THE EARLY VERSUS THE LATE ACCENT-LENDING FALL IN DUTCH: PHONETIC VARIATION OR PHONOLOGICAL DIFFERENCE?

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ABSTRACT

There are two well-known models of Dutch intonation: the GDI or Grammar of Dutch Intonation and the autosegmental model formulated by Gussenhoven. Gussenhoven's model distinguishes – at least – two different types of falling pitch accent (%H H*L and %H !H*L), whereas the GDI recognizes only one type of accent-lending fall ('A'). The aim of the experiments presented below is to find out whether Dutch has two types of falling pitch accent or not by investigating whether there is a systematic meaning difference associated with a difference in timing of the fall. Short sentences with an early fall, a late fall or a standard pointed hat contour ('1&A' or H*L) were presented in contexts varying the information status of the focused information, asking subjects to perform a number of comparison and rating tasks. Results indicate that the early and the late fall belong to separate linguistic categories.

1. INTRODUCTION

Investigating intonation usually presupposes the choice for a specific intonation model, since the variation occurring in natural speech data is so large that some abstract structure is needed. In the relevant literature there generally seems to be consensus about the melodic shape ('phonetic interpretation') that is associated with a certain ('phonological') unit within a specific intonation model and, vice versa, about the correct way to attach phonological labels to phonetic data. In practice, however, there does not appear to be such a clear relationship between phonological entities and phonetic data. The problem is not limited to rare melodic shapes; in fact, it is not even clear how the notion of *starred tone* – a fundamental part of all autosegmental models of intonation – has to be interpreted phonetically [1].

Apart from the fact that it is not always straightforward how a specific melodic shape should be labelled within a specific intonation model (see for example [2]), there may also be problems in deciding which model gives the better interpretation of a specific melodic form. For example, in Gussenhoven's model of Dutch intonation [3, 4, 5] two types of accent-lending fall are distinguished, a downstepped and a non-downstepped fall (cf. [5], fig. 1), whereas the GDI [6] recognizes only one such fall ('A'), the precise timing of which, at least in the standard synthesis, depends on its melodic environment [7]. Can we decide whether these two shapes, viz., differently timed pitch falls, constitute different basic categories or whether they are phonetic variants of a single phonological form? Or, to use Ladd's [8] terminology, is the difference between an early and a late accent-lending fall in Dutch linguistic or paralinguistic? Within an experimental linguistic setting, two different approaches to this problem come to mind:

- categorical versus gradual perception

It is widely assumed that linguistic differences are categorical in nature [e.g. 8, 9]. However, investigating categorical perception of melodic differences does not always lead to conclusive results [10, 11]. It may not even be the case that all phonological contrasts are strictly categorical in nature; for example, [12] could not find strictly categorical perception for the unquestionable phonological differences between Dutch vowels. A second possible line of approach is the following:

- a difference in abstract meaning

There seems to be – implicit – agreement that when two melodic shapes differ in meaning they have to differ phonologically [e.g. 5, 8, 13]. Starting from this point, we may have an instrument to decide whether two melodic shapes are phonetic variants of the same underlying phonological form or whether they constitute two phonological entities.

In the experiments reported upon in the present paper, an early and a late fall are contrasted with each other and with the default pitch accent (the most frequently used pitch accent type in Dutch, the 'pointed hat' or H*L). Below, the three pitch accent types are illustrated with a schematic contour:

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(1)     _________/\__________
        (0)      1&A      (0)      (GDI)
        %L       H*L       L%      (Gussenhoven)
        Ik heb Jolanda gezien

(2)     _________
                 \__________
        (Ø)      A        (0)
        %H      !H*L       L%
        Ik heb Jolanda gezien

(3)     __________
                  \_________
        (Ø)       &A      (0)
        %H       H*L       L%
        Ik heb Jolanda gezien
        'I have seen Jolanda.'
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Throughout the remainder of the text, label '1&A' is used for the pointed hat; for the early fall label 'A' is used, and for the late fall '&A', because this movement is phonetically very similar to the fall in the pointed hat. Note that the early accent-lending fall ('A') and the late fall ('&A') only differ from each

other in terms of timing; the late fall and the pointed hat ('1&A') differ in onset height (indicated with the symbols '0' or '%H' versus '0' or '%L') and 'A' and '1&A' differ in both onset height and timing of the fall.

2. HYPOTHESES AND APPROACH

Based on the theoretical analysis formulated by Keijsper [14], earlier experimental findings [15, 16, 17, 18], and intuition, the following hypothesis was formulated:

- a difference in timing of a pitch fall corresponds to a difference between *new* and *projected* information

This means that it is expected that the early fall 'A' suits already projected information and the late fall '&A' – like the default pitch accent '1&A' – fits new information.

Inspired by Judith Haan (p.c.) and [13, p.65] it was further hypothesized that:

- a difference in onset height of a contour corresponds to a difference between *elliptic* and *non-elliptic* information

This means that a contour starting with a high onset (e.g. 'A' or '&A') is expected to refer back to earlier information and therefore fit 'elliptic' information, whereas '1&A' does not.

The experiment was presented to subjects as a series of short conversations between two teachers (A and B) working at the same school, discussing the upcoming school party. Subjects were instructed to identify with speaker B.

The opposition between 'projected' and 'new' information was operationalized as an opposition between an utterance which forms the second part of a conjunction and the same utterance as a single 'new' utterance (the target utterance is in italics):

A Er is nog niemand van de barcommissie
'There is nobody from the bar committee yet.'

B 1 *Ik heb Jolanda gezien*
2 Ik hoorde Marina en *ik heb Jolanda gezien*
'(I heard Marina and) I have seen Jolanda.'

The opposition between 'plus ellipsis' and 'minus ellipsis' was operationalized as the difference between utterances implicitly and explicitly contradicting the previous utterance:

A Er is nog niemand van de barcommissie
'There is nobody from the bar committee yet.'

B 1 *Ik heb Jolanda gezien*
2 Jawel! *Ik heb Jolanda gezien*
'(Yes there is!) I have seen Jolanda.'

The opposition between 'plus ellipsis' and 'minus ellipsis' is not considered relevant for the utterances containing 'projected' information, because it seems impossible to have an utterance that is projected by an earlier utterance (viz., by the first part of a conjunction), and at the same time elliptic (the preceding utterance has been omitted).

2.1. Design

The investigation comprised two sorts of test: a pairwise comparison experiment and a rating experiment. In the comparison experiment subjects had to compare two melodic versions of a target utterance in a specific context, and they had to select the contour best fitting the presented context. In the rating experiment subjects were asked to judge each combination of context and contour type (using the same materials) on the following scales: acceptability, irritation, detachment and finality. The 'acceptability' scale is used to complement the pairwise comparison data; 'irritation' and 'detachment' are two of the 'favorability' scales used by Grabe et al. [13], and 'finality' is an attitude associated with downstep [5, 8, 19].

To avoid a direct influence of the pitch of the context preceding the target utterance, subjects were presented with visual representations of the dialogue contexts only.

2.2. Method

Two Dutch intonologists, a male and a female, realized the target utterances with each of the three intonation contours.

Thirty-six native Dutch listeners participated in the experiments.[1] Their ages varied between 21 and 58 and no hearing difficulties were reported. The data were presented via an interactive computer program.[2] Subjects needed approximately 30 minutes to complete the task. Since the majority of subjects participated through the internet, there was no strict control over the circumstances under which the experiment was performed (such as ambient noise, type of headphones, type of loudspeaker, etc.).

In the pairwise comparison experiment subjects were asked to picture themselves as speaker B in each of the (visually) presented dialogue contexts and to decide which of the two melodic versions of the target utterance, which they could make audible as often as they wished, best fitted the given situation.

In the rating experiment subjects were asked to judge the combination of a specific (visually presented) dialogue context and a specific (audible) target utterance on a ten-point scale, ranging from e.g. totally unacceptable intonation to totally acceptable intonation.

The order of the two experiments as well as the order of the four scales within the rating experiment was counter-balanced over subjects.

3. RESULTS

3.1. Pairwise comparison experiment

Table 1 presents the preferences for the three contour types, broken down by the three context types (note that the maximum percentage per contour type is 67%, since subjects had to choose between two contours, not three). The strongest context effect lies in the opposition between 'new' and 'projected' information; in the former context types, the pointed hat and the

preferred contour type	new + ellipsis	new - ellipsis	projected	total
‘A’	61 (15%)	62 (15%)	131 (32%)	254 (21%)
‘&A’	166 (41%)	147 (36%)	133 (33%)	446 (36%)
‘1&A’	181 (44%)	199 (49%)	144 (35%)	524 (43%)

Table 1. Absolute frequency (and percentage) of preferred contour type, broken down by context type.

contour type	new + ellipsis	new - ellipsis	projected	mean
‘A’	5.1 (2.1)	6.5 (2.3)	6.5 (2.5)	6.0 (2.4)
‘&A’	6.2 (2.4)	7.4 (1.7)	6.4 (2.2)	6.7 (2.2)
‘1&A’	7.3 (2.0)	8.0 (2.3)	7.3 (2.3)	7.5 (2.2)
mean	6.2 (2.3)	7.3 (2.2)	6.7 (2.3)	6.7 (2.3)

Table 2. Mean acceptability scores (and standard deviation) per contour type, broken down by context type.

late fall are preferred over the early fall (χ^2= 62.87, df=2, p<.001, χ^2= 70.34, df=2, p<.001), whereas there is no preference for one of the contour types in the ‘projected’ contexts (χ^2= .721, df=2, ins.). There is no significant effect of the factor ‘ellipsis’ (χ^2= 2.01, df=2, ins.), which means that there does not seem to be a relation between the height of the onset of the stimulus utterance and whether or not the utterance can be viewed as elliptic.

Summarizing, the early accent-lending fall (‘A’) differs from the late fall and the pointed hat (‘&A’ and ‘1&A’) in that it does not fit the ‘new’ contexts very well (preferred in only 15% of the cases), which can be taken as support for the hypothesis that the early and the late accent-lending fall form different phonological categories.

3.2. Rating experiment

3.2.1. Acceptability scores. In table 2 the mean acceptability scores (meant to complement the pairwise comparison data) are given for the three contour types, broken down by the three context types. There is a significant effect of contour type, F(2,303)= 11.6, p<.001, and an effect of context type, F(2,303)= 6.9, p<.005, but no significant interaction. Post-hoc analyses (Newman-Keuls) reveal that the pointed hat is judged as more acceptable (7.5) than the late accent-lending fall (6.7), which in turn sounds more acceptable than the early accent-lending fall (6.0). Furthermore, the stimuli in the ‘new minus ellipsis’ contexts are judged significantly more acceptable (7.3) than those in the ‘new plus ellipsis’ contexts (6.2), but neither differ from the ‘projected’ contexts (6.7).

The acceptability ratings confirm the general preference found for the pointed hat in the pairwise comparison test; the fact that the pointed hat and late fall were preferred over the early fall in the ‘new’ contexts, but not in the ‘projected’ contexts (cf. table 1), is reflected in a relatively higher acceptability of ‘A’, compared to ‘&A’ and ‘1&A’, in the ‘projected’ contexts than in the ‘new’ contexts; however, these differences do not reach significance.

3.2.2. Irritation Scores. Table 3 contains the mean irritation, detachment and finality scores for the relevant variables. An analysis of variance on the irritation judgments shows an effect of contour type, F(2,302)= 13.6, p<.001, no main effect of context type, F(2,302)<1, and an interaction between contour and context type, F(4,296)= 4.9, p<.005. When the context contains ‘projected’ information, ‘A’ sounds significantly more irritated (5.9) than ‘&A’ (4.4), which in turn sounds more irritated than ‘1&A’ (2.7). In the ‘new plus ellipsis’ contexts the late fall sounds more irritated than the pointed hat. In the ‘new minus ellipsis’ contexts, there is no effect of contour type (4.6, 4.5 and 4.4 respectively). These data suggest a rather complex relationship between the measure of ‘irritation’ expressed by a certain pitch accent type and the context it appears in.

3.2.3. Detachment Scores. An analysis of variance on the detachment scores reveals a main effect of contour type, F(2,303)= 12.3, p<.001, but no influence of context, F(2,303)= 1.1, ins. and no interaction. Post-hoc analyses show that ‘A’ sounds more detached than ‘1&A’ or ‘&A’ (a mean score of 5.6 versus 4.3). These results indicate that ‘detachment’ is an attitude closely associated with the early accent-lending fall.

3.2.4. Finality Scores. The finality scale shows an effect of contour type, F(2,300)= 6.7, p<.005, no difference between the three context types, F(2,300)= 1.7, ins., and no interaction. All contour types sound rather final, but post-hoc analyses reveal that the late fall (‘&A’) sounds less final (6.3) than the early fall or the pointed hat (7.0 and 7.5 respectively). This means that the data do not support the expectation that a downstepped fall (‘A’) sounds more final than a non-downstepped one (‘&A’), cf. [5, 8].

4. CONCLUSION

Taking into account that subjects cannot be forced to interpret stimuli occurring as the second part of a conjunction as ‘projected information’, plus the fact that there is a large overlap in meaning between the three pitch accent types (viz., ‘plus focus’ or "this is important information"), the results of the experiments are quite clear. With respect to the main question – is there a systematic meaning difference between an early and a

contour type	irritation scores				detachment scores				finality scores			
	new +	new -	project.	mean	new +	new -	project.	mean	new +	new -	project.	mean
‘A’	4.8 (2.3)	4.6 (2.3)	5.9 (2.5)	5.1 (2.4)	5.6 (2.1)	5.6 (2.8)	5.5 (2.0)	5.6 (2.3)	6.6 (2.5)	6.8 (2.4)	7.6 (2.4)	7.0 (2.5)
‘&A’	5.1 (2.7)	4.5 (2.6)	4.4 (2.4)	4.7 (2.6)	4.4 (2.2)	4.5 (2.2)	4.1 (2.1)	4.3 (2.2)	6.1 (2.6)	6.3 (2.7)	6.6 (2.3)	6.3 (2.5)
‘1&A’	3.6 (2.4)	4.4 (2.3)	2.7 (1.6)	3.6 (2.2)	4.6 (2.5)	4.3 (2.4)	3.9 (2.1)	4.3 (2.3)	7.1 (2.3)	8.2 (2.0)	7.3 (2.2)	7.5 (2.2)
mean	4.5 (2.5)	4.5 (2.4)	4.3 (2.6)	4.4 (2.5)	4.9 (2.3)	4.8 (2.5)	4.5 (2.2)	4.7 (2.3)	6.6 (2.5)	7.1 (2.5)	7.1 (2.3)	6.9 (2.4)

Table 3. Mean irritation, detachment and finality scores (and standard deviation) per contour type, broken down by context type.

late accent-lending fall in Dutch? – they can roughly be summarized as:

- the early accent-lending fall (‘A’) does not fit new information, in contrast with the late accent-lending fall (‘&A’)
- the early accent-lending fall sounds less acceptable, more irritated, more detached and more final than the late accent-lending fall

This indicates that the two types of fall differ in information status as well as attitude, which in my view should lead to the tentative conclusion that they must belong to two separate phonological categories: Dutch has two different types of accent-lending fall. Further research involving more speakers and more stimulus material is called for, followed by production studies (including database research and imitation experiments [9]).

The linguistic relevance of melodic phenomena cannot be determined in the same way as, for instance, segmental phenomena (phonemes), since there is no list of melodic ‘words’ agreed upon, and therefore we do not know what would constitute a melodic ‘minimal pair’. This means that other criteria have to be used. Experimentally verified meaning differences seem a useful (additional) measure to establish whether a difference in melodic shape is to be interpreted as mere phonetic variation or as a phonological difference.

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NOTES

1. Due to a computer crash and a mistake in interpreting the instructions, the data of two subjects could not be used in the analyses; furthermore, one initial irritation score and three consecutive finality scores were lost.
2. URL http://fonetiek-6.leidenuniv.nl/caspers/le5-intro.html, programmed by J.J.A. Pacilly of the Leiden University Phonetics Laboratory.

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