On the Phonological Status of the HL*H vs. H*LH Timing-Related Tonal Opposition in Dutch

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Abstract

The paper deals with one timing-related opposition of nuclear accents within the falling-rising HLH% pitch contour typically observed in Dutch questions. It appears that speaker preferences for either H*LH% or HL*H% nuclear accent type are to a considerable extent determined by the duration of the “nucleus + tail” part and that the analysed opposition is neutralised in monosyllabic nuclei with minimum voicing. Possible phonological interpretations of the observed dependency are given, the most likely suggesting an allotonic nature of the analysed timing-related distinction.

1. Introduction

In most modern intonation taxonomies the timing of the pitch accent (i.e. its alignment with respect to the boundaries of the accented syllable) is used as a phonologically relevant feature ensuring category distinctions between otherwise identical pitch contours. The timing-related opposition discussed in this paper can be described as *early fall-rise* vs. *late fall-rise*. In the latest and most detailed description of Ditch intonation ToDI [1] the following correspondences can be found:
Early fall-rise - %H(LH*)L*(H)H%; %H(LH*)!H*(H)H%
Late fall-rise - %H(LH*)H*LH%

For our purposes we have simplified these transcriptions to illustrate only one clearly expressed timing-related HL*H% vs. H*LH% opposition.

There are a number of factors known to influence the timing of pitch accents [2]. Although these factors are generally assumed to be incapable of affecting cross-accent category boundaries, little data is available as to the extent of permissible within-category timing variability. This also has to do with the absence of generally accepted reliable criteria for the linguistic relevance of registered prosodic phenomena. Whether or not certain formal differences should be considered linguistically relevant, is largely determined by the level of abstraction chosen by the researcher as the principal one in intonation analysis. Here, however, numerous possibilities can be found, which is the direct result of the existing diversity in the understanding of the function of intonation and its relation to form.

Most experimental techniques used to verify presumed categorical distinctions between pitch accents can hardly be called objective since they are to a certain extent determined by the researcher’s theoretical or methodological preferences. In the experiment reported here an attempt is made to derive preliminary evidence for or against the categorical character of the discussed tonal opposition (HL*H vs. H*LH) purely from the production properties of the pitch contours and their contextual distribution. The two pitch accents are analysed on the basis of their realisational contexts, i.e. specific characteristics of the segmental string the pitch contours are imposed upon: its communicative role, syntactic structure, accentual and rhythmic characteristics, as well as some segmental features.

2. Experimental procedure

2.1. Speech Material

Speech material for the analysis has been collected from various sources: accompanying recordings provided for the Dutch language course Praatpaal [3], specially designed dialogues produced (read) by Dutch native speakers, recordings of Dutch TV programmes. Thus, a large stylistic range was encompassed – from carefully read to spontaneous speech.

In the overwhelming majority of cases the target falling-rising pitch contour with high onset was observed in yes-no and special questions which were subsequently selected for further analysis.

In the selected 245 utterances with the overall falling-rising contour both of the nuclear accent types were adequately represented: 140 instances of the HL*H nuclear accent (57%) and 105 of the H*LH nuclear accent (43%). Below (Fig.1) a schematic illustration is provided for the difference in the alignment of the falling-rising pitch movement, the “nucleus (+ tail)” part shown in bold type and alternatives in contour shape by a dotted line:

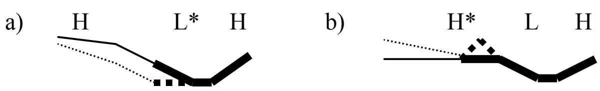

Figure 1: Schematic representation of the HLH pitch contour with a) early and b) late timing of the nuclear accent.

The phonological character of any tonal opposition is determined by the consistency of its manifestation on utterances varying in characteristics assumed to be communicatively irrelevant, such as the segmental composition of the nuclear syllable, number of post-nuclear syllables and speech tempo. At the first stage of our experiment we investigated the realisation of the target opposition in utterances with a varying number of post-nuclear syllables.

2.2. Realisation of the HL*H vs. H*LH opposition in utterances with a varying number of post-nuclear syllables

All of the utterances with the falling-rising contour were divided into 4 groups depending on the number of post-nuclear syllables: 0 (107 utt.), 1 (63 utt.), 2 (29 utt.), 3 and more (46 utt.). The analysis of pitch contours in each group showed that the distribution of the two accent types was uneven. The tendency is illustrated by the typical examples of pitch contours in utterances with a varying number of post-nuclear syllables (Fig. 2 – 5). The “nuclear + post-nuclear” part is to the right of the dotted line.

Thus, in utterances with a monosyllabic nucleus the HL*H contour was observed practically invariably (99%), as in the example in Fig. 2:

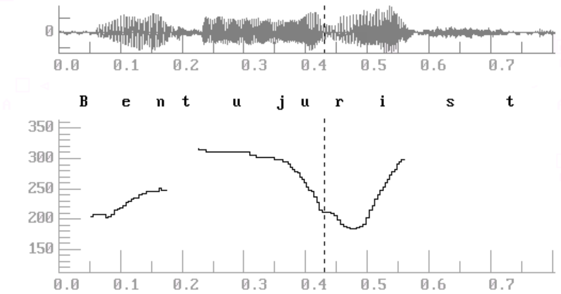

*Figure 2: The HL*H nuclear accent in the utterance with no post-nuclear syllables produced by a female speaker:* ***Bent U jurist?*** *(Are you a lawyer?)*

Conversely, in utterances with the nucleus followed by 2,3 and more post-nuclear syllables, the prevailing accent was H*LH (93% of utterances with 2 post-nuclear syllables, 100% of utterances with 3 and more post-nuclear syllables). The pitch contour typically looks as in Fig. 3 below:

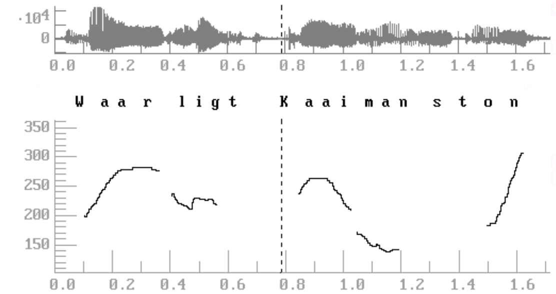

*Figure 3: The H*LH nuclear accent in the utterance with 2 post-nuclear syllables produced by a female speaker:* ***Waar ligt Kaaimanston?*** *(Where is Kaaimanston situated?)*

The only context with an almost even distribution of both accent types was a two-syllable nuclear foot – in utterances with 1 post-nuclear syllable the HL*H accent was realised in 51% and the H*LH accent in 49% of cases. Examples of the realisation of both accent types by two different speakers on the same verbal context are given in Fig. 4 (female speaker) and in Fig. 5 (male speaker):

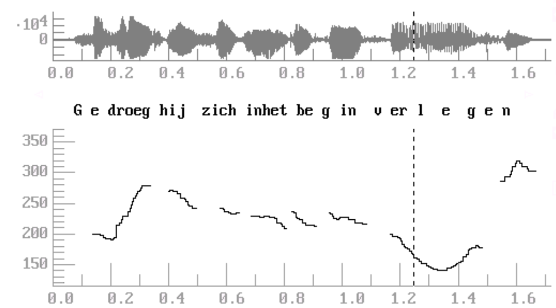

*Figure 4: The HL*H nuclear accent realised in the utterance with 1 post-nuclear syllable:* ***Gedroeg hij zich in het begin verlegen?*** *(Did he behave shyly at first?)*

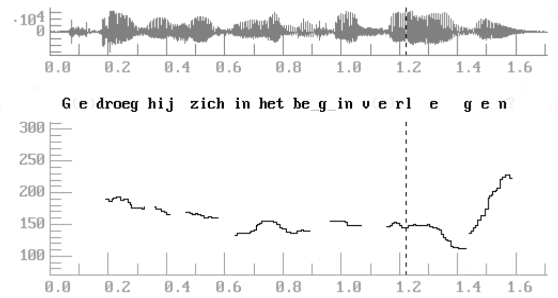

*Figure 5: The H*LH nuclear accent realised in the utterance with 1 post-nuclear syllable:* ***Gedroeg hij zich in het begin verlegen?*** *(Did he behave shyly at first?)*

Thus, as can be inferred from the figures, the increase in the number of post-nuclear syllables was accompanied by the increasing number of H*LH realisations, with the proportion of HL*H realisations decreasing accordingly.

The percentage statistics of either accent type realisation across structurally different contexts are presented in the diagram below:

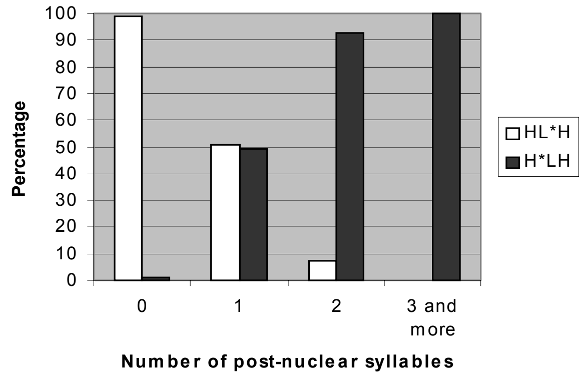

*Figure 6: Realisation of the HL*H and H*LH nuclear accents in utterances with a varying number of post-nuclear syllables.*

As the diagram shows, the choice of contour type (HL*H or H*LH) seems to be related to the presence and number of post-nuclear syllables in the utterance: the more post-nuclear syllables, the bigger the proportion of the H*LH accent and the smaller the proportion of the HL*H accent. This kind of distribution is close to mutually complementing, the only exception being a two-syllable foot where the two accent types are observed with an almost equal degree of regularity.

Since the change of nuclear accent timing from late to early is associated with the reduction in nuclear foot size, it was assumed that other factors known to evoke timing shifts, such as the segmental composition of the nuclear syllable and speech tempo, could produce a similar effect. Experimental evidence for this assumption will be dealt with in the following subsection.

2.3. Realisation of the HL*H vs. H*LH opposition in utterances differing with respect to the speaking rate and the segmental composition of the nuclear syllable

A number of examples from our material, namely, from the Praatpaal course [3], were produced by the speaker (female) in

both normal and slow tempo. For our purposes we have chosen three interrogative utterances:
*Is dat een **boek**?* (Is that a book?)
*Is dat een **stoel**?* (Is that a chair?)
*Is dat een **ta**fel?* (Is that a table?)

It should be noted that the speaker whose realisations were used for this part of the analysis gives obvious preference to the H*LH accent type in contexts with 1 post-nuclear syllable where both accent types were found to be equally frequent.

The F0 contours of the analysed utterances are shown below (Fig. 7 – 9). For convenience only the pitch on nuclear and post-nuclear syllables (if any) is shown. The pre-nuclear pattern is identical in all utterances – high pitch at the onset gradually descending from high to mid or low.

a) b)

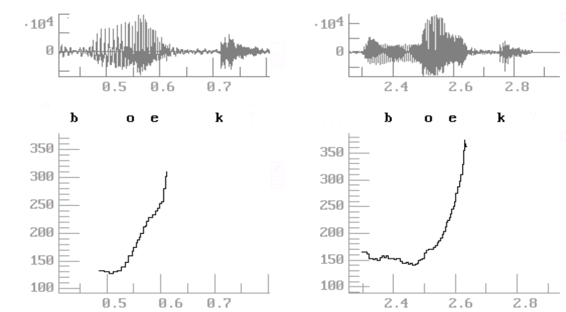

*Figure 7: Nuclear accent of **boek** (from Is dat een boek?) realised as (H)L*H in both a) normal and b) slow tempo.*

a) b)

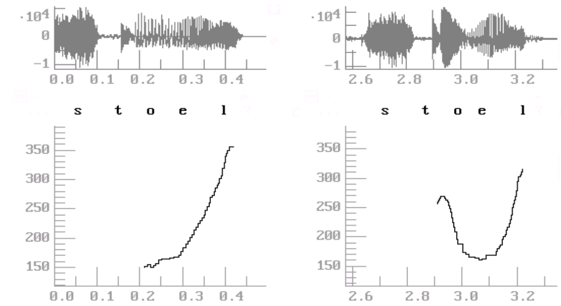

*Figure 8: Nuclear accent of **stoel** (from Is dat een stoel?) realised as (H)L*H in a) normal and as H*LH in b) slow tempo.*

a) b)

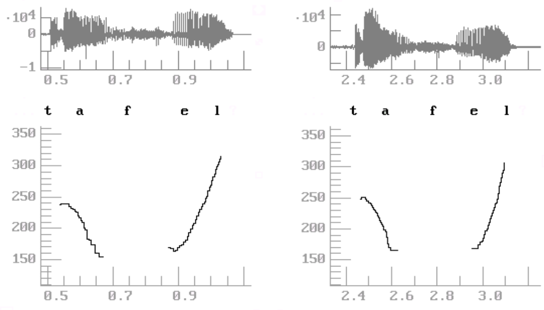

*Figure 9: Nuclear accent of **tafel** (from Is dat een tafel?) realised as H*LH in both a) normal and b) slow tempo.*

Apart from speech tempo, the analysed utterances also differ with respect to the number of syllables in the nuclear foot and segmental composition of one-syllable nuclei:

boek – monosyllabic: voiced stop + half-long accented vowel /uˑ/ + voiceless stop;

stoel – monosyllabic: voiceless consonant cluster + half-long accented vowel / uˑ/ + sonorant;

***ta**fel* – two-syllable foot with a long vowel /aː/ in the accented syllable.

As can be seen, the type of nuclear accent varies from context to context, which can be attributed to the difference in the duration of the voiced part of the "nucleus + tail" part. In normal tempo both one-syllable nuclei, irrespective of the differences in their segmental composition, are realised with the HL*H accent (7a and 8a), whereas in 9a the presence of the post-nuclear syllable results in the realisation of the H*LH accent. In slow tempo no categorical change takes place in the two-syllable nuclear foot (9b), nor in the monosyllabic foot with a voiceless coda (7b) - the initial sustained low pitch of the slow part (7b) is due to the prolonged pronunciation of the /b/ closure by the speaker. Conversely, a one-syllable nucleus with a sonorant coda in slow tempo is realised with a H*LH accent (8b), seemingly due to the longer duration of voicing in the nuclear syllable.
Thus, the findings reported in this subsection provide further evidence suggesting the dependence of nuclear accent choice on the duration of the "nucleus + tail" part.

3. Discussion

In this section some possible phonological interpretations will be given for the dependencies reported in the previous section.

Our findings suggest that the distribution of the HL*H and HL*H pitch accents in Dutch interrogative utterances is significantly correlated to the duration of the "nucleus + tail" part determined, in turn, by the presence and number of post-nuclear syllables, speaking rate and the segmental composition of a monosyllabic nucleus.

The following interpretations can be suggested for the observed dependencies:

- the analysed timing-related distinction presents allotonic variation within one tonal structure;
- the distinction is phonological but subject to neutralisation in certain contexts.

The problem with the first assumption is that it fails to account for the presence of alternative realisations of the two accent types in structurally similar contexts, especially in utterances with one post-nuclear syllable. One factor could speak in favour of this interpretation, though: in our material there are a number of verbally (near-)identical examples produced by the same speakers with the timing of the nuclear accent modified to a greater or smaller extent as a result of various changes in speech rate or segmental make-up, which suggests (at least in some cases) a gradient character of the observed timing-related distinction. This observation is in compliance with the treatment of the "A" falling accent in Dutch suggested, among others, in [4], where this type of accent (the only accent-lending falling movement in this intonation description of Dutch) is analysed as having no strict timing specification. The issue is contradictory, however, and this point demands further investigation since the data available are not sufficient to draw any definite conclusions.

If we accept the second hypothesis, it would be problematic to reconcile it with the absence of any observable communicative contrasts associated with the analysed timing distinctions. Also, it is not quite clear how we should differentiate between "neutralised" realisations in monosyllabic nuclei – in normal tempo there are seemingly no relevant phonetic criteria to determine if the accent is potentially "early" or "late".

In either case, however, the fact that the same speakers feel free to alternate the two patterns in communicatively identical contexts suggests that there exists no timing-related semantic/pragmatic distinction.

It is worth noting that in both hypotheses the speaker is assumed to change his accent type preferences or modify some of the accent features due to a number of context-dependent constraints. One of the possible explanations for the observed speaker strategies can be sought in the currently very popular typological distinction between typically compressing and typically truncating languages. Thus, some languages are known to have a tendency to avoid tonal compression on segmental strings with short duration of voicing. In [5] and [6], for example, evidence is provided for such a tendency in German. On the basis of our analysis and some other observations left outside the scope of the present work, such as the tendency to realise nuclear tones as (successions of) levels rather than changing pitch movements (see, for example, [7] for this issue), it can be assumed that Dutch can be close to German in its attempt to avoid tonal compression. This could explain, why practically no examples were found to illustrate the realisation of the complex falling-rising nucleus H*LH on a monosyllabic nuclear foot, whereas in utterances with at least one post-nuclear syllable they were very frequent.

The nuclear pitch pattern in Dutch interrogatives appears to always adapt to the verbal context so that the final rise could be fully realised on the last syllable, no matter whether lexically stressed or not. With two and more post-nuclear syllables the realisation of the H*LH tone makes the final rise clearly distinctive. A monosyllabic nucleus, conversely, cannot accommodate the same tonal succession unless it is compressed. In order to provide the basis for the final rise the falling part is substantially reduced, changing the accent type to HL*H (see Fig.2). In utterances with one post-nuclear syllable both of the accent types are equally acceptable as, on the one hand, making the final rise distinctive and, on the other hand, not requiring tonal compression.

However, it should be kept in mind that along with the (H+)H*LH% "late" falling-rising pitch accent analysed in this paper there exists "another" falling-rising pattern. Contrary to the accent described here this other pattern is often realised in utterance non-final position and/or is characterised by specific semantics associated with some sort of contrast, contradiction or reservation. This kind of fall-rise is quite possible in monosyllabic nuclei even if voicing is kept to the minimum. As a rule, it is preceded by low pitch and the final rising movement is less intensive than in its counterpart observed in "neutral" interrogatives. Provisionally it could be designated as L+H*LH%.

4. Conclusion

We believe that our findings provide sufficient ground for questioning the absolute relevance of timing-related oppositions of pitch accents. At least in interrogative contexts for the opposition investigated in this paper (HL*H% vs. H*LH%), the timing of the nuclear accent has been found to be influenced by several factors: presence and number of post-nuclear syllables, speaking rate and segmental composition of a monosyllabic nucleus. Since all these factors are generally considered incapable of producing categorical accent change and speakers seem to be linguistically unconstrained in their choice of either of the two accent types, the existence of communicatively relevant semantic and pragmatic distinctions between them is highly improbable and, thus, the analysed timing-related distinction is likely to be of an allotonic nature.

Most of the factors found to influence accent type choice (speaking rate, duration of the nuclear foot, segmental composition of the nuclear syllable) are virtually the same as those reported in the literature as producing peak timing shifts [2]. However, it might be the case that although the factors causing timing shifts are universal, the extent of influence they exert differs from language to language depending on certain language-specific properties. One of such properties may be the preferred way of contour adaptation to the segmental string of decreasing length – compression vs. truncation. Thus, it can be hypothesised that in typically compressing languages (e.g. English) the effect of timing-shifting factors is smaller than in typically truncating languages or those with a tendency to avoid tonal compression (e.g. Dutch), which is reflected in the degree of permissible phonetic variation within pitch accent types.

A more general tentative conclusion to be drawn from the results of our experiment concerns the relevance of the compositional approach to the analysis of pitch contours. Thus, the relevance of the nucleus timing in the analysed structures appears to be considerably weaker than that of other features, namely, high contour onset and offset, which gives way to a more global pitch contour characterisation advocated by the holistic approach.

5. References

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6. Acknowledgement

Pitch extraction was performed by means of the SIS (Speech Interactive Systems) software package developed in the Speech Technology Center (STC).