

# Prosody in Luxembourgish: the example of the nuclear falling contours

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## ABSTRACT

This study analyses nuclear falling intonation in Luxembourgish both phonetically and phonologically and investigates its function(s). Data from scripted and non-scripted tasks show that Luxembourgish speakers use two different falling contours: one with a downstepped high tone in the nuclear syllable and a following fall (mid-falling) and one with a high tone and a following fall (high-falling). Both patterns appear in final as well as in interrogative phrases, showing the same phonological structure. In final phrases the two patterns are used with a slightly different meaning and in interrogatives, the mid-falling contour appears in yes/no-questions while the high-falling contour is used in wh-questions. Apart from their obviously different communicative functions, each contour differs phonetically when used in one or the other function.

**Keywords:** Luxembourgish, falling intonation, finality, marked interrogativity

## 1. INTRODUCTION

Luxembourgish is a young Germanic language, spoken by ca. 266,000 people as their main language [3]. Due to its young age, many linguistic fields still need to be explored in depth. As prosody and especially intonation are usually the last fields in linguistic research, the low number of studies for Luxembourgish [6, 12] is unsurprising.

In the tradition of these studies and their perception of intonation as organizing speech (cf. also [5]), the three major functional concepts, namely ‘final’, ‘continuation’ and ‘question’ form the basis of this study in order to express the relation between form and function.

Independent of its function, this paper assumes a falling contour in Luxembourgish as this is, in a very crude classification, one of the two movements that can often be found in textbooks. If a learner of a new language encounters information about pitch movements, it is usually ‘falling’ in order to signal completion or ‘rising’ in order to signal incompleteness. In a very simplistic way, this shows a general inventory of pitch movements. As [12] demonstrates, high final boundary tones do not seem to be part of the Luxembourgish inventory, which means that simple rising movements do not exist in

Luxembourgish and are thus not considered in this study. The term ‘falling’ refers here to the nuclear structure of an intonation phrase, i.e. including the last accented syllable of a phrase towards the end of the latter. Within the autosegmental-metrical framework (applied in this study) the focus often lies on this part of a phrase for a formal and functional analysis as it plays a crucial role (crosslinguistically) in the distinction of statements and questions [14].

The first aim of this study therefore is the formal description of the nuclear falling contour(s) supported by a phonetic analysis, which allows a comparison of similar and different patterns.

The second goal is the identification of the different functions of nuclear falling intonation in Luxembourgish. The older literature states that the majority of languages use a falling intonation to realize final phrases [1]. While there are many languages for which this is not true (e.g. Hungarian, cf. [11]), in which final phrases, i.e. declaratives, are represented by a rising intonation, the association of falls and finality is widespread. As different functions can be associated with falling intonation, Cruttenden [2] suggests the cover label *closed* for its different local meanings, specifying that the actual shape and placement of the tones is specific to a language or situation. Even though this concept is quite diverse and may not be suitable to cover all functional aspects of falling intonation, the term *closed* is helpful in this particular case as it can not only be used for falling intonation in finals but also in interrogative phrases. Many languages and varieties use a falling pattern in finals as well as in questions e.g. German [17, 14] and some of its varieties [10], several English varieties [7] or Italian [15], and even share the same contour with final phrases. This is the case in German where the same pattern is used in final phrases and in wh-questions. Yes/no-questions, however, only show a nuclear fall (in German) when the speaker expects his conversation partner to keep the answer short [14] and thus marks a *closedness* towards the answer. In an extreme case, the expectation towards the answer (cf. [10]) can be reduced to a ‘yes’ (cf. confirmation-seeking questions [1], yes-bias [13]). This shows that falling intonation can appear in different functions, such as finals and questions.

The questions addressed in this paper therefore are in which way(s) intonation falls within the nuclear structure in Luxembourgish and when falling patterns

are used, e.g. in finals and/or questions.

## 2. METHOD

### 2.1. Material

The data were gathered for a study (cf. [12]) aiming at a more extensive picture of Luxembourgish intonation, which explains the methodological approach. Speakers were recorded in three different settings. In the first, each participant spoke freely with the author in an interview-like dialogue about the language situation in Luxembourg, planned holidays and other everyday topics in order to elicit continuation and final intonation (dialogue-setting). In the second, two speakers played a board game (Scotland Yard) together with the investigator in order to yield question intonation in a freely spoken situation (game-setting). In the third setting, the participants were confronted with very short stories that served as a context in which a target sentence in direct speech was embedded. The purpose of this scripted part of the study was to obtain comparable data of the exact same situation with the same amount of syllables and without any hesitations, regulatory or fragmentary phrases. The context was carefully chosen in order to create unambiguous, everyday situations, as speaker attitude can influence intonation (e.g. a person wants to cook but cannot find the pineapple in the store and thus asks for it). To avoid a reading intonation the target sentences were then presented in direct speech (*Hutt Dir Ananas?* ‘Do you have pineapples?’). The disadvantage, of course, is that it is not the same as a spontaneously uttered sentence, hence the combination of the three settings.

The data were selected as follows: intonation phrases were determined, classified on the basis of speech organizing criteria and assigned respectively to the earlier mentioned conversational concepts of finality and continuation (following [5]) as well as interrogation, limited to *wh*- and *yes/no*-questions (for more detail cf. [12]). After that, the contours were selected both on a perceptual and on a visual basis.

### 2.2. Speakers

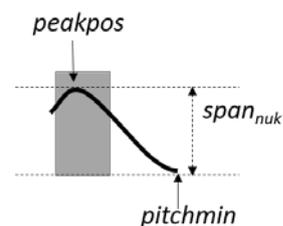
Twelve Native speakers of Luxembourgish (six female, six male) of two age groups (22-29 years, average: 25.5; 59-69 years, average: 64.6) born and raised in the central region of Luxembourg provided the data. They had never lived abroad and indicated Luxembourgish as their only mother tongue.

### 2.3. Phonetic parameters

Three parameters provide phonetic information about the contour, which allows for a concrete description

of the pattern as well as a comparison between phonologically identical contours. These are the pitch span of the nuclear structure ( $span_{nuk}$ ) and the pitch minimum within the nuclear structure ( $pitchmin$ ) on a vertical level as well as the peak position within the nuclear syllable ( $peakpos$ ) on a horizontal level. Both  $span_{nuk}$  and  $pitchmin$  are measured in semitones (st) and then put in relation to the average speaker’s span in order to normalize the data and obtain percentage values. The peak position is measured within the rhyme of the nuclear syllable, put in relation to its length and expressed in percent (cf. Table 2 in the result section). Thus, a peak position at the beginning of the syllable is represented by a low percentage value and a peak position towards the end of the syllable by a high value. All measurements were made with PRAAT. Fig. 1 shows the three parameters in a hypothetical falling contour, the nuclear syllable marked in grey.

**Figure 1:** Phonetic parameters in a hypothetical falling contour (nuclear syllable in grey)



Only intonation phrases with at least two syllables following the nuclear syllable were taken into account, in order to avoid truncated or compressed contours.

## 3. RESULTS

The data reveals two distinct falling patterns. One shows a high fall, starting early in the nuclear syllable and continuing thereafter (henceforth ‘high-falling’). Moreover, a rise towards the nuclear syllable can be observed. The other also consists of a fall on the nuclear syllable that continues towards the end of the phrase but without a supplementary rise towards the nuclear syllable; therefore called here ‘mid-falling’ (cf. Fig. 2).

**Figure 2:** Schematic pattern of the nuclear falling contours in Luxembourgish (nuclear syllable in grey)



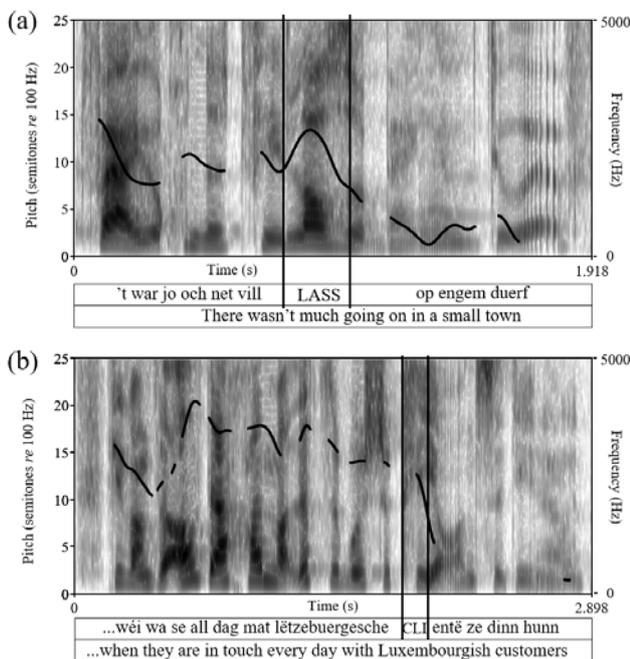
Speakers use the two contours in final phrases as well as in interrogative phrases. The experiment produced a total of 94 high-falling and 121 mid-falling contours

in final phrases as well as 14 high-falling and 14 mid-falling contours in questions suitable for this analysis. More questions with only one syllable following the nuclear syllable support the findings presented here.

### 3.1. Possible functions of falling contours

This section is a first attempt to interpret the function of the nuclear contours based on their conversational context. Both contours mark finality as they appear in syntactically and pragmatically final phrases (in the non-scripted dialogue-setting). While the high-falling contour seems to demand a back-channelling signal in this setting, the mid-falling contour is the more ‘neutral’ (and slightly more frequent form,  $n=116$  vs.  $n=84$ ) as no reaction, such as confirmation from the conversation partner seems to be necessary (critical remarks on the notion of a neutral form e.g. in [16]). Fig. 3 shows two examples taken out of the corpus.

**Figure 3:** Examples of high-falling (a) and mid-falling (b) contours in final phrases taken out of the corpus from different speakers



Speakers also used both contours in the scripted speech in the exact same declarative sentence within the same context. The target sentence was the last sentence in the context, which makes it unlikely that they intended to evoke a back-channelling signal with the high-falling contour. Possibly the contexts either triggered some kind of storyteller or a stating-the-obvious intonation (cf. Table 1 for an overview of the different functions). One situation for example describes a visit in the zoo and a grandchild pointing to a monkey and asking what it is doing. The following target sentence from the grand-mother is *Hien ësst eng Ananas.* ‘He is eating a pineapple.’

The same two contours are used in questioning phrases (elicited in the game-setting). While the high-falling contour appears in yes/no-questions, the mid-falling contour shows up in wh-questions (cf. Table 1). In both question types, the speaker restricts the length and/or amount of detail in the answer (such as a confirmation of what the speaker says) by using those falling patterns (noted with ‘closed’, that is, with restricted answering potential).

**Table 1:** Functions of the two falling contours

final		interrogative		
high-falling		mid-falling	high-falling	mid-falling
Non-scripted back-channel (n=84)	scripted stating-the-obv. (n=10)	‘neutral’ (n=121)	closed yes/no-question (n=14)	closed wh-question (n=14)

Note that in the game setting, closed wh-questions (mid-falling) are much rarer than the closed yes/no-questions (high-falling). The latter even represent the most frequent group within the interrogative function in this setting, most likely because a cooperation and therefore also a checking up with the other participant is mandatory. In the scripted data, the mid-falling contour is used mostly in wh-questions, requiring a restricted answer. This is probably due to the fact that in the scripted setting, no real dialogue partner is present and the necessity to ask an open question is less frequent than in the game setting.

### 3.2. Acoustic results of the falling contours

Acoustic measurements confirm the schematic contours displayed in Fig. 2 in the sense that they show an early peak and a low pitch at the end of the phrase. The difference in the height of the nuclear tone can be confirmed, too: the two contours mainly differ by the parameter  $span_{nuk}$ , which is larger for the high-falling contour. Together with the similar values for  $pitchmin$  in both contours, it indicates a higher pitch maximum in the nuclear syllable.

This holds true for the general comparison of the high-falling and the mid-falling contours. The comparison of the same contour used in a different function, however, shows phonetic differences.

**Table 2:** Results of the phonetic parameters  $span_{nuk}$ ,  $pitchmin$  (both relative to each speaker’s average span) and  $peakpos$  (relative to the nuclear syllable’s rhyme) describing the patterns

	high-falling		mid-falling	
	final	interrog.	final	interrog.
$span_{nuk}$	94%	103%	58%	85%
$pitchmin$	-9%	3%	-7%	-3%
$peakpos$	20%	18%	11%	25%

Table 2 shows the data of the phonetic parameters for both contours in the two conversational functions (final and interrogative). Negative values originate from *pitchmin* values below the average speaker's base line and values over a hundred from values above the average speaker's top line.

The high-falling contour uses more or less the entire average speaker's span to perform the fall in the nuclear structure, i.e. a bit less in finals (94%) and a bit more in interrogatives. For the latter a tendency to reach higher pitch minimum values (*pitchmin*) and thus higher pitch maximum values can be observed.

As for the peak position, it is sufficient to operate with a classification of 'early', 'mid' and 'late', i.e. with all the values of *peakpos* appearing in the first third of the syllable, the contours present early peaks.

The most striking difference appears in mid-falling phrases for *span<sub>nuk</sub>*, i.e. 58% of the speaker's span in finals and 85% of the speaker's span in interrogative phrases, showing how much stronger the pitch movement in questions is. As both end slightly below the baseline of the speaker's span (-7% for finals and -3% for interrogatives), the pitch maximum in the interrogative phrases is much higher.

Comparing the *span<sub>nuk</sub>* for finals and interrogatives in the high-falling (94% and 103%) and the mid-falling pattern (58% and 85% ) respectively, a more important difference for the mid-falling contour appears and thus a clearer distinction of the functions.

#### 4. DISCUSSION

The results show that the two falling contours in Luxembourgish appear in final phrases, just like in a multitude of other languages. They differ phonetically by the larger pitch span used in the high-falling contour and, as the similar, very low values of the pitch minimum demonstrate, the differences lie in the pitch maximum within the nucleus. This suggests a high target tone for the high-falling contour and a lower target tone, probably a downstepped high tone, for the mid-falling contour. The latter assumption derives from the high pitch level leading towards the nuclear syllable. In both contours, the fall starts within the nuclear syllable and is perceptually prominent. Although not further explored, both contours seem to have an 'elbow' in the nuclear structure, from which the pitch level runs low towards the end of the phrase. Even though the position of the latter is not yet explored, these observations lead to a first attempt to transcribe the contours within the AM-framework: H\*+L L% for the high-falling contour and !H\*+L L% for the mid-falling contour. This still needs to be verified by further research.

Regarding the different use of the two contours within final phrases, this would mean that the choice of the tonal target in the nuclear syllable is decisive in the nuance of finality in Luxembourgish: the H-tone in H\*+L requires a speaker's reaction such as back-channelling/confirmation and/or is used to state the obvious while the !H-tone in !H\*+L is not. Still, other parameters might play a role in the distinction.

The falling contours both also appear in interrogative phrases. As in both question types a closedness towards the possible answer could be observed (as it is described in German yes/no-questions [13]), it is possible that the falling movement carries this meaning at the conversational level. This assumption is supported by the findings from [12], stating that open questions are realized with a rising movement on the nuclear syllable.

The same phonetic difference between the two contours noted for the final phrases can be observed for the interrogative phrases, which leads to the conclusion that the same tone sequence is used. In this case the choice of the tonal target (H\*+L vs. !H\*+L) would make the difference between a closed wh-question and a closed yes/no-question. Of course, these considerations only refer to the nuclear structure and leave out any activity in the pre-nuclear structure or on other levels such as syntax, which provides the hearer right from the beginning with the notion of question (with the wh-word or the subject-verb-inversion in yes/no-questions).

The phonetic measurements also show how the same contour is realised differently in distinct functions, i.e. questions use a higher pitch than final phrases. This is true at an overall level, which means that both question types reach higher up and fall towards a slightly higher pitch at the end of the phrase than the contours used in finals. Especially in the mid-falling contour in wh-questions, the nuclear span is bigger than in the same pattern in final phrases. This is in line with observations e.g. by [13] for German and [8] for Dutch that share the same contour in final phrases and wh-questions or in Akan, a non-related language, that shares the same contour in yes/no-questions and statements [4]. Concerning this, Hirst and di Cristo [9] claim that a higher pitch is a universal feature of questions.

The results thus show that form and function interact: when the formally identical contour appears in distinct functions such as 'final' and 'interrogative', there must be a difference on the phonetic level, which could be confirmed in this study.

To sum up, this study presented two nuclear falling contours in Luxembourgish and described their form and functions.

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