of this reported difference with a comparison of the stress group patterns in the two registers.

2. METHOD AND MATERIALS

The results presented in this paper come from analysis of the corpus that was also used in [6]. The corpus consists of recordings of map task conducted by 12 pairs of adolescents (age range 13 to 15 years) who were all born and raised in the city of Copenhagen. 6 of the pairs consisted of speakers from monolingual homes and 6 of the pairs consisted of speakers from multilingual homes. All participants had Danish as a first language but the multilingual participants also used either Western Arabic, Farsi, Punjabi or Turkish at home with family members. While multiethnolects are not exclusively used by speakers with multilingual backgrounds, and although being multilingual does not automatically lead speakers to use a multiethnolect register, speakers with this background are more likely to use such a register because they live their everyday lives in areas where it is prevalent. Participants were put in pairs where the conversational partner could be reasonably assumed to use the same register so as to maximise the likelihood of participants using a non-standard register like the Copenhagen Multiethnolect despite the formal setting of being recorded. Participants were recorded directly to compact disc in a quiet room at the school they went to using professional recording equipment from the Linguistics Laboratory at the University of Copenhagen.

2.1 Map design and task

The participants were seated with their backs to each other, ensuring that they could not see each other's maps. One participant in a pair, the follower, had a blank map with only roads and landmarks on it, while the other participant, the guide, could see the names of roads and particular places in a fictional town. The task for the participants was for the guide to enable the follower to place a set of stickers with street names and labels for locations correctly on the blank version of the map. When one set of maps had been completed the two participants switched roles and completed another map task. The participants were told that the purpose of the experiment was to see how people help each other find their way, when they can only speak to each other. In other words, the instructions did not call attention to particular ways of speaking Danish.

The names of roads on locations on the maps were designed to control for a number of microprosodic effects, originally with a specific view to minimising intrinsic durational differences between vowels of different heights and vowel differences as a consequence of number of syllables in a word according to [6]. Thus the target words of the map tasks in this corpus are all words of three or four syllables. What is particularly useful for the purposes of the present study is that a subset of the road and place names contained the same vowel in the stressed and first posttonic syllable, e.g. [ˈminivɑjˀ], [ˈmanavɑjˀ] or had vowels of the same height in these poisitions e.g. [ˈ gu̥biu̥gæːðə̥]. Since I wanted to study the pitch movement of the stress group, it was desirable to control for intrinsic fundamental frequency as a function of vowel height [7]. We therefore only used the 17 target words where this condition was met.

2.2 Segmentation and measurement

The recordings have been transferred from the original compact discs in lossless wav-format and were thus available for analysis in Praat [8]. Only two pairs of speakers were analysed for the current study, one with two male adolescents speaking in the Modern Copenhagen register and the other pair two male adolescents speaking in the Copenhagen Multiethnolect register. Two recordings are available for each of these four participants, one as guide and one as follower, yielding a total og eight map task recordings to be analysed. In each of these eight recordings, the 17 target words were found in previous transcriptions and each vowel in every token segmented by hand. Each vowel was labelled for whether it was 1 stressed, 2 the first posttonic or 3 the syllable following the first posttonic. For example, in a token of the target word [ˈmanavɑjˀ] the [a] in [ma] was labelled 1, the [a] in [na] was labelled 2 and the [ɑ] in [vɑjˀ] was labelled 3.

Preliminary visual inspection of the raw fundamental frequency contours overall confirmed the expectation that the tonal contour of the stress group in both registers as represented by these four speakers would consist of a relatively low tone on the stressed syllable with a rise to the first posttonic and a subsequent fall. Therefore, and following previous studies of Copenhagen Danish, it was decided to measure the minimum fundamental frequency of

syllables with stress but the maximum fundamental frequency of the first posttonic so as to capture the turning points of the tonal contour. For the syllable following the first posttonic, the average fundamental frequency was measured. All measurements were made in semitones relative to 100 Hz and extracted automatically using the autocorrelation method in the Praat editor with pitch range set for 50 to 400 Hz.

3. RESULTS

Visualization of the measurements for each speaker are presented in Figures 1 and 2. Each column represents a recording, and each pair of columns represent a speaker of the pair. Each row in the figure represents a target word. The x-axis shows the labelling of the vowel, and the y-axis gives the measure in semitones. The colour of the lines represents the time of occurrence in the recording, but this will not be treated in the current study.

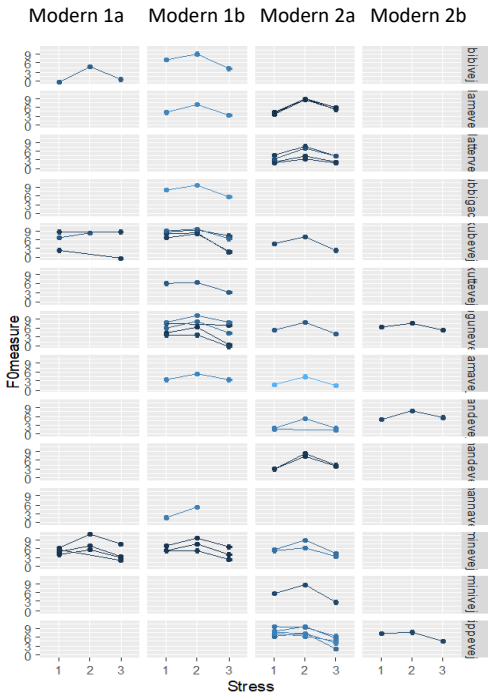

Figure 1: Stress group patterns for the two speakers of Modern Copenhagen.

The contours for the two Modern Copenhagen speakers tend to confirm the expectation that the stress group pattern consists of a low tone on the stressed syllable with a rise to the first posttonic and a subsequent fall. As can be seen, reliable measures were not always obtained for each vowel resulting in contours with less than three anchor points. What is also apparent is that not all stress groups exhibit the expected pattern. Looking at column number two (representing recording Modern 1b) we see in rows 7 and 12 indications that these words (*lagunevej* and *minevej* respectively) may occasionally exhibit a flat or even slightly falling contour from the stressed to the first posttonic. The same can be seen in the bottom row of column 4 (*tippevej*) which represents the other speaker of Modern Copenhagen.

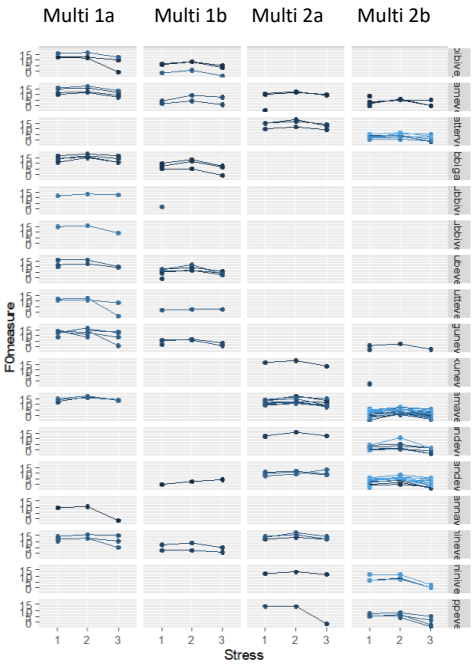

Figure 2: Stress group patterns for the two speakers of Copenhagen Multiethnolect.

The contours for the two Copenhagen Multiethnolect speakers given in Figure 2 tend to show quite a different pattern from this found in Modern Copenhagen. Almost all of the contours appear to be nearly level when it comes to the change in pitch from the stressed to the first posttonic. Note however, that the range in semitones is larger for Figure 2 than Figure 1. This is because one of the Speakers of Copenhagen Multiethnolect had higher general pitch than the other three. It is therefore helpful to zoom in on a selected few words to make a clearer comparison. This is done in Figures 3 and 4.

3.1 Individual words

Figures 3 and 4 have the same structure as Figures 1 and 2. Note that the ranges are still different on the y-axis, since all recordings were analysed in semitones relative to 100 Hz. This also means that the visual differences in magnitude cannot be directly compared, as a smaller difference will appear larger for the Modern Copenhagen speakers.

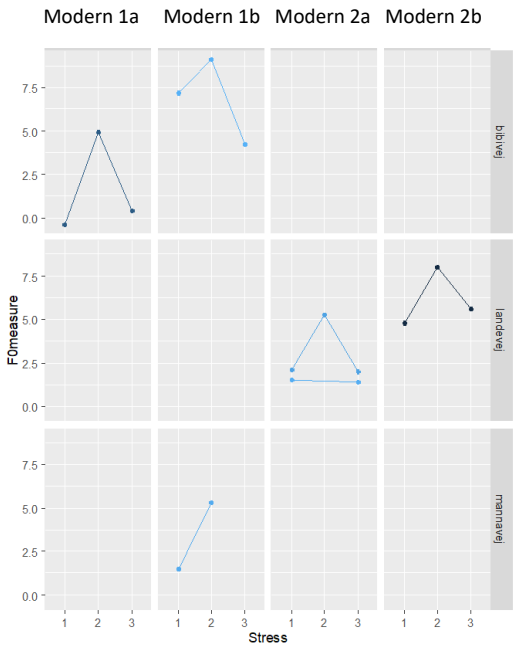

Figure 3: Stress group patterns for the words [ˈbi̯bi̯vɑjˀ], [ˈlanəvɑjˀ] and [ˈmanavɑjˀ] for the two speakers of Modern Copenhagen.

Zooming in on these three words, where the segmental structure controls for microprosodic effects on the measurements, the expected stress group pattern becomes clearer for the two Modern Copenhagen speakers: there is generally a steep rise of about 3 to 5 semitones (although again there are exceptions). An average difference of 2.9 semtiones is found for these two speakers (standard deviation of 2.2 st).

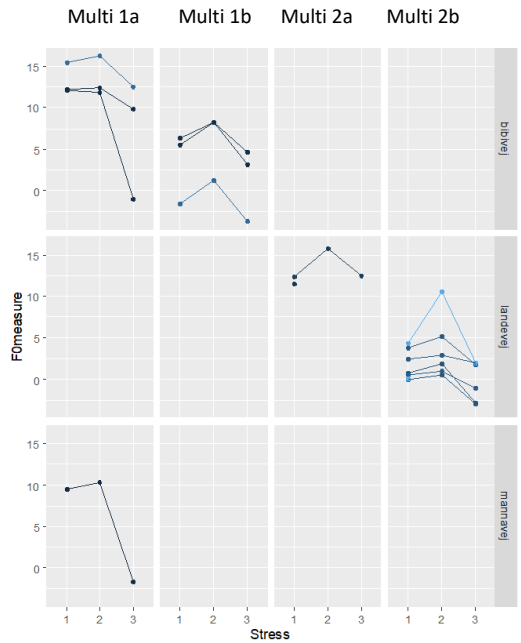

Figure 4: Stress group patterns the words [ˈbi̯bi̯vɑjˀ], [ˈlanəvɑjˀ] and [ˈmanavɑjˀ] for the two speakers of Copenhagen Multiethnolect.

For the individual words for the Copenhagen Multiethnolect speakers we see that while the contour is not flat, the rise from stressed to first posttonic indeed tends to be much less steep for this pair. While it may comprise a span of approximately 3 semitones, the tendency is for the slope to be between 0.5 and 2 semitones. An average difference of 0.5 semitones is found for these two speakers (standard deviation 2.4 st).

4. DISCUSSION

The analyses presented here only provide a qualitative look at the tonal stress group patterns in this pilot study of the differences between the two registers. While it is clear that further analysis of all of the recordings in the corpus is needed before more substantial claims on a solid quantitative foundation can be made, the pilot study also shows interesting findings with respect to the prosody of the Copenhagen Multiethnolect. There is evidence for the hypothesis that the rise in pitch from the stressed to the first posttonic tends to be less steep in the Copenhagen Multiethnolect compared to Modern Copenhagen. There was also greater variability of the tonal stress group pattern in Copenhagen Danish than what has been found in read speech (cf. [7]), since speakers of both registers produced tokens with no difference between the stressed and first posttonic. This is in spite of the fact that the analyses rest only on target words controlled for the intrinsic effect of vowel height. This could be due to the fact that these recordings are of spontaneous speech, where one might expect greater variability in general. However, a study of read speech in a number of different dialects of Jutlandic Danish [9] also indicates that the tonal stress group pattern may be more variable than reported in [7]. Furthermore, the variability appeared to be greater in the Copenhagen Multiethnolect with the two speakers analysed here showing a tendency to vacillate between the pattern found for the Modern Copenhagen of the two age matched monolingual peers and the less steep contour that appears more prevalent in the multiethnolect. If this greater variability emerges as a robust difference between the two registers, it would suggest that the perceived staccato-like rhythm is related to what [10] refers to as macro-rhythm: the stability and regularity of tonal units in the phrase. In this framework, the Multiethnolect speakers studied here could be classified as having a less macro-rhythmic pattern, because of the shallower pitch rise and the greater variability in the tonal contour associated with the stress group. Further analyses will help to clarify and substantiate the observations made here.

5. REFERENCES

[1] Weirich M., Jannedy S., Schüppenhauer G. 2020. The Social Meaning of Contextualized Sibilant Alternations in Berlin German. *Frontiers in Psychology*. 2020 Oct 29, 11, DOI=10.3389/fpsyg.2020.566174.

[2] Cheshire, J. 2020. Taking the longer view: Explaining Multicultural London English and Multicultural Paris French. *Journal of Sociolinguistics* 24: 308-327.

[3] Young, N.J. 2021. The sociolectal and stylistic variability of rhythm in Stockholm. *Language & Speech* (ETAP4 Special Issue on Sociolinguistic Variation in Prosody), 1–37.

[4] Quist, P. 2000. Ny københavnsk 'multietnolekt'. Om sprogbrug blandt unge i sprogligt og kulturelt heterogene miljøer. *Danske Talesprog* 1, 143-212.

[5] Maegaard, M. 2010. Linguistic practice and stereotypes among Copenhagen adolescents. In: Quist, P. & Svendsen, B.A. (eds), *Multilingual urban Scandinavia: New linguistic practices.* Multilingual Matters, Bristol,189-206.

[6] Pharao, N. & Hansen, G.F. 2010. Prosody in the Copenhagen Multiethnolect In: Quist, P. & Svendsen, B.A. (eds), *Multilingual Urban Scandinavia: New Linguistic Practices.* Multilingual Matters, Bristol, 79-95.

[7] Grønnum, N. 2022. Modeling Danish Intonation. In: Barnes, J. & Shattuck-Hufnagel, S. (eds), *Prosodic Theory and Practice*. MIT Press, Cambridge MA & London, 85-116.

[8] Boersma, P. & Weenink, D. 2022. Praat: doing phonetics by computer [Computer program].

[9] Jespersen, A.B., Šturm, P. & Hejná, M. 2021. On the feasibility of the Danish model of intonational description: Phonetic evidence from Jutlandic Danish. *Proceedings of Interspeech 2021*. 2611-2615.

[10] Jun, S.-A. 2012. Prosodic typology revisited: adding macro-rhythm. *Proceedings of Speech Prosody 2012*, 535-538.