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The Distribution and Phonological Behaviour of Neuchâtel
French High Vowels

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Contents

Acknowledgements	4
1 Introduction	5
2 Preliminaries	7
2.1 The Vowel System of Standard French	7
2.2 The Vowel System of Neuchâtel French	10
2.3 Some Diachronic Remarks	11
3 The High Vowels of Neuchâtel French	12
3.1 Distribution	12
3.2 Nasal Vowels	20
3.3 The Semivowels	21
3.4 The Lengthening Consonants	22
3.4.1 Interactions with Vowels	22
3.4.2 Interactions with Consonants	24
4 Theoretical Modelling	27
4.1 The Main Questions	27
4.2 Classical Element Theory	28
4.2.1 Harris (1990, 1994)	29
4.2.2 Kaye (2000)	37
4.2.3 Rennison and Neubarth (2003); Neubarth and Rennison (2005)	38
4.2.4 Backley (2011)	41
4.2.5 Conclusion of Literature	43
4.2.5.1 Summary	43
4.2.5.2 Zdziebko (2015)	45
4.3 Length	48
4.3.1 Final Length	48
4.3.1.1 Verbs	49
4.3.1.2 Adjectives	52
4.3.1.3 Nouns	56
4.3.1.4 Technical Implementation	57
4.3.2 LeCs	61
4.3.2.1 Stress	61
4.3.2.2 Front Vowels and /ɜ/	63
4.3.2.3 Syllable Structure	65
4.4 GP 2.0	67
4.4.1 Length and Voicing	67
4.4.2 Place of Articulation	70
4.4.3 Binding	71
4.4.4 /B/ and the other LeCs	75

4.4.5	Summary	77
4.5	Irregular Cases of /u:/	78
4.5.1	Lexicon or Phonology?	78
4.5.2	The Representation of /u(:)/	79
4.6	Summary	82
5	Conclusion	83
	References	85
	Abstract	89
	Deutschsprachiges Abstract	90

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1 Introduction

This thesis is concerned with the high vowels of Neuchâtel French. Both these notions need further elaboration, starting with the latter. Neuchâtel French is not a term usually found in the dialectological literature. In the following, it will refer to the variety of French that is spoken in the canton of Neuchâtel in western Switzerland. In this area, a Franco-Provençal dialect was originally spoken (the *Patois Neuchâtelois*), but it died out most probably in the first quarter of the twentieth century, after being already displaced by French in almost all places by the end of the 19th century (Pauchard, 2019). The language spoken today clearly is a variety of modern French. There are some remarkable differences, however, mostly but not exclusively to be found in phonology and lexicon. Some of those are innovations, e.g. through contact languages like German. Others are archaisms lost in the standard language. The canton of Neuchâtel is obviously a politically, not linguistically defined area, even though the term is not completely absent in the linguistic literature (see e.g. Avanzi, Schwab, Dubosson, & Goldman, 2012). Why still choose it as the defining area of this thesis? On the one hand, this is a pragmatic choice. The informants I have access to are mostly from this canton, and so my experience and expertise can be most easily defined geographically. There are, however, some linguistically relevant reasons, too, why I have chosen a rather neutral areal definition. The idiosyncrasies that will be discussed in this thesis, just as many others, differ enormously with regard to their areal and generational distribution. Some archaisms that happen to have survived in Neuchâtel French may also be present in other parts of Switzerland as well as Belgium, Southern France or Canada. Other characteristics might be more regional, but still shared by different areas within Switzerland. Other details seem to be very local (see also Avanzi et al., 2012). And then we still have questions about the divergences between the generations, which are greater with respects to some properties than others. To define which of the characteristics that we will be discussing are shared by what other dialect groups, and to define them dialectologically accurately, is not only impossible for our purposes, but not especially useful either, since we are concerned with the synchronic workings of a system/set of systems rather than the classification of phenomena into dialectal groups, however interesting this latter question may be. It seems, therefore, more sensible to define the linguistic variety without any preconceived notions of dialectal affiliation, but to stick with the rather imprecise, but at least neutral term of Neuchâtel French. Still, it is very likely that some of the data discussed in the following thesis is not shared by all native speakers from that canton.

The other term to be expanded on are the high vowels. Here, we do not run into problems of definition, since we refer to what is generally meant by high vowels, i.e. the set of vowels where the body of the tongue is highest within the oral cavity. It is rather the choice of this group to the exclusion of other vowels that needs justification. Again, there are pragmatic reasons motivating the choice. To cover the whole vocalic system of Neuchâtel French would certainly be an interesting and maybe more promising enterprise. To give it its due diligence, however, one would need more space than is appropriate for this thesis, the reason being that the non-high vowels share most of the behaviour of the high vowels but show additional properties, including alternations of vowel quality that complicate the picture significantly. Moreover, it is in exactly those areas where the data becomes muddier and dialectal mixing becomes even more pervasive, as far as I can tell. The high vowels naturally give a “purified” picture of the vowel system, without the very interesting but messy facts added by non-high vowels. That this is the case is an interesting question in itself and adds to the debate of what the properties and representational status of non-high vowels are. For this thesis, however, we will start this endeavour by investigating the high

vowels. As will become clear, there are enough mysteries to be uncovered here anyway. This will not prevent us from making reference to non-high vowels when needed. In fact, there are certain cases where non-high vowels provide crucial evidence for issues pertaining to both, themselves and the high vowels. I hope that I have been able to identify this evidence in at least most cases, which are then discussed in the text. It is, however, sometimes difficult to fully grasp an aspect of a system if the complete system is not known. Therefore, I will give an overview of the complete vowel system where the basic properties and behaviours are illustrated.

The data used in this thesis is of different origin. The observations are generally based on my experience as a native speaker of this variety of French. To confirm these, I have used a mixture of methods. Most influential is probably the pool of observations I have made throughout the years concerning this variety of French. These consist almost exclusively of linguistic data from native speakers in natural contexts. To add to those observations, I have discussed some of the issues with native speakers directly. In cases where the data was not entirely clear to me, I asked native speakers to produce certain words or sentences. These “elicitation tasks” were all conducted in informal settings. Together with the other types of evidence, one can gather a rather complete picture. I have not used any corpus data for this thesis. First, I am not aware of a corpus of acoustic data for exactly this region. Secondly, controlling for different factors, like age, education or linguistic history of the speakers as well as the contexts of the conversations is almost impossible. With the choice of especially selected informants, however, in addition to the anecdotal data of personal observations “in the field”, as well as my native speaker judgments and conversations with other native speakers, the picture that arises is pretty clear. It is, however, true that large-scale acoustic analyses of native speakers would be tremendously helpful. This is even more true for non-high vowels and some questions regarding consonants. The dialectological literature is only referred to rarely. This is mostly due to the types of questions discussed in this thesis, which are oftentimes too detailed to be featured in the literature. In cases where I could find relevant information in the literature, I have included it. The same holds for experimental studies.

The theoretical discussion of the data will be based on different strands of Government Phonology, mostly its classical interpretation (Harris, 1994; Kaye, 2000; Kaye, Lowenstamm, & Vergnaud, 1985, 1990) and the recent developments of GP 2.0 (Pöchtrager, 2006, 2018, 2021; Živanović & Pöchtrager, 2010). However, many of the points made are translatable into other frameworks as well. To facilitate this, I have tried to separate the empirical observations and the conclusions one may draw from them from the theoretical assumptions tied to specific frameworks.

The thesis will be structured in the following way: In chapter 2, I will describe the vowel systems of Standard French as well as Neuchâtel French in their entirety, followed by some remarks about their diachronic evolution. These will not be detailed analyses, but should suffice to give the reader an understanding of the phonology of French in general, and the points of interest of Neuchâtel French specifically. Then, I will go on to describe the high vowels of Neuchâtel French in detail, covering most of the empirical data that will be discussed later on. Additionally, the consonants that interact with high vowels will be discussed in this chapter. Chapter 4, then, will be concerned with the theoretical modelling of the data. This section will be split into four main parts: the representations of vowel and consonant quality in classical Government Phonology, the sources of length in high vowels, the possibilities of combining those two aspects in GP 2.0, and, lastly, some unexpected cases of vowel length. A conclusion completes the thesis.

2 Preliminaries

2.1 The Vowel System of Standard French

Contemporary French, as it is spoken by educated people throughout the francophone world is said to be rather homogeneous (Batchelor & Chebli-Saadi, 2011). This might be even more true of continental French. To a large part, this is the result of long efforts to “purify” the language by eliminating all varying or “non-standard” elements — a trend which became serious in the 17th century (Batchelor & Chebli-Saadi, 2011; Guiraud, 1968; Marchello-Nizia, Combettes, Prévost, & Scheer, 2020; Rey, Duval, & Siouffi, 2007). It is no coincidence that the *Académie Française* was created in 1634/35 (Marchello-Nizia et al., 2020; Rey et al., 2007), which probably still is, just as back then, the most influential institutional body to continue this endeavour.

However, there are certain aspects of the French language that have remained local. Besides lexical peculiarities, it is certainly in the phonology, more precisely in the vowel system that we can look for variation.

Since the goal of this thesis is to look at some of those deviations, it is useful to give a quick overview of the vowel system of Standard French first. What is to be considered as Standard French is a complicated question, of course. Some sources, like Walter (1977), define it as a fluid, rather eclectic summary of various differing idiolects. This is probably the best approximation we can make, and even more traditional sources admit to a certain amount of variation (see e.g. Dauzat, 1947; Grevisse & Goosse, 2011).

Most of the literature has a structuralist basis, putting most emphasis on contrasts between certain vowel pairs. This is, indeed, an interesting matter, since micro-variation in these areas is quite common. It is, however, also true that some interesting observations might have been lost in these works. There is no way to say for certain if, for instance, some length distinctions that are entirely dependent on the context were present but omitted, or just not attested.

The following presentation of the Standard French vowel system will be a summary of the inventories proposed by some descriptions of the phonology of French as well as some pronunciation dictionaries. No exhaustive presentation is intended, rather an overview over the broad similarities and differences. For an extensive, even though slightly outdated bibliography, see Côté (2005).

A rather standard view of the system of oral vowels as a whole is given in table 1, following Walter (1977, p. 39).

Long	Front unrounded	Front rounded	Back
	i	y	u
	e	ø	o
ɛː	ɛ	œ	ɔ
	a		ɑ

Table 1: Standard French oral vowels (Walter, 1977)

This picture, however, is deceiving. It is true that all these vowels are contrastive, but not in all contexts. Thus, Walter provides the following, more detailed explanations. The system for absolute final position looks as follows, according to Walter (1977, p. 40).

Front unrounded	Front rounded	Back
i	y	u
e	ø	o
ɛ		
a		ɑ

Table 2: Standard French final oral vowels (Walter, 1977)

As we can see, the open mid vowels lose three of their four distinctive members in this position with only /ɛ/ surviving and still forming a contrast with /e/.¹ On the other hand, closed syllables, final and non-final, maintain a contrast between all open mid vowels, but prohibit /e/.

Long	Front unrounded	Front rounded	Back
	i	y	u
		ø	o
ɛː	ɛ	œ	ɔ
	a		ɑ

Table 3: Standard French oral vowels in closed syllables (Walter, 1977)

Lastly, non-final open syllables show all vowels except /ɛː/, although certain contrasts, like /e/ vs. /ɛ/ are unstable and not maintained by many speakers.

Interestingly, Walter mentions some interactions of vowels with following consonants. Specifically, a final /r/ consistently causes lengthening of the preceding vowel and sometimes lowering of mid vowels. The same lengthening effect was not found for other consonants (/v, z, ʒ, j/) which are sometimes said to behave identically to /r/ in this regard. As we will see, these question are highly pertinent for Neuchâtel French as well.

Martinet and Walter (1973) give a very similar picture, with some slight differences concerning /e/, /ɛ/ and /ɛː/ in non-final syllables. With regard to lengthening before certain consonants, the authors note the same phenomenon, namely a consistent lengthening of any vowel before final /r/, less consistently before final /v/, /z/ or /ʒ/, and least of all before final /j/.²

Warnant (1968) gives no systematic overview of the sytem he transcribes, but the transcriptions show the following vowels:

Front unrounded	Front rounded	Back
i	y	u
e	ø	o
ɛ	œ	ɔ
a		ɑ

Table 4: Standard French oral vowels (Warnant, 1968)

Long variants of these vowels only occur before certain final consonants: /r, v, z, ʒ/. The exception is /a/ which is also transcribed as a long vowel in some other cases.³

¹In this thesis, I will use slashes to indicate any kind of mental or at least abstract representation, be it an underlying input form, or the outcome of a process. Square brackets will only indicate concrete utterances. I adapt transcriptions from the literature to this standard.

²The text in the source is ambiguous as to whether /v/, /z/, /ʒ/, and /j/ also have to be in final position. From the context I gather that this should be the case.

³As far as I can see, this only occurs in final syllables.

Tranel (1987) gives the same inventory of vowels, but observes slightly different conditions for length. According to him, any vowel is lengthened before a final /r, z, ʒ, v, vr/, but /a, ø, o/ are lengthened before any final consonant.⁴ As Walter (1977), Tranel also specifies that in final syllables, /ɔ/ and /œ/ get neutralized to their more closed counterparts (with the exception of function words ending in /œ/⁵). In closed syllables, Tranel also observes the absence of /e/. The distribution of vowels in non-final syllables is also discussed, but since it is not immediately relevant, we will omit it here and refer the interested reader to the original source.

Côté (2005) offers an almost identical picture, as do Léon and Léon (1997). The latter, however, include an additional vowel, /ə/. This so called *e muet* is notoriously hard to pin down. Whether it is distinguishable from /œ/ on phonetic grounds or just by its phonological behaviour, which is often seen as the only noticeable difference (see e.g. Anderson, 1982) is difficult to say and oftentimes not made explicit in descriptions. The phonological behaviour in question concerns the potential elision of the vowel in certain phonological contexts, e.g. before an immediately following vowel, as well as when followed by a vowel in the next syllable of the same word. There are many restrictions on these potential elisions which differ from one variety of French to the next. In any case, the *e muet* can be elided in those contexts, whereas /œ/ is said to be stable. Whether this definition is circular or not, is not of importance to us. As there exist no special interactions between any of those vowels with the high vowels, we will not pursue this topic any further. Many studies of French, including the ones mentioned in this chapter, deal with the matter, although its intricacies and dialectal distribution (especially for Neuchâtel French) remain somewhat unresolved.

Finally, Juilland (1965) works with the system in table 5. No vowel lengths are marked.

Front unrounded	Front rounded	Back
i	y	u
e	ø	o
ɛ	œ	ɔ
a	ə	ɑ

Table 5: Standard French oral vowels (Juilland, 1965)

As we can see, the general picture is clear and common to all approaches: There are three distinctive high vowels, three distinctive closed mid vowels, and two low vowels, whose differentiation might be unstable in many speakers. The open mid vowels are a major point of debate: Some authors posit three short and one long vowel in some positions. For other speakers, /ɛ/ and /ɛ:/ seem to have merged into the short variant in all positions. /œ/ and /ø/ might also have an unstable boundary in some cases. Most authors agree that some consonants, when in absolute final position, cause the preceding vowel to lengthen. This is certainly the case for /r/, less significantly for /v, z, ʒ, vr/ and not really present for /j/. Other authors, specifically Juilland (1965), do not mention this fact at all. This might be due to dialectal differences in the choice of informants,⁶ or to a more phonemic and/or prescriptive transcription.

All sources agree on the four basic nasal vowels /ɛ̃, œ̃, ɔ̃, ɑ̃/, including the observation that the two front nasal vowels merge into the unrounded version for a significant amount of speakers, especially in the area of Paris (see also Grevisse & Goosse, 2011). There are slight differences in the transcription

⁴Tranel's formulation is slightly different. He speaks of vowels under stress in closed syllables. For simplicity's sake I have decided to convert this formulation into the terms we have used so far.

⁵Note, that this vowel is sometimes referred to as *e muet* or schwa, as will be discussed below.

⁶Although most works claim to be based at least to some degree on educated Parisians.

of the other two nasal vowels, mostly between /ɔ̃/ and /ɔ̃/ on the one hand, and /ã/ and /ã/ on the other. Vowel length on nasal vowels is indicated by some authors, with the distribution seemingly motivated by the phonological context.⁷

A good amount of research has been conducted on other varieties of French, most prominently Canadian French. Although this particular variety shows some interesting parallels to Neuchâtel French, it also shows some considerable differences. I will, therefore, not indulge in the description of Canadian French and refer interested readers to the literature, e.g. the works of Charette (to appear); Côté (2012); Walker (1984).

2.2 The Vowel System of Neuchâtel French

This gives us a good basis for our description of Neuchâtel French. For completeness' sake, the full vowel system will be introduced before we zoom in on the high vowels. This description is the result of my own research on the topic.

The system distinguishes short, long and nasal vowels. The nasal vowels are inherently long, both phonetically and phonologically.

(1)	<table> <tr><td>i</td><td>y</td><td>u</td></tr> <tr><td>ε</td><td>œ</td><td>ɔ</td></tr> <tr><td colspan="3">a</td></tr> </table>	i	y	u	ε	œ	ɔ	a			<table> <tr><td>i:</td><td>y:</td><td>u:</td></tr> <tr><td>e:</td><td>ø:</td><td>o:</td></tr> <tr><td>ɛ:</td><td>œ:</td><td>ɔ:</td></tr> <tr><td colspan="3">a:</td></tr> </table>	i:	y:	u:	e:	ø:	o:	ɛ:	œ:	ɔ:	a:			<table> <tr><td>ẽ:</td><td>œ̃:</td><td>õ:</td><td>õ:</td></tr> </table>	ẽ:	œ̃:	õ:	õ:
	i	y	u																									
	ε	œ	ɔ																									
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i:	y:	u:																										
e:	ø:	o:																										
ɛ:	œ:	ɔ:																										
a:																												
ẽ:	œ̃:	õ:	õ:																									

All these vowels are distinctive, with the exception of the pairs of long mid vowels, which are in complementary distribution (with some rare exceptions). One can argue about the length of the closed mid vowels, especially /e:/. There are some reasons to believe that they are, indeed, long. This contradicts most of the literature which analyses /e/, /ø/ and /o/ as short vowels. I will stick with the view that they are long, which will be reflected in the transcriptions used in the following. Nothing concerning the high vowels hinges on that assumption, however.

Non-high vowels may be long in any syllable, high vowels only in final syllables under specific conditions to be discussed in the next section. All vowels are lengthened (if not already long) before a final /ʁ, v, z/, and front vowels also before a final /ʒ/.

The two sets of long mid vowels are in complementary distribution. In final position, only the long open mid vowels are permissible, before a final /ʁ/ only the open ones. In all other positions, the distribution of each pair is idiosyncratic, but still retains a complementary distribution. Interestingly, if put into a certain order, a “gradual” distribution emerges, as can be seen in table 6.

	/_#/	/_z#/	/_C#/	/_σ/	/_v#/	/_ʁ#/	
e:							e:
ø:							œ:
o:							ɔ:

Table 6: Distribution of long mid vowels in Neuchâtel French

⁷The exact choice is unclear to me. Warnant (1968), for instance, seems to mark nasal vowels in closed final syllables as long (in accordance with the description in Léon & Léon, 1997), but there are some exceptions.

The contexts /_C#/ and /_σ/ stand for “before any final consonant other than the ones mentioned separately” and “in non-final syllable” respectively. In those contexts, the distribution of /œ:/ and /ø:/ is not clear-cut, marked by the light gray coloring. In some rare cases, both vowels occur in the same context, forming quasi-minimal pairs. Some of these examples include onomatopoeic expressions. Generally, the frequency of those vowels is lower than that of others, and examples in certain contexts are scarce, making a clear identification of the distribution difficult. Whether this sheds doubts on their status as complementarily distributed or not will depend on one’s assumptions.

Neuchâtel French only shows one low vowel, transcribed as /a/ in the following, although the exact phonetic nature is certainly up for debate. Distinctions between /a/ and /ɑ/ known from other dialects tend to be represented as length distinctions (see Métral (1977) for an overview of the differences between the Swiss dialects). The status of Neuchâtel French, i.e. it having only one low vowel which shows contrast in length, is also confirmed by an experimental study and seems to be locally restricted (Racine & Andreassen, 2012).

The exact nature of the nasal vowels is difficult to determine. As in Standard French and, to my knowledge, all other dialects of French, there are no high nasal vowels. More surprisingly, it seems to me that there are no low nasal vowels either. What is traditionally transcribed as /ã(:)/ is certainly a more centralized vowel. The exact phonetics are very difficult to determine and might vary slightly across different subdialects. If we try to harmonize our data with the transcriptions generally found, the vowel might be described as similar to the /ā(:)/ of other dialects, which is why one finds this transcription in some sources for Neuchâtel French too, e.g. in Walter (1982) for a speaker from La Chaux-de-Fonds (a city in the canton of Neuchâtel). In my experience, however, it is much more central than that, coming closer to a /ɔ:/ or maybe /ɛ:/ . We will use /ɔ:/ in the following as the best approximation. The length of the nasal vowels is inherent, both phonetically and phonologically (see also Ploch, 1995).⁸

Having discussed the most salient properties of the general vowel system of Neuchâtel French, we will now briefly discuss the role of diachrony, before moving on to the main matter of this thesis: the high vowels.

2.3 Some Diachronic Remarks

Clearly, synchronic phonological behaviour is the result of diachronic change. Sometimes, the lines are blurred between these two dimensions. In the following, I have tried to clarify why the patterns that are discussed should be interpreted as synchronic in nature, not just as the remnants of historical sound changes. It is, however, true that the patterns (and sometimes their analyses) are reminiscent of diachronic processes. These include the lengthening before certain consonants as well as the introduction of length by suffixes, which are historically visible but synchronically zero (on the surface at least). Some of those changes will also be visible in the orthography, due to its anachronistic nature, causing some experimental researchers to base their studies on orthographic generalizations (Grosjean, Carrard, Godio, Grosjean, & Dommergues, 2007; Racine & Andreassen, 2012). An understanding of the diachrony of the French vowel system would certainly guard against such misinterpretations. It is, however, impossible to give an overview over such an extensive topic in this thesis. I refer readers to

⁸One might challenge the view that the distributional evidence is to be seen as a result of the synchronic status of nasal vowels rather than the remnant of the old vowel+nasal sequences, which later developed into nasal vowels. Since these two explanations do not exclude one another, and the question itself is not pertinent to the high vowels, we will not pursue it further.

Fouché (1952); Marchello-Nizia et al. (2020); Meyer-Lübke (1934); Zink (1999) for in-depth treatments of this topic and to Pierret (1994) for a useful overview.

A last note concerning the approach taken to the synchrony-diachrony dichotomy is in order. It is true that the patterns seen today are the result of sound changes of the last few centuries (and sometimes older than that). One would be mistaken to think, however, that the sound changes were identical to the patterns we see today or that what we observe in the language at this stage also came into it at the same time. Fact is, that a number of different, mostly very specific and complex changes took place in certain chronological relations, molding and remolding the underlying phonological structure and rules. These changes can certainly explain (most of) the facts concerning the segment inventory, the presence of certain alternations as well as distributional patterns in the modern language. What they cannot do is capture the system as a whole as it is visible today, neither abstractly nor more concretely as the linguistic knowledge of native speakers. That we are indeed dealing with a system and not just a random collection of historical accidents can be argued from two types of phenomena. First, the regularity of a pattern is a strong indicator that some synchronic process is at work, preventing loan words, new formations etc. from violating the pattern. This is even more relevant in cases where the conditions are not conducive to the preservation of such a pattern, for instance when there are strong analogical pressures present. Second, productive alternations show that a process has to be taking place creating the alternation. Whether an alternation is productive or not is difficult to determine in theory. In practice, however, there are some good indicators. A lack of exceptions as well as the adaptation of new words to the pattern, either in loan words or through productive word-formation processes (inflectional or derivational), must show some kind of synchronic process taking place, in addition to the input pattern, which is, of course, the result of a long diachronic process. I have tried to follow this line throughout this thesis, although one may certainly disagree with some of the specific assumptions made.

3 The High Vowels of Neuchâtel French

3.1 Distribution

The three high vowels of Neuchâtel French are /i/, /y/ and /u/. In their short form, their distribution is almost unrestricted. They are contrastive in all these positions.⁹

⁹A few comments are in order concerning the transcriptions. The examples are given phonologically first, followed by an English translation and the French orthography in parentheses. Verbs will be translated as follows: the English infinitive preceded by 'to', followed by a designation of the verbal form after a comma, if the French original is not an infinitive itself. In that case, only the English infinitive is given. If an English translation is given that is ambiguous between verb and noun, the presence or absence of 'to' is decisive.

/-/ will mark morpheme boundaries (when necessary), /=/ marks clitic boundaries.

For issues pertaining to the transcription of non-high vowels, see chapter 2.2. Generally, nothing of importance for our purposes hinges on the decisions taken in those cases.

Lastly, the nature of /ɐ/ is rather complex and different transcriptions might be justified. We will stick with /ɐ/ in all cases. This point will be discussed in more detail in section 3.4.2.

(2) Word-finally

- a. /li/ 'bed' (<lit>)
- /ʒi/¹⁰ 'gypsum' (<gypse>)
- b. /ly/ 'to read, PTCP' (<lu>)
- /ʒy/ 'juice' (<jus>)
- c. /lu/ 'wolf' (<loup>)
- /fu/ 'crazy' (<fou>)

(3) Final syllable

- a. /biʃ/ 'doe' (<biche>)
- /pil/ 'battery' (<pile>)
- b. /byʃ/ 'log' (<buche>)
- /pyl/ 'pullover, sweater' (<pull>)
- c. /buʃ/ 'mouth' (<bouche>)
- /pul/ 'chicken' (<poule>)

(4) Non-final syllable

- a. /kite:/ 'to quit' (<quitter>)
- /ivɛːʁ/ 'winter' (<hiver>)
- b. /ʃaʁkɥtje:/ '(pork) butcher' (<charcutier>)
- /yvy/ 'uvula' (<uvule>)
- c. /kute:/ 'to cost' (<coûter>)
- /uvɛːʁ/ 'open' (<ouvert>)

The positions in which short high vowels do not occur are: before final /ʁ/, /v/ or /z/, and for the front high vowels additionally before final /ʒ/.

(5) a. *(-)iʁ#

b. *(-)yʁ#

c. *(-)uʁ#

(6) a. *(-)iv#

b. *(-)yv#

c. *(-)uv#

(7) a. *(-)iz#

b. *(-)yz#

c. *(-)uz#

(8) a. *(-)iʒ#

b. *(-)yʒ#

c. ✓(-)uʒ#

Exceptions are very rare. The only example I have been able to find so far is the following.

¹⁰The pronunciation of <gypse> is regional and probably quite old-fashioned. The standard pronunciation would be /ʒips/.

(9) /lyʒ/ ‘sled’ (<luge>)

For non-high vowels, more exceptions exist. They are still marginal, however. There do not seem to exist any exceptions concerning /ʁ/. It is, also in other respects, the most regular out of these four consonants.

The long high vowels are restricted in their distribution. Strikingly, they occur in the three/four contexts prohibited for short vowels.

(10) /-ʁ#/

- a. /pi:ʁ/ ‘worse’ (<pire>)
/si:ʁ/ ‘wax’ (<cire>)
- b. /py:ʁ/ ‘pure’ (<pur>)
/sy:ʁ/ ‘sure’ (<sûr>)
- c. /pu:ʁ/¹¹ ‘for’ (<pour>)
/su:ʁ/ ‘deaf’ (<sourd>)

(11) /-z#/

- a. /kʁi:z/ ‘crisis’ (<crise>)
/vali:z/ ‘suitcase’ (<valise>)
- b. /by:z/ ‘buzzard’ (<buse>)
/ɛksky:z/ ‘apology’ (<excuse>)
- c. /du:z/ ‘twelve’ (<douze>)
/ɛpu:z/ ‘wife’ (<épouse>)

(12) /-v#/

- a. /ʁi:v/ ‘shore’ (<rive>)
/lɛsi:v/ ‘laundry’ (<lessive>)
- b. /ky:v/ ‘vat’ (<cuve>)
/ɛfly:v/ ‘effluvium’ (<effluve>)
- c. /du:v/ ‘moat’ (<douve>)
/lu:v/ ‘she-wolf’ (<louve>)

(13) /-ʒ#/

- a. /ti:ʒ/ ‘stem, stalk’ (<tige>)
/pʁɛsti:ʒ/ ‘prestige’ (<prestige>)
- b. /ʒy:ʒ/ ‘judge’ (<juge>)
/ʁ(œ)fy:ʒ/ ‘refuge’ (<refuge>)

The consonants in question, /ʁ, v, z, (ʒ)/, will be referred to as lengthening consonants (LeCs) in the following.¹² The same consonants do not cause any lengthening if they are not in final position themselves. This holds for tautosyllabic as well as heterosyllabic combinations.

(14) /ʁ/

- | | | | |
|----|-----------|----------------------|-------------|
| a. | /miʁwa:ʁ/ | ‘mirror’ | (<miroir>) |
| | /viʁil/ | ‘virile’ | (<viril>) |
| b. | /ysyʁpe:/ | ‘to usurp’ | (<usurper>) |
| | /pyʁe:/ | ‘mash’ | (<purée>) |
| c. | /kuʁt/ | ‘brief, short, fem.’ | (<courte>) |
| | /kuʁi:ʁ/ | ‘to run’ | (<courir>) |

(15) /v/

- | | | | |
|----|-----------|--------------|-------------|
| a. | /livʁe:/ | ‘to deliver’ | (<livrer>) |
| | /aʁive:/ | ‘to arrive’ | (<arriver>) |
| b. | /kyʁle:/ | ‘to case’ | (<cuveler>) |
| | /kyʁe:/ | ‘cuvée’ | (<cuvée>) |
| c. | /kuvʁi:ʁ/ | ‘to cover’ | (<couvrir>) |
| | /uvʁe:ʁ/ | ‘open’ | (<ouvert>) |

(16) /z/

- | | | | |
|----|------------------------|---------------------|------------|
| a. | /izʁaɛl/ ¹³ | ‘Israel’ | (<Israël>) |
| | /vize:/ | ‘to aim’ | (<viser>) |
| b. | /myzle:/ | ‘to muzzle (a dog)’ | (<muser>) |
| | /yze:/ | ‘to use’ | (<user>) |
| c. | — | — | n.a. |
| | /kuzy/ | ‘to sew, PTCP’ | (<cousu>) |

¹¹The vowel of this preposition might be shortened in a sentence context due to its low prosodic prominence. In isolation, the vowel is long.

¹²In the following, the term lengthening consonant/LeC must always be understood in relation to the preceding vowel. When talking about /i/, for instance, LeC refers to /ʁ, v, z, ʒ/. When talking about /u/, it refers to just /ʁ, v, z/. LeC is to be understood as “those consonants which force the lengthening of the vowel in question”.

¹³This is probably a marginal pronunciation. The standard would be /izʁaɛl/.

- (17) /ɜ:/
- | | | | |
|----|---------|-----------|------------|
| a. | — | — | n.a. |
| | /piʒõ:/ | ‘pigeon’ | (<piʒeõ>) |
| b. | — | — | n.a. |
| | /syʒɛ:/ | ‘subject’ | (<sujet>) |
| c. | — | — | n.a. |
| | /buʒi:/ | ‘candle’ | (<bougie>) |

In this list, examples with the suffix /-mõ:/ (<-ment>) are omitted. The reason is that I suspect this suffix to behave strangely in some respects. For instance, it appears to have the tendency to preserve a preceding /œ/, which would normally be elided, after coda-onset clusters.¹⁴ Similarly, I have the impression that a permissible long high vowel before a final LeC might be preserved by some speakers, even when the suffix /-mõ:/ is attached. I have not tested this assumption with native speakers. It seems plausible to me, however, that a word like <jugement> (‘judgement’) might keep the long /y:/ before the suffix. If this turned out to be true, it would support the evidence from (the lack of) /œ/-elision. Both facts could be explained by assuming that /-mõ:/ is attached at a very late stage in the derivation. Whether these hunches prove correct remains to be seen. To avoid muddying the waters, I have not included any examples involving this suffix.

The other context in which long high vowels can appear is word-finally.

- (18) a. /vi:/ ‘life’ (<vie>)
 /si:/ ‘saw’ (<scie>)
- b. /vy:/ ‘sight, view’ (<vue>)
 /vɛʒy:/ ‘verruca’ (<verru>)
- c. /ʁu:/ ‘wheel’ (<roue>)
 /ʒu:/ ‘to play, 1SG’ (<joue>)

Long high vowels are contrastive in all positions. Word-finally, they are comparatively rare which makes minimal pairs more scarce.

The distributions of long and short high vowels only overlap word-finally. In this position the length contrast is phonemic.

- (19) a. /kʁi:/ ‘to shout, 1SG’ (<crie>)
 /kʁi/ ‘shout, call’ (<cri>)
- b. /si:/ ‘saw’ (<scie>)
 /si/ ‘if’ (<si>)

¹⁴This is only a tendency: /uvɛʁtœmõ:/ (‘openly’, <ouvertement>) is more natural than /uvɛʁtmõ:/ along with other such examples. But some words like /apɑʁtœmõ:/ (‘apartment’, <appartement>) can lose the /œ/ without any problems, resulting in /apɑʁtmõ:/.

- (20) a. /ty:/ ‘to kill, 1SG’ (< tue >)
 /ty/ ‘you, Sg.’ (< tu >)
 b. /vy:/ ‘sight, view’ (< vue >)
 /vy/ ‘to see, PTCP’ (< vu >)

- (21) a. /bu:/ ‘mud’ (< boue >)
 /bu/ ‘end, piece’ (< bout >)
 b. /ʁu:/ ‘wheel’ (< roue >)
 /ʁu/ ‘red’ (< roux >)

In all other contexts, long and short high vowels show complementary distribution. When those contexts are modified via morphological means, one finds alternations between long and short vowels. Specifically, when a suffix is added to an otherwise final LeC, the length of the vowel changes due to the different position of the LeC. Derivational morphology may produce the occasional example of this kind.¹⁵ But inflectional morphology comes to the rescue. The best example comes from the infinitive suffix of the first conjugation: /-e:/. This suffix is added directly to the verbal stem. In the first to third person singular present indicative as well as the third person plural, no overt affix is added which leaves us with the bare verbal stem. If this stem ends in one of the LeCs, this consonant will stand in final position in the finite forms, but not in the infinitive. Since the lengthening only occurs before an LeC in final position, we get a good amount of cases where alternations would be expected. And, indeed, we find exactly those alternations.

- (22) a. /tiʁe:/ ‘to pull, to shoot’ (< tirer >)
 /ti:ʁ/ ‘1SG’ (< tire >)
 b. /ʒyʁe:/ ‘to swear’ (< jurer >)
 /ʒy:ʁ/ ‘1SG’ (< jure >)
 c. /buʁe:/ ‘to fill up’ (< bourrer >)
 /bu:ʁ/ ‘1SG’ (< bourre >)

- (23) a. /aʁive:/ ‘to arrive’ (< arriver >)
 /aʁi:v/ ‘1SG’ (< arrive >)
 b. /kyve:/ ‘to ferment, to sleep (off)’ (< cuver >)
 /ky:v/ ‘1SG’ (< cuve >)
 c. /tʁuve:/ ‘to find’ (< trouver >)
 /tʁu:v/ ‘1SG’ (< trouve >)

¹⁵Most derivational affixes in French are not very productive, making the construction of examples difficult.

- (24) a. /vize:/ ‘to aim’ (<viser>)
 /vi:z/ ‘1SG’ (<vise>)
- b. /yze:/ ‘to use’ (<user>)
 /y:z/ ‘1SG’ (<use>)
- c. /ɛpuze:/ ‘to marry’ (<épouser>)
 /ɛpu:z/ ‘1SG’ (<épouse>)
- (25) a. /diʁiʒe:/ ‘to direct, to conduct’ (<diriger>)
 /diʁi:ʒ/ ‘1SG’ (<dirige>)
- b. /ʒyʒe:/ ‘to judge’ (<juger>)
 /ʒy:ʒ/ ‘1SG’ (<juge>)

These cases illustrate the distributional properties of high vowels with regard to LeCs perfectly. Note that other stem-final consonants never cause such length alternations.¹⁶

- (26) a. /kule:/ ‘to flow, to sink’ (<couler>)
 /kul/ ‘1SG’ (<coule>)
- b. /tʁife:/ ‘to cheat’ (<tricher>)
 /tʁiʃ/ ‘1SG’ (<triche>)
- c. /vise:/ ‘to screw’ (<visser>)
 /vis/ ‘1SG’ (<visse>)
- d. /lyte:/ ‘to struggle’ (<lutter>)
 /lyt/ ‘1SG’ (<lutte>)
- e. /ɛdyke:/ ‘to bring up, to educate’ (<éduquer>)
 /ɛdyk/ ‘1SG’ (<éduque>)
- f. /lupe:/ ‘to miss’ (<louper>)
 /lup/ ‘1SG’ (<loupe>)
- g. /vide:/ ‘to empty’ (<vider>)
 /vid/ ‘1SG’ (<vide>)
- h. /fatige:/ ‘to tire’ (<fatiguer>)
 /fatig/ ‘1SG’ (<fatigue>)

We have already discussed potential cases of a short high vowel before a final LeC (see ex. (9)). Since they are extremely rare, we can discount them as exceptions. The opposite constellation, i.e. a long high

¹⁶This is certainly true for high vowels. There are two verbs in which the low vowel /a/ alternates with its long counterpart before stem-final /s/. The verbs in question are <passer> and <casser>. These are the only cases of “lengthening” without LeC I have been able to find.

vowel before a final non-LeC, proves to be a bit trickier. Firstly, we find some loan words that show this behaviour.

- (27) a. /di:l/ ‘deal’ (<deal>)
 b. /klu:n/ ‘clown’ (<clown>)

These are not too troubling for our analysis since loanwords tend to show some unusual patterns but oftentimes adapt over time.¹⁷ A more concerning phenomenon is the occurrence of long /u:/ before some final non-LeCs.

- (28) c. /vu:t/ ‘arch, vault’ (<voûte>)
 /bu:l/ ‘ball’ (<boule>)
 d. /su:l/ ‘to get drunk, 1 SG’ (<soûle>)
 /ʁu:l/ ‘to drive, to roll, 1 SG’ (<roule>)

It is especially striking that the majority of these examples have /u:/ before a final /l/. One might hypothesize that /l/ is also an LeC, at least for back or high back vowels. The following examples, however, show that this cannot be the case.

- (29) a. /pul/ ‘hen’ (<poule>)
 b. /mul/ ‘mussel’ (<moule>)
 c. /ful/ ‘crowd’ (<foule>)
 d. /kul/ ‘to flow, to sink, 1 SG’ (<coule>)

We also find some minimal pairs in these cases.

- (30) a. /bu:f/ ‘to cork, to plug, to block, 1 SG’ (<bouche>)
 /bu/ ‘mouth’ (<bouche>)

Two of the examples in (28) are finite forms of verbs. In those cases, the vowel stays long in the infinitive as well.

- (31) a. /ʁu:le:/ ‘to drive, to roll’ (<rouler>)
 /su:le:/ ‘to get drunk’ (<soûler>)

Again, such cases produce minimal pairs.

- (32) a. /bu:fɛ:/ ‘to cork, to plug, to block’ (<boucher>)
 /bu:fɛ/ ‘butcher’ (<boucher>)

¹⁷See for instance the word <steak> (‘steak’) which is pronounced /stɛk/, at least for some speakers of Neuchâtel French, but /stɛ:k/ for speakers of other dialects, like Montreal French (Charette, to appear).

To my knowledge, long /u:/ only occurs in non-final syllables when it is located in the final syllable of a verb stem, followed by an inflectional suffix.

To sum up the distribution of short and long vowels, we can state that short vowels occur in all positions, except before a final LeC, these LeCs being /ʁ/, /v/, /z/ and, for front vowels only, /ʒ/. In all of those positions, the corresponding long vowels occur instead, leading to possible alternations, especially in the verbal system. In final position, both long and short vowels are permissible, giving us the only regular examples of minimal pairs between them. Exceptions to these generalizations are rare, the only notable one being cases of /u:/ before non-LeCs, mostly, but not exclusively, /l/.¹⁸

3.2 Nasal Vowels

Another type of alternation can be seen between high and nasal vowels. These are most common in adjectives, where the masculine form ends in a nasal vowel, while the feminine form ends in an oral vowel followed by /n/. The orthography records the historical situation, where the feminine was formed by adding a vowel, thus altering the syllable structure and the nasalization pattern (see Marchello-Nizia et al., 2020). All nasal vowels are non-high in contemporary French, leading to rather opaque correspondences between oral and nasal vowels. Furthermore, different oral vowels may result in the same nasal counterpart, as can be seen in (33b-c).

- (33) a. /bryn/ ‘brown, FEM’ (<brune>
 /brœ:/ ‘MASC’ (<brun>
 b. /fin/ ‘fine, thin, FEM’ (<fine>
 /fɛ:/ ‘MASC’ (<fin>
 c. /mjɛn/ ‘mine, FEM’ (<mienne>
 /mjê:/ ‘MASC’ (<mien>

Even the choice of nasal consonant in an alternating scenario is not predictable based on the nasal vowel. Whereas the vowel /œ:/ alternates with the sequence /yn/ in example (33a), it alternates with /ym/ in (34).

- (34) /paʁfœ:/ ‘perfume’ (<parfum>
 /paʁfyme:/ ‘to perfume’ (<parfumer>

No alternations of /u/ with nasal vowels exist. This is due to historical reasons (see e.g. Ruhlen (1979) for a summary of the development of nasal vowels).

Such gaps in the system, the fact that there are no one-to-one correspondences between oral and nasal vowels and the phonetic disparity between them in most cases are all strong indicators that we are not dealing with a productive process. Considering that the nasalization process, that gives us the

¹⁸There exists a handful of surnames that show a long /i:/ in non-final syllable, e.g. the surname of the French historian *Henri Guillemin*, pronounced /gi:mɛ:/ . In my view, these cases are best analyzed as underlying /ijœ/-sequences. This is also corroborated by the orthography in the case above. The underlying form of the name *Guillemin* would therefore be /gijœmɛ:/ . The /œ/ is then elided by the regular phonological process briefly described in section 2.1. The remaining /ij/-sequence has merged with /i:/ in Neuchâtel French, as can be seen in other lexemes as well, e.g. *filles* (‘girl’), which is pronounced /fij/ in many French dialects, but /fi:/ in Neuchâtel French. Since these cases are extremely marginal and seem to only occur in personal names, I will not discuss them any further.

nasal vowels today, took place already in Old French and that the loss of final nasal consonants had been completed by the 16th century (Ruhlen, 1979), the idiosyncrasies discussed above are not surprising.

I conclude that the alternations between oral and nasal vowels, especially in the case of high vowels, are to be regarded as historical remnants, not as features of the synchronic phonology of French.

3.3 The Semivowels

All high vowels have a consonantal/glide counterpart. That their distribution is not just determined by the phonological context is shown by minimal pairs like the following, taken from Martinet and Walter (1973, p. 32).

- (35) /pɛj/ ‘to pay, 1SG’ (<paye>)
 /pɛi/ ‘country’ (<pays>)

These examples also occur in Neuchâtel French. There is, however, considerable variation across dialects and maybe even idiolects which lexical items have a high vowel and which ones show glides. To illustrate this, I give a few entries from Juilland’s dictionary (in his transcription) first, and the corresponding form in Neuchâtel French second. I only give examples for /i/ vs. /j/ here, since there are more words to pick from. The same type of difference also occurs with /y/ vs. /ɥ/ and /u/ vs. /w/.

- (36) a. /plie/ ‘to fold’ (<plier>)
 /plie:/
 b. /lje/ ‘to tie, bind’ (<lier>)
 /lie:/
 c. /buklje/ ‘shield’ (<bouclier>)
 /buklie:/
 d. /prynje/ ‘plum tree’ (<prunier>)
 /prynje:/

In those cases where Standard French and Neuchâtel French differ, the latter variety oftentimes shows the full vowel. I see no phonological reason why this difference exists in some cases but not in others.¹⁹

All this shows that there is lexical variation but no phonologically relevant distribution. The fact that speakers might sometimes accept both versions, as I suspect, just shows that it might be an unstable distinction in those cases, or that Standard French influence is especially strong there.

More interesting are the cases where we see alternations between glides and high vowels. Such alternations are rare, since in most cases, all forms show a full vowel in Neuchâtel French. A few examples can be found, however.²⁰

¹⁹I have chosen words with /l/ or /n/ preceding the vowel/glide. This is meant to facilitate comparisons between the examples, not to represent a tendency in the data. These sorts of differences arise with all kinds of preceding consonants and even clusters to some extent.

²⁰I am unsure whether parallel cases also exist for the other semivowels/high vowels. The fact that verbs ending in *-ier* are extremely frequent certainly distorts the picture even more.

- (37) a. /ɛtydje:/ ‘to study’ (<étudier>)
 /ɛtydi:/ ‘1SG’ (<étudie>)
 b. /dɛdje:/ ‘to dedicate’ (<dédier>)
 /dɛdi:/ ‘1SG’ (<dédie>)

As far as I can see, this is the only type of real alternation between high vowels and glides to be found within the system of Neuchâtel French.

3.4 The Lengthening Consonants

3.4.1 Interactions with Vowels

So far, we have labeled the group of consonants that only allow long high vowels to precede them, if they are themselves in final position, lengthening consonants, LeCs. We have, however, not elaborated on that term or discussed if it is even lengthening that takes place here.

Let us recap the facts quickly. Before a final /ʁ/, /v/ or /z/, only long vowels appear. Before a final /ʒ/, /u/ is short, but the front vowels /i/ and /y/ are long (see (5) to (8)). There are some very rare exceptions, but let us first look at the evidence for positing this generalization in the first place. Beside the clear distributional evidence, we find alternations in the verbal system that support the above claims. Examples are given in (22) to (25). All these examples show an alternation of vowel length depending on the nature and position of the following consonant. However, this does not give us evidence per se that lengthening is occurring. It could also be the case that shortening in non-final syllables takes place.²¹ The fact that the long high vowels appear only before certain consonants when in final syllable would then have to be explained as a remnant of historical sound changes.²²

Non-high vowels will help us make the picture clearer. They show the same distributional properties with regard to the LeCs as the high vowels, i.e. before final /ʁ/, /v/ and /z/ only long vowels are permitted, before final /ʒ/, front vowels show the same behaviour, although the evidence is less clear here. Accordingly, we also find alternations in the verbal system.²³

- (38) a. /sɛpaʁe:/ ‘to separate’ (<séparer>)
 /sɛpa:ʁ/ ‘1SG’ (<sépare>)
 b. /lave:/ ‘to wash’ (<laver>)
 /la:v/ ‘1SG’ (<lave>)
 c. /ɛkʁaze:/ ‘to crush’ (<écraser>)
 /ɛkʁa:z/ ‘1SG’ (<écrase>)

²¹The few cases of /u:/ in non-final syllable would contradict that (see ex. (31)). Since these are rare and rather irregular, they will pose a challenge to any generalization.

²²The fact that other dialects of French, like Canadian French (Côté, 2005; Walker, 1984), also show lengthening before those four consonants supports the idea that this behaviour is inherited from older periods of French.

²³This holds for all non-high vowels, as is discussed below. To keep the picture as clear as possible, only examples of the low vowel /a/ are given for the moment, since mid vowels show alternations in vowel quality depending on length and position.

Again, one could argue that what we see here is a case of shortening in non-final syllables. However, non-high vowels can appear in their long form in any context,²⁴ even in non-final syllables, which gives us examples like the following.

- (39) a. /ga:ʁe:/ ‘to park’ (<garer>)
 /ga:ʁ/ ‘1SG’ (<gare>)
 b. /kʁwa:ze:/ ‘to cross, to meet’ (<croiser>)
 /kʁwa:z/ ‘1SG’ (<croise>)
 c. /ʃ:ka:vɛ:/ ‘to lay in (casks)’ (<encaver>)
 /ʃ:ka:v/ ‘1SG’ (<encave>)

These examples show that a long vowel does not have to be shortened in non-final syllables. We can conclude, therefore, that for non-high vowels there does not exist a shortening process. Since short vowels are still prohibited before final LeCs, we must assume lengthening. Now, high vowels could, theoretically, be subject to different processes, but by Occam’s Razor it seems most sensible to assume that the same rules apply in both cases. This does not necessarily exclude the possibility of a shortening process taking place additionally, but reduces its likelihood significantly.

The mid vowels show the same behaviour as /a/. They, too, show the same alternations, but may also be long throughout the paradigm.

- (40) a. /ʒɛ:ʁe:/ ‘to handle, to manage’ (<gérer>)
 /ʒɛ:ʁ/ ‘1SG’ (<gère>)
 b. /adɔ:ʁe:/ ‘to adore’ (<adorer>)
 /adɔ:ʁ/ ‘1SG’ (<adore>)

- (41) a. /ʁɛ:vɛ:/ ‘to dream’ (<rêver>)
 /ʁɛ:v/ ‘1SG’ (<rêve>)
 b. /plœ:ʁe:/ ‘to cry’ (<pleurer>)
 /plœ:ʁ/ ‘1SG’ (<pleure>)
 c. /o:ze:/ ‘to dare’ (<oser>)
 /o:z/ ‘1SG’ (<ose>)

There are more exceptions to those generalizations with non-high than with high vowels. As far as I can see, they always involve a short vowel before a final LeC, never an unexpected long vowel.²⁵

²⁴There are some general syllable structural restrictions on all long vowels. They are not of interest to us here.

²⁵The only two cases of unexpected length in non-high vowels I have found are the two verbs <passer> and <casser> mentioned in footnote 16.

- (42) a. /nɛʒe:/ ‘to snow’ (<neiger>)
 /nɛʒ/ ‘3SG’²⁶ (<neige>)
- b. /aʁɔze:/ ‘to water (plants)’ (<arroser>)
 /aʁɔz/ ‘1SG’ (<arroze>)
- c. /ʁɛnɔve:/ ‘to renovate, to refurbish’ (<rénover>)
 /ʁɛnɔv/ ‘1SG’ (<rénove>)
- d. /bave:/ ‘to drivel, to drool’ (<baver>)
 /bav/ ‘1SG’ (<bave>)
- e. /ʁaze:/ ‘to shave’ (<raser>)
 /ʁaz/ ‘1SG’ (<rase>)

Why non-high vowels show more exceptions is unclear to me. This fact underlines the divide between high and non-high vowels, however.

3.4.2 Interactions with Consonants

So far, we have discussed the interactions of the LeCs with vowels. LeCs may, however, also interact with other consonants. Since these interactions all involve voicing, we need to take a look at obstruents in general.

As Dell (1995) and Fagyal, Kibbee, and Jenkins (2006) report for Standard French, there exists a regressive devoicing rule between obstruents that seems to be obligatory within words and at least optional between them. The same holds for Neuchâtel French. To illustrate this point, we will give examples of words in which an /œ/ can be elided for phonological reasons (see the brief discussion in section 2.1). As a result of such elisions, consonant clusters emerge and regressive devoicing takes place.

- (43) a. /ʒœte:/ → /ʃte:/ ‘to throw’ (<jeter>)
 b. /ʒœ=fɛ/ → /ʃ=fɛ/ ‘I do’ (<je fais>)
 c. /dœsu/ → /tsu/ ‘underneath’ (<dessous>)
 d. /dœsy/ → /tsy/ ‘top’ (<dessus>)

Examples of such alternations are rather scarce, but the distributional pattern is clear, as is the morphological evidence. That this regressive devoicing rule only affects obstruents is evidenced by cases like the following:

- (44) /lœsɔ̃:/ → /lsɔ̃:/ ‘lesson’ (<leçon>)²⁷

Fagyal et al. (2006, p. 48) also give the following examples for progressive devoicing of sonorants after voiceless consonants (I adapted their transcription and translation to our standard).

²⁶For obvious semantic reasons, I use the third person here instead of the first. Morphologically and phonologically, they are identical.

²⁷Reduction is only possible in certain phonological contexts, when preceded by a vowel, e.g. the feminine article *la*.

- (45) a. /pli/ ‘fold’ (<pli>)
 b. /kɔmynism/ ‘communism’ (<communisme>)

These pronunciations might be possible for Neuchâtel French in fast speech, but they are not common, as far as I can see, and certainly not mandatory. A sequence of a voiceless consonant followed by a voiced consonant is not excluded in Neuchâtel French. This leads directly to the next observation: Dell (1995) and Fagyal et al. (2006) both report a rather regular regressive voicing assimilation between two consonants, though Dell points out that it might not be mandatory in careful speech. Typical examples are the following (the first from Fagyal et al. (2006, p. 48), the second from Dell (1995, p. 12), transcription and presentation adapted).

- (46) a. /sæɡð:/ → /zgð:/ ‘second’ (<second>)
 b. /dɛfœzɛ/ → /dɛvzɛ/ ‘to undo, to unfasten, 3SG.IMPF’ (<défaisait>)

These examples are also valid for Neuchâtel French, a voiceless pronunciation of the first obstruent being more unnatural in those words. These two examples are, however, high frequency words. The first being a low ordinal number, the second the imperfect of the verb ‘to do’ (plus a reversive prefix).²⁸ In less frequent words/combinations, Neuchâtel French allows a voiceless obstruent to be followed by a voiced obstruent:²⁹

- (47) a. /ʃœval/ → /ʃval/ ‘horse’ (<cheval>)
 b. /il=tœ=vwa/ → /i=t=vwa/ ‘He sees you’ (<il te voit>)
 c. /il=sœ=bu:f (le:z=ɔbɛj)/ → /i=s=bu:f (le:z=ɔbɛj)/ ‘he plugs (his ears)’ (<Il se bouche (les oreilles)>)

Thus, we cannot speak of a regular process of regressive voicing between obstruents in Neuchâtel French. What we have is a process of regressive devoicing which is very regular, and maybe progressive devoicing from obstruents to sonorants, which might just be a coarticulation effect. A voiceless obstruent can, therefore, be followed by any voiced segment; some high-frequency items display exceptions. Sequences of a voiced obstruent followed by a voiceless one are, however, ruled out.

What does this mean for our LeCs? /v, z, ʒ/ participate regularly in the processes described above. Therefore, we will not find sequences of any one of those followed by a voiceless obstruent. Should such an “encounter” happen, the LeCs will devoice. In reality, such clusters will probably be rather rare within a word, due to phonotactic constraints. Across word-boundaries, devoicing is probably not obligatory, but possible. Sequences of a voiceless obstruent followed by one of these three LeCs should be permitted, however. Again, real instances of this are rare because of phonotactics.

The status of /ʁ/ is less clear. One would maybe expect it to behave parallel to the other LeCs. /ʁ/ shows a much greater variation, however. First of all, this consonant is voiceless in Neuchâtel French, especially in final position, as is also supported by Walter (1982) and Racine and Andreassen (2012).

²⁸The prefix before the verb does not change the facts about the voicing assimilation. Without the prefix, that version being more frequent, voicing would take place just the same.

²⁹Examples are very rare. Since clitics are subject to regressive devoicing, seen with the first person clitic <je>, it is reasonable to include their (lack of) evidence for regressive voicing as well.

This pronunciation as /χ/ is sometimes called “/r/ *qui racle*” in the literature (Andreassen, Maître, & Racine, 2010). Besides the phonetic facts, there are also phonological arguments to support this claim. The regressive devoicing rule discussed above is sometimes triggered by /ʁ/.³⁰

- (48) a. /ʒœ=ʁð:tr/ → /ʃ=ʁð:tr/ ‘I come home, I return’ (<*je rentre*>)
 b. /ʒœ=ʁɛaʒi/ → /ʃ=ʁɛaʒi/ ‘I react’ (<*je réagis*>)

This should indicate that the sound /ʁ/ truly is voiceless, phonetically and phonologically, and comes closest to /χ/. However, some speakers do not devoice in those cases. Others show it to a lesser extent. Most troubling of all, even speakers who devoice as in the examples above do not do so in other cases.

- (49) a. /ʒœ=ʁigɔl/ → /ʒ=ʁigɔl/ ‘I laugh’ (<*je rigole*>)
 b. /ʒœ=ʁð:fl/ → /ʒ=ʁð:fl/ ‘I snore’ (<*je ronfle*>)

What the determining factors are for this ambivalent behaviour is not clear to me. I have not found a phonologically conditioned pattern so far. Neither quality or length of the following vowel, nor of the next consonant seem to be decisive. Matters are also complicated by pragmatic effects: It seems that people do not devoice /ʒ/ before /ʁ/ in slower or more careful speech. So, /ʁ/ does not cause devoicing unconditionally, which sets it apart from voiceless obstruents. Still, devoicing sometimes occurs with some speakers.

Even the distributional evidence is ambiguous. /ʁ/ can stand before voiceless obstruents which indicates that it is voiceless itself. On the other hand, when in an onset cluster, it does not cause the preceding obstruent to devoice.³¹

- (50) a. /ʁfɛ:ʁ/ ‘to redo, to remake’ (<*refaire*>)
 b. /ʁpʁɛ:ðʁ/ ‘to resume, to retake’ (<*reprendre*>)

- (51) a. /bʁɛ:f/ ‘branch’ (<*branche*>)
 b. /vʁɛ/ ‘true, real’ (<*vrai*>)

In fact, when directly preceded by an obstruent, /ʁ/ might slightly assimilate to its voicing. /ʁ/ in clusters like /dr/ or /vr/ seems to me to be more voiced than in /tr/ or /fr/, which indicates progressive voicing or devoicing. Progressive voicing would be completely unheard of, progressive devoicing optional, if at all, in other sonorants. Acoustic analyses would be very helpful to verify this suspicion.

Lastly, the distribution of /ʁ/ betrays its historical origins. It is found in the same contexts as /l/, clearly indicating the distribution of the liquid it once was. This sets it apart from the other LeCs, that are fricatives in every respect. The clearest difference can be seen in possible clusters: /ʁ/ can be

³⁰/χ/ would obviously be a more accurate transcription if this consonant is, indeed, voiceless. The evidence is not that clear, however, as will be discussed shortly. To not complicate the transcriptions further, I have decided to stick by the symbol /ʁ/ in all cases.

³¹In (50), both examples could optionally be pronounced with an intervening /œ/, as the orthography suggests.

preceded by all obstruents, apart from sibilants,³² in onset clusters — a typical instance of *muta cum liquida*. Non-sibilant fricatives simply cannot be the second segment in an onset cluster. The sibilant /s/ occurs in many Greek loan words beginning in /ks/ or /ps/. For /z/ and /ʒ/, there are no such cases.

Based on the evidence presented above, the status of /v, z, ʒ/ as voiced fricatives is confirmed. What to do with /ʁ/? The distribution points to a liquid, the phonetics to a voiceless fricative with a limited voicing assimilation after voiced obstruents (seen nowhere else in the system). Phonological behaviour is ambiguous, showing that /ʁ/ might cause devoicing, but not necessarily. We will return to these issues in section 4.2.1.

4 Theoretical Modelling

4.1 The Main Questions

From the description of the facts above, several questions arise that a theory should ideally be able to predict or at least capture. The main issues in my view are:

- Why are long high vowels restricted to final syllables?
- Why are long and short high vowels in complementary distribution in all but one context, namely word-finally?
- Why/how do the lengthening consonants cause lengthening on preceding vowels and why only when they are in final position?
- What is the nature of the asymmetry between back and front vowels?

Whereas the last two of those questions are relevant to all vowels, the first and second are specific to the high vowels. All other (i.e. non-high) long vowels may occur in all syllables and positions³³ and can form minimal pairs with their short counterparts.

In any case, these main objectives are not just relevant to understand the behaviour of high vowels themselves but also their role in the system, as well as their commonalities and differences with all other vowels.³⁴

	High Vowels	Non-High Vowels	Nasal Vowels
Lengthening before final LeCs	✓	✓	—
Length in final syllable	✓	✓	✓
Length in non-final syllable	✗	✓	✓
Long/Short-Contrast word-finally	✓	✓	—
Long/Short-Contrast word-internally	✗	✓	—
Front/Back-Asymmetry	✓	(✓)	?

Table 7: The behaviour of Neuchâtel French vowels

³²As John Rennison points out to me, the word <cerise> ('cherry') will be pronounced as /sɛi:z/. Whether we should analyze this as an underlying onset cluster and therefore a counterexample, or as a case of underlying /æ/ which is elided, is not clear to me, since there are no alternations involving this stem. Due to the lack of parallel cases, one might be tempted to opt for the second possibility.

³³This excludes the long mid vowels which are in complementary distribution with each other.

³⁴I have omitted the evidence for apparently irregular cases of /u:/ from table 7.

The four questions at the outset of this chapter are concerned with issues of quantity and quality. It should be clear by now that these dimensions interact intensely in Neuchâtel French and cannot be separated completely. The quality of vowels and consonants both influence vocalic length, as does syllable position. To dissect this interplay, we will start by discussing quality: What are the representations of high vowels and the consonants they interact with, namely LeCs? To answer this question, we will look at several trends within Element Theory and see the predictions it makes for our Neuchâtel French data.

Afterwards, we shall tackle the issue of quantity and look at proposals concerning syllable structure and the like. We will especially be concerned with the question of how these structures can interact with the qualitative representations of sounds to create the interplay we described in chapter 3.

Then, we will discuss GP 2.0. This variation of Government Phonology closely links the representations of quality and quantity, making them more interdependent than other theories. This is achieved by reducing the primitives of qualitative representations, replacing them with structure. Due to those fundamental differences, GP 2.0 will be discussed in a separate chapter.³⁵

Lastly, we shall examine cases of unexpected long /u:/.

4.2 Classical Element Theory

In the following, we will use classical Element Theory (Backley, 2011; Harris, 1990, 1994; Kaye et al., 1985, 1990) for the representation of sounds. There are independent reasons to prefer this theory in comparison with traditional feature-based theories: The more restrictive nature of the theory and the privative rather than binary status of the variables are among the most important. There is, however, also a more practical reason: Since much of the theoretical discussion will focus on different strands of Government Phonology, which traditionally uses (different strands of) Element Theory, it would be counterproductive to illustrate the representations of sounds in another framework first. This does not stop us from making reference to traditional features where useful.

Four different versions of classical Element Theory will be presented in chronological order. The aim of this overview is to gain insights into Element Theory and to see different implementations and priorities within its boundaries. Our focus will be on the various representations of the high vowels and lengthening consonants of Neuchâtel French. Element Theory in general depends on acoustic as well as phonological properties to establish representations. How these two aspects are weighted differs from one account to another. Backley (2011, p. 5) assumes that “there is a direct mapping between these acoustic patterns and phonological categories in the grammar” whereas Rennison and Neubarth (2003, p. 96) state that their framework is “neither motivated by, nor always directly relatable to, phonetics”. As a result, representations formed for one language might be more easily transferable to another in the view of some authors than of others. This becomes especially relevant in the case of consonants, where acoustic cues become scarce and ambiguous, and more emphasis is generally put on phonological behaviour. This also means that there is no simple translation of the representations given in those articles and books to our French sounds. I will, nevertheless, try to show the confines that each approach sets and how the variability within might be exploited in our case, based on the descriptive data discussed

³⁵The fundamental difference does not lie in the idea of sacrificing the primitives of quality representations in favor of structure. Most strands of Government Phonology follow this type of reasoning to a certain extent, when they use the same elements for vowels and consonants, the difference arising through specific types of syllable structure. What makes GP 2.0 stand out is the extent to which this strand of thought is pursued.

in chapter 3. In some cases, different options for the representation of some sounds will remain for the time being.

4.2.1 Harris (1990, 1994)

The representation of vowels in Element Theory, especially of high vowels, is quite straightforward. As Harris (1994, p. 97) says, it is an “established practice” to assume three basic vowel elements {I}, {U} and {A}. While the third in isolation represents the vowel /a/ and in compound expressions lowness, its absence indicates the highness of a vowel. The other two elements then specify the quality of that high vowel. They can either occur in isolation or combine to form a compound expression.³⁶

- (52) a. {I} = /i/
 b. {U} = /u/
 c. {I U} = /y/

As many other approaches, Harris assumes that, when more than one element is present, one of those must be a head, whereas the others become dependents. This asymmetrical relation can be seen in the phonetic signal as well as the phonological behaviour. In our case, the question is not easy to settle. There is no a priori way to decide whether {I} or {U} should be the head in the expression for /y/. Unfortunately, there is no second /y/ with slightly different acoustic output that we can compare it against. Phonological behaviour is also scarce. We have seen that /y/, just like /i/ but in contrast to /u/, is lengthened before a final /ʒ/. There is only a handful of examples, and one notable exception, namely the word for sled, /lyʒ/ (<luge>). /u:/ on the other hand, also appears in a number of apparently irregular cases, mostly in final syllable before non-LeCs, but also in non-final syllables (before verbal suffixes). /y:/ shows no examples of this. With regard to general distributional patterns, no clear tendencies can be seen, slight asymmetries are probably due to the relative rareness of /y(:)/. All of this taken together, /y/ does seem to pattern more with /i/ than with /u/. We can, therefore, tentatively propose that {I} is the head, not {U}.

The issue of tenseness/ATR is closely related to headedness. Harris’s approach to it is the following: He assumes a neutral element { @ } that is “latently present as a dependent in all vocalic expressions” (Harris, 1994, p. 111). When it is not the head, it does not add a phonetic contribution. When it is the head it can, on the one hand, represent several schwa sounds. On the other hand it can also be used for lax/[–ATR] vowels. The high vowels in Neuchâtel French lack a tenseness/ATR distinction. For the mid vowels, however, the question becomes highly relevant. Whether the two sets of mid vowels should be analyzed as differing in tenseness/ATR is beyond our scope. If one sees the distinction in the mid vowels as one of tenseness/ATR, which is, after all, a reasonable supposition, we should assume the high vowels to be marked with a value for that characteristic, too. Since there are no alternations, vowel harmony processes or the like, we can only go after the phonetic cues to decide which value to choose for the high vowels. It seems to me that they are very much closed and tense. Following this assumption, we

³⁶The notation of element compounds differs widely. In the following, I will give elements in curly brackets. The head of an expression will be underlined and stand in first position. This seems to be the least ambiguous option in our case. If not indicated otherwise, the representations given in the sources discussed will be adapted to this standard.

Another issue is the choice of parentheses for the “translations” of melodic expressions. Given the fact that phonological behaviour plays a major part in the decision of the representations, it seems appropriate to use phonological transcription in their translations as well. Note, that this does not necessarily correspond to the notational choices of the cited sources.

can represent the high vowels as follows. I indicate the dependent { @ } element, too, although this is not really necessary and Harris himself only follows this practice when it is useful.

- (53) a. { I @ } = /i/
 b. { U @ } = /u/
 c. { I U @ } = /y/

The correct representation of consonants is a much more debated area within Element Theory. Both the inventory of elements as well as their characteristics and exact values differ widely. It is generally assumed that the same elements are used in the representation of vowels and consonants, the difference between them originating in syllable structure (see e.g. Backley, 2011; Harris, 1994). For instance, the element {U} will be interpreted as /u/ when appearing in a nuclear/vowel position, but as /w/ in consonantal positions. Nevertheless, some elements that have been proposed seem to target consonants specifically, without obvious uses for vowels (and sometimes vice versa).

Harris (1990) and Harris (1994) differ slightly in some details but the general system employed is the same. The following elements are relevant for the representation of consonants:

- (54) ? : stop
 h : noise
 R : coronal
 I : palatal
 U : labial
 A : uvular, pharyngeal
 @ : neutral³⁷
 L : voiced/low fundamental frequency
 H : voiceless/high fundamental frequency
 N : nasal

Our main interest lies in the representation of the lengthening consonants of Neuchâtel French. The first issue to solve is voicing. Traditional binary features make one's life easy in this regard, either a segment is [+voiced] or [–voiced]. Element theoretic approaches, however, tend to make a three-way distinction: voiced, neutral, voiceless aspirated. The reasoning behind this is the observation that e.g. English voiced stops are, in fact, not voiced at all, but correspond to the voiceless stops in Standard French. The idea then is that this is a neutral consonant and a language can choose to specify a special voiced or voiceless consonant (or both) in addition. To illustrate this thought, a table from Harris (1994, p. 135) is given in table 8.

	Element	English	French
Voiced	L	—	bo 'beautiful'
Neutral	—	<bay>	po 'skin'
Voiceless aspirated	H	<pay>	—

Table 8: Voicing according to Harris (1994)

³⁷In Harris (1990), this element is written as {v}, a convention going back to Kaye et al. (1985).

This categorization from Harris is widespread and makes sense on an acoustic level. In Neuchâtel French, voiceless stops are just as unaspirated as in Standard French and voiced stops are definitely voiced, not just neutral. This would support Harris' analysis. There are, however, some questions remaining. If we assume the voiceless stops to have no element expressing voicelessness in their representation, but voiced ones to have an L-element, we should expect the latter group to be phonologically more active than the former. As we have seen, the evidence is ambiguous at best. It is true that there might be a regressive voicing assimilation, at least in some words. Similarly, /ʁ/ tends to be slightly more voiced after voiced obstruents than after voiceless ones, where it is certainly voiceless. These patterns are not particularly pervasive, though. By contrast, regressive devoicing between obstruents seems to be a rather regular phonological process in the language. This should be impossible if no {H} element indicating voicelessness were present in the representation. Harris is a proponent of Government Phonology, which classically states a *non-arbitrariness principle*: "There is a direct relation between a phonological process and the context in which it occurs." (Kaye et al., 1990, p. 194). If voicelessness spreads, there must be voicelessness in the first place. The traditional wisdom that French is an L-language³⁸ is seriously called into question by the facts of assimilation. In fact, if we take the pillars of Element Theory and of Government Phonology seriously, we would have to conclude that voiceless obstruents are marked with an {H} element.

In an experimental setting, Snoeren, Hallé, and Segui (2006) produced some results that suggest a different picture. They show that for Parisians,³⁹ final voiceless stops tend to assimilate more if followed by an initial voiced consonant than vice versa.⁴⁰ Abdelli-Beruh (2012) shows the same tendency for just word-final /z/ and /s/. This would suggest that it is, in fact, voicedness that is phonologically more active than voicelessness, exactly what we would expect from an L-language. The easy way for us to discount these results is to point out that they cover a different dialect of French. A few other major points are also relevant. Both studies deal with assimilations across word-boundaries. Although it is natural to assume that the same processes take place there as word-internally, this is not certain at all. Secondly, the distributional evidence, as discussed earlier, shows that sequences of voiced obstruents followed by voiceless ones are excluded, the opposite combination allowed. This supports strong regressive devoicing, not voicing. Lastly, the phonological interpretation of the acoustic data is not simple. Snoeren et al. (2006, p. 253) report that "[w]ord-final voiceless stops [...] are more frequently and more completely assimilated than word-final voiced stops". Abdelli-Beruh (2012) entertains the interpretation that the fact that regressive devoicing of /z/ in her study is rate dependant, but voicing of /s/ is not, represents the former being optional, the latter obligatory. This is all indirect evidence and does not clearly correspond to phonological representations. Phonetic factors might play a role, as Abdelli-Beruh also remarks. The evidence that the voiced series is phonologically more active than the voiceless series is, therefore, still not very strong, especially for Neuchâtel French. The phonological evidence shows that, at least word-internally, regressive devoicing is consistent between obstruents, whereas voicing is not. The conclusion that voiceless obstruents have a {H} element is still valid.

The status of the series of voiced obstruents is less clear. We have seen that acoustic properties

³⁸L-languages being languages that have a neutral and a voiced series, H-languages those with a neutral and a voiceless series.

³⁹In one experiment the speakers were native speakers living in Paris for over 10 years, the other experiment involved students studying in Paris. Their linguistic history is not made clear.

⁴⁰They also show that voicing assimilations are partial. How this should be interpreted phonologically is unclear to me.

would suggest that (Neuchâtel) French is an L-language. Regressive voicing is not as regular as one would like, the distributional evidence does not suggest much. The lack of phonological behaviour for an element that is supposed to be present is, of course, less troubling than evidence for phonological behaviour of absent elements. Whatever does not exist can't have an effect, what exists is not forced to have a visible effect. Nevertheless, we would expect cues if an element is present in a representation. More importantly, children need evidence of an element to postulate it in their representations. We are left with the issue of weighing up phonological against phonetic evidence. The latter speaks for an {L} element, the former gives no clear indications. For the moment, we will have to endure this uncertainty.

What can we conclude for /ʁ/? Here, the evidence is even harder to interpret. The phonetics suggest a representation as a voiceless fricative, except for some contexts where /ʁ/ really does seem to become (slightly) voiced. Its phonological behaviour is especially odd. It has the typical distribution of a liquid, sometimes causes devoicing, and assimilates to an obstruent to its left in voicing. With the voiced fricatives it only has the fact in common that they form the set of LeCs together. This idiosyncratic behaviour of /ʁ/ might also be part of the solution, however. table 9 summarizes with which natural classes /ʁ/ overlaps and what sets it apart. *Phonetically voiceless* refers to sounds that are voiceless in an unconditioned environment.

	Liquids (=l/)	Voiced Fricatives	Voiceless Fricatives	/ʁ/
Phonetically voiceless	✗	✗	✓	✓
2 nd member in onset clusters	✓	✗	✗	✓
V.-Ass. to prec. obstr.	(✓)	✗	✗	(✓)
Devoicing prec. obstr.	✗	✗	✓	✓/✗
Before voiceless obstruent	✓	✗	✓	✓
LeC	✗	✓	✗	✓

Table 9: The behaviour of Neuchâtel French consonant classes

This table shows quite clearly how little /ʁ/ has in common with each group. Still, there are trends. Voiced fricatives share basically no traits with /ʁ/ except that they all are LeCs and that they (sometimes) do not cause devoicing. Voiceless fricatives share all properties that have to do with voicelessness, no others. It is with the other liquid that /ʁ/ has the most diverse overlap. Their distributional properties are identical, with regard to voicing they are mostly different but share the lack of regressive devoicing (for the cases in which /ʁ/ does not cause it). Whether /l/ assimilates to a preceding obstruent in voicing is not entirely clear. Some amount of devoicing might take place. The clearest difference is the nature of /ʁ/ as an LeC. The other differences seem to be mostly tied to voicing. In fact, differences related to voicing pop up in all three groups. We have established that the voiceless fricatives are marked with {H}, for voiced fricatives we have not yet made the decision, what about /l/? Phonetically, this sound is obviously very voiced, it only gets rarely and partially, if at all, devoiced after voiceless obstruents. The fact that it can appear directly before a voiceless obstruent is not a sign of it being voiceless as well. The rule of regressive assimilation only targets obstruents. This can be seen with vowels and nasals, which do not get devoiced. Liquids fall into the same category. This is also evidenced by the fact that /l/ never causes devoicing of any kind. This could be seen as evidence that /l/ also contains an {L}. In classical Government Phonology, however, it is generally assumed that sonorants are not characterized by {L}. Instead, they show spontaneous voicing, i.e. their default condition is to be voiced (see e.g.

Harris, 1994).⁴¹

Now, there exists a clear difference in voicing properties between /ʁ/ and the other sonorants, as well as between /ʁ/ and voiceless obstruents. We have three logical options to pursue. /ʁ/ could either be marked with {L} and {H}, only with {L}, or with neither without being spontaneously voiced, as are the other sonorants. The first option is quite improbable. It would imply that /ʁ/ is voiced and aspirated. Neither of those characteristics is present phonetically. The second option seems wrong, too. {ʁ} does not show any hint of being voiced. Other sounds in the system fulfill this condition much more convincingly. This leaves us with the last option which is also the most probable to begin with, considering that /ʁ/ is a sonorant. The default assumption should be that it shares properties with the other members of this group. To assume that it is marked with neither {L} nor {H} should, therefore, not come as a surprise. Its special status comes from the fact that /ʁ/ does not seem to be spontaneously voiced in Neuchâtel French. This could either mean that it is spontaneously voiceless, or simply neutral with regards to voicing. The answer to that question will depend on one's theoretical assumption. It is not overly relevant for our purposes, however. What is important for us is that /ʁ/ has a special status with regards to voicing in that it is unmarked and not spontaneously voiced. I will, therefore, refer to it as a neutral sound in the following, without any theoretical definitions attached to that notion.

Where does this leave us? The acoustic facts about /ʁ/ are quite easily explained. Since there is a lack of voicing (either spontaneous or conditioned by {L}), a voiceless realization is not surprising, especially considering the phonetic variation commonly observed for r-like sounds. The fact that it is the only sound that assimilates to preceding obstruents is explained if all other sounds already have a marking for voice (i.e. contain {L}) or are spontaneously voiced. This would lead us to assume that voiced fricatives are indeed marked with an {L} element. There are three arguments in favor of this step: Firstly, the acoustic data would suggest this representation to begin with. Secondly, if /ʁ/ is neutral and assimilates to preceding obstruents/consonants in voicing, we should expect the same thing from other neutral sounds. Voiced fricatives do not share this behaviour, therefore they cannot be neutral. That they should be marked with {L} and {H} is highly unlikely, as is the suggestion that they are spontaneously voiced, too.⁴² This, again, supports the idea of them being marked with {L}. Lastly, /ʁ/ gets voiced after voiced fricatives. This voicing can only occur if the fricatives are voiced themselves. It is, therefore, only /ʁ/ that is neutral and available for this type of assimilation. Its distribution in clusters is explained when it is regarded as a liquid. Cases where devoicing is not caused easily follow.

We are left with two main issues. First, the question of the LeCs. It should be clear that voicing may

⁴¹Whether this assumption is consistent with the definition of other elements is a different question. Generally, elements are correlated with certain acoustic patterns. These patterns are recognized by children during language acquisition which makes them posit a certain elemental representation. {L} seems to be thought of differently, however. If we want to assume different representations of voicing in obstruents and sonorants, there is no clear correspondence between the acoustic signal and the representation of the sound. If a child hears a voiced segment, it cannot know whether it contains an {L} or not. It has to first analyze the other acoustic components, on the basis of which it categorizes the sound as either an obstruent or a sonorant. Only then can it decide whether the voiced nature of the segment is to be represented by an {L} (in the case of obstruents) or by nothing (in the case of sonorants). This seems to me to be a slight inconsistency in the application of elements and their relationship to the acoustic signal. It is, however, a topic that we cannot pursue further in this thesis. It suffices to say that I would not necessarily exclude Neuchâtel French consonantal sonorants to be marked with an {L} as well. Vowels are differentiated by syllable structural properties in any case.

⁴²If one extended spontaneous voicing to obstruents, this would defeat the object of the notion altogether. Spontaneous voicing is only a useful concept if it correlates with the distinction between obstruents and sonorants. Admittedly, the assumption that /ʁ/ is not spontaneously voiced weakens this separation. It is, however, less problematic to assume that the boundary between spontaneously voiced sounds and those that are not (i.e. neutral and/or spontaneously voiceless sounds) is shifted by one position than to assume all consonants to potentially be spontaneously voiced.

be a, but certainly not the only or most important factor determining whether a consonant will be an LeC. Other characteristics play decisive roles. We will have to come back to this question once we discuss these other factors. For now, there is not much more we can do. The second issue is more pressing: why does /ʁ/ sometimes cause devoicing on a preceding obstruent?

The only cases where /ʁ/ does cause devoicing are ones involving the first person subject clitic /ʒœ/ (<je>), as far as I can see. The clitics in French have some special properties. They are, obviously, unstressable, but more than that, they are subject to all kinds of reductions. The loss of /œ/ in /ʒœ/ is regular in (Neuchâtel) French. Other clitics show special types of behaviour. The second person subject clitic /ty/ (<tu>) loses its /y/ before vowels in colloquial speech. This is the only /y/ that can be elided in a phonologically defined context as far as I can see.⁴³ Similarly, the third person masculine subject clitic /il/ (<il>) loses its /l/ before a following consonant. Again, this loss of /l/ is not observed elsewhere. Lastly, the locational clitic /i/ (<y>) might reduce to a /j/ in some contexts. These irregular types of behaviour do not tell us anything about /ʁ/ per se. But what they show is that it might actually be the clitic that behaves strangely here, not the /ʁ/. If we look back at the cases of /ʒ/-devoicing caused by /ʁ/, several things stand out. Devoicing occurs less, the more careful or slow speech is. Where it occurs, it does not seem to be conditioned by phonological context (alone), i.e. it is not predictable. These characteristics are reminiscent of the patterns we see in reductions of clitics generally. Whether the /l/ of /il/, or the /y/ of /ty/ is elided is not entirely predictable from the phonological context. There are pragmatic (and probably prescriptive) factors that play a decisive role. So, the element sometimes undergoing devoicing before /ʁ/ is one of the clitics, which are known for phonological reductions, and the sources and distribution of the devoicing seem similar to the sources and distributions of clitic reductions. It is, therefore, conceivable, that we are not dealing with devoicing caused by /ʁ/ at all. Instead, it might just be the case that the clitic /ʒœ/ does not only reduce to /ʒ/, but even further to an unspecified palato-alveolar fricative, that is neither voiced (i.e. containing an {L} element) nor voiceless (i.e. containing a {H} element). In other words, the clitic /ʒœ/ can reduce to a neutral fricative. Once this happens, it regains a value for voicing from the next sound, just as it would if it were voiced, due to the regressive devoicing rule between obstruents. If it is followed by a neutral segment, however, there is no value for voicing to be taken over. What we should expect is that the neutral segment surfaces or that it takes its voicing value from somewhere else. In the first case, we could expect the segment to come out rather voiceless, similar to /ʁ/. In the second case other segments should have an influence. As stated above, vowels or consonants following an initial /ʁ/ do not seem to influence the voicing of /ʒ/. What might have an influence are preceding segments. Those would not be within the same phonological word since in clitic chains the subject clitic comes first.⁴⁴ It is possible that neutral /ʒ/ would assimilate to preceding segments in the sentence context. I have not tested this for several reasons. To control how people reduce a clitic within one phonological word is difficult enough, since they oftentimes still use unreduced forms. Within a sentence, this gets even harder. But even if it were possible, the results would still be ambiguous. If it is true that there exists a full version of the clitic /ʒœ/, a reduced version /ʒ/ and an even more reduced one /ʒ/, we can never know whether voicing comes from assimilation or we are just dealing with the less reduced clitic, which is voiced anyways. Moreover, syntactic structure could have

⁴³I cannot exclude that there are some irregular lexemes which delete an /y/ for some analogical or folk-etymological reasons. That is why the formulation “in a phonologically defined context” is used.

⁴⁴This obviously depends on the set of clitics one assumes for French. The set the literature generally assumes for Standard French (see e.g. Angelopoulos & Sportiche, 2021; Belletti, 1999; de Cat, 2007) also represents Neuchâtel French.

an influence on such assimilations in a sentence context, just as it does with *liaison* (see Côté, 2011), since the word preceding the subject clitic can have different syntactic status. To settle this question, a corpus analysis of spoken Neuchâtel French in informal settings would be most promising. Considering all those factors, namely having two reduced versions (one voiced, one neutral) of the clitic, different phonological contexts, and the syntactic factors, we should expect a very messy picture: exactly what we have described in section 3.4.2. This is not directly an argument for the analysis given above, but the fact that the data are so unclear would at least not be surprising. So far, our analysis is as follows. Just like several other clitics, /ʒœ/ also shows an irregular reduction pattern, in addition to the possible elision of /œ/: it can lose its {L} element. In such cases, it assimilates to the following segment with respect to voicing. If the following segment is neutral as well, i.e. an /ʁ/, either neutral /ʒ/ has to surface, maybe as a voiceless /ʒ̥/, or some other information in the sentence context comes to the rescue. One might argue that this line of reasoning is circular if those other determining factors are not clearly defined, but I think this criticism is not valid. We might not understand the distribution of voiceless /ʒ̥/ well, but a simple phonological rule can be excluded due to the inter- and intra-speaker variation found, as well as the pragmatic effects. If we accept the argument above, we should not expect a clear distribution.

One question that does arise in this analysis concerns the behaviour of neutral segments. Once we assume that there exists a neutral /ʒ/ due to reduction, we expect it to behave similarly to our other neutral segment, /ʁ/. This is not the case. Neutral /ʒ/ assimilates to the following segment, /ʁ/ to the preceding consonant. This difference is a consequence of the other natural classes they belong to. /ʒ/ is always an obstruent, and obstruents show regressive voicing assimilation (namely devoicing), just as neutral /ʒ/ does. Sonorants, on the other hand, do not participate in this process. Instead, there is a tendency toward progressive devoicing affecting sonorants (as discussed in section 3.4.2), even though it is probably not completely grammaticalized in Neuchâtel French. Neutral segments follow their usual paths with regard to voicing assimilations: obstruents look ahead, sonorants backwards, which is summarized in (55) and (56).

(55) Obstruents: take over {H} element from following obstruent
if neutral, take over {H} or {L} element from following obstruent

(56) Sonorants: sometimes take over {H} element from preceding obstruent
if neutral: take over {H} or {L} element from preceding obstruent.

We can conclude, therefore, that /ʁ/ is indeed a neutral sonorant, showing the typical distribution for sonorants as well as their assimilation tendencies. The apparent cases of obstruent devoicing caused by /ʁ/ are in fact not assimilations at all, but a lack of them. /ʒ/ can simply reduce to a neutral segment which then takes its value for voicing from the next segment, in the fashion of obstruents. If the next segment is an /ʁ/, no value for voice is obtained and the neutral /ʒ/ surfaces as /ʒ̥/, if no other factors come into play. For some people, neutral /ʒ/ might simply surface as a voiced /ʒ/, explaining why they do not show /ʒ̥/. In these cases, one might expect that /ʁ/ is pronounced (more) voiced as well. Or it could just be the case that for some speakers, /ʒœ/ only reduces to a voiced /ʒ/, never to neutral.

Returning to Harris' proposal, we can now make some statements about the representations of our LeCs. We have not discussed how to assess headedness yet. Harris (1994) only points to headedness in relation to the question of how to differentiate strident and non-strident fricatives and affricates. Strident

sounds have the element {h} as their head, since they are ‘noisier’. Non-stridents have {h} only as an operator/dependent.

Taking all the evidence gathered so far together, and following the definitions of elements in Harris (1990, 1994), we can assume these representations of the three fricative LeCs of Neuchâtel French:

- (57) a. {h L R} = /z/
 b. {h L R I} = /ʒ/
 c. {h L U} = /v/

It is more difficult to ascertain the representation of /ʁ/. Harris (1994) specifies the elemental makeup of three different types of /r/. A tapped /r/, a dark approximant or a clear approximant. The tap consists of just {R}, the dark approximant {R} plus { @ }, the light approximant {R} plus {I}. The problem we have is that these representations are meant to cover different English dialects, not French. Now, it is certainly possible that the same representations might also be valid for our case, but considering the different phonetic nature of r-sounds in English and French, this might be a stretch. Still, we can narrow in on a solution. Neuchâtel French /ʁ/, being a liquid, should presumably also contain an {R} element. Since Harris assumes that {R} alone will result in a tap, we must add something else to our representation. The {I} element Harris uses for his clear approximant is not a good choice. There is no evidence of French /ʁ/ patterning with palatal sounds, either articulatorily, acoustically or phonologically. For the same reasons, we can also discard {U} as an option. Obviously, we do not want to include any element that adds a specification for voice, since we concluded that /ʁ/ should be neutral. We can also discount the nasal as well as the stop element for obvious reasons. This leaves the elements {h}, {A} and { @ }. {h} would make sense insofar as our /ʁ/ is rather fricative-y in nature. {A} expresses uvular and pharyngeal sounds and therefore matches the place of articulation of {ʁ}. { @ } is used by Harris to express a dark approximant-/r/, i.e. an /r/ that has some velarized or pharyngealized colouring. However, he speaks specifically of /r/ as an approximant, which is rather different from the phonetic nature of /ʁ/. Furthermore, Neuchâtel French /ʁ/ is neither velarized nor pharyngealized, but simply uvular (not even uvularized). All in all, { @ } does not seem well-suited for our purposes either. This leaves {h} and {A}. Combining {R} and {h} should give some kind of coronal fricative, {R} and {A} would not be easily interpretable together, since they express coronality and uvularity respectively. The question of headship only complicates the picture. We might even doubt whether {R} is the right element at all to describe rhotics in general since it normally describes coronals. What becomes obvious in the course of these considerations is how Harris’ system functions at its core: For every place of articulation there is, more or less, one element. The manner of articulation is specified by additional elements, their makeup being determined by looking at lenition processes and the like. Stops are, therefore, the most complex sounds, fricatives follow them etc. As a consequence, the sounds that are oftentimes the last results of lenition processes, e.g. approximants, have the simplest structure and may only contain a place element. This makes it very difficult to express the natural class they all should be part of, since they do not share any elements. Based on the information we have, we have no other choice than to assume {R} to be the basis for rhotics.⁴⁵ Combined with {A} alone or {A} and {h} we might get close to the representation of /ʁ/. How headship should be determined here is unclear.

⁴⁵Even though the choice of symbol for a particular element is obviously arbitrary, it is still telling that Harris chose “R”, indicating that our interpretation might not be completely off.

- (58) a. $\{\underline{h} \text{ L R}\} = /z/$
 b. $\{\underline{h} \text{ L R I}\} = /ʒ/$
 c. $\{\underline{h} \text{ L U}\} = /v/$
 d. $\{h \text{ A R}\} = /ʁ/$

What is immediately obvious is that there is no commonality between the four LeCs other than the appearance of $\{h\}$. They share this characteristic with the voiceless fricatives $/s, ʃ, f/$ which do not cause lengthening. It can, therefore, not be the defining property of LeCs. Other than that, they might be grouped in terms of complexity, all sounds containing at least three elements, given our representation of $/ʁ/$ is correct. This requirement will, however, also be met by most stops. Lastly, we might take a look at the elements that do not occur in the expression. Harris's model contains a rather large number of elements. Listing all of those which do not occur in the above expressions is not useful for the moment. But we will keep this idea in mind and come back to it in section 4.2.5.

Before despairing, let us look at three other element-systems of slightly later date.

4.2.2 Kaye (2000)

Jonathan Kaye's "User's Guide to Government Phonology" gives a concise summary of Government Phonology, including Element Theory. It omits a lot of discussions due to its brevity. Still, it is a useful guide to the theory and gives the then opinions of one of the most eminent phonologists working on Government Phonology.

The set of elements is rather simple, it contains six elements, $\{A, I, U, H, L, ?\}$, as well as the identity element, represented as $\{_ \}$. For vowels, he assumes a similar system to that of Harris. High vowels are marked by the lack of $\{A\}$ and the presence of $\{I\}$ or $\{U\}$ or both, again. Whether these expressions are headed or not will depend on more or less the same discussion as before. We will assume that they all are headed. With regard to $/y/$, Kaye assumes $\{U\}$ to be the head rather than $\{I\}$. This choice is motivated by licensing constraints, which are defined as "language-specific combinatory laws on phonological expression for that language" (Kaye, 2000, p. 2). Owing to the format of the "User's Guide", the point is not discussed further. This leaves us with the following representations for the high vowels:

- (59) a. $\{\underline{I}\} = /i/$
 b. $\{\underline{U}\} = /u/$
 c. $\{\underline{U} \text{ I}\} = /y/$

The principles of consonant representations are the same as usual. The examples given for Mandarin Chinese, English and French are very limited and do not allow for a clear adaption procedure. A tentative approach to characterize the LeCs of Neuchâtel French could look like (60):

- (60) a. $\{\underline{U} \text{ L}\} = /v/$
 b. $\{_ \text{ A L}\} = /z/$
 c. $\{\underline{I} \text{ L}\} = /ʒ/$
 d. $\{_ \text{ A}\} = /ʁ/$

Again, no clear pattern emerges. The amount of elements per expression differs, as do the heads and operators. What they do have in common are the following two characteristics: {H} never occurs in the expressions, {?} never occurs, and neither {A} nor {L} appear as heads, but they may occur as operators. This last point seems rather accidental. It is true for the group of the four LeCs, but also for other sounds in the system. Moreover, the LeCs themselves show no unified behaviour, some of them including {A}, or {L}, or both. The lack of {H} seems more principled. Neither of the four LeCs includes it. Again, this is not a unique characteristic of LeCs. We would assume voiced stops, as well as sonorants to also not include {H}. Finally, the lack of {?} might be more promising. It will depend on the representations we assume for the other sounds, but it is fair to say that all stops will include it, as well as nasals and probably laterals. What we are left with are fricatives, glides, vowels and /ɸ/. Vowels can be excluded due to syllable structural points. Voiceless fricatives could be ignored because they include {H}. This would result in a natural class of voiced fricatives, glides and /ɸ/. In other words, it is the intersection of segments lacking {?} and {H} that defines the LeCs closest so far, even though this class also contains some other sounds.

4.2.3 Rennison and Neubarth (2003); Neubarth and Rennison (2005)

Rennison and Neubarth (2003) give a reduced number of elements with more varied applications depending on their status as vowel or consonant and head or operator. The biggest difference to other systems is the role the functional {F} element plays: in vowels, it expresses what is traditionally defined as {A} element, in consonants the stop element. It can be understood as the most typical expression of both worlds. The overview in table 10 is given in Rennison and Neubarth (2003, p. 100). (ME stands for “melodic expression” which is defined as “[t]he set of elements which are attached to a particular skeletal point” Rennison and Neubarth (2003, p. 101); the asterisk indicates impossible positions for elements.)

Element	ME	As head of ME	As operator in ME
<i>F</i>	C	stop	fricative/spirant
	V	“A” (non-high)	ATR
<i>I</i>	C	i-glide	palatal
	V	“I” (front)	front
<i>U</i>	C	u-glide	labial, “dark”
	V	“U” (rounded)	rounded
<i>R</i>	C	liquid	coronal
	V	* (see §2.5)	* (see §2.5)
<i>H</i>	C	fricative	aspiration
	V	* (see §2.5)	high tone
<i>L</i>	C	nasal	voiced
	V	* (see §2.5)	nasal/low tone

Table 10: Elements and their roles in Rennison and Neubarth (2003)

We do not need to discuss all questions concerning this system. We will focus on the representations relevant to our problem. The high vowels do not pose any difficulties. As one would expect, they are

characterized by the elements {I} and {U} and the lack of {A}. If we want to mark the ATR-ness of the vowels, we have to add an {F}-operator to the expression. Which element should be the head in /y/ still depends on the same arguments as before. Rennison and Neubarth give a strength metric for all elements as head and as operator. The use of this metric is, however, not to determine headship but to motivate what is called C-government, i.e. a form of phonological government between two sylls (their smallest constituent, similar to a CV-syllable) determined by the strength of the respective consonants. In any case, {I} and {U} have the same values in all positions. So there are no theoretical reasons to prefer one over the other as a head. Their assertion in footnote 11 on page 128 that “[i]n a melodic expression consisting of both *I* and *U* and nothing else, the vowel with a *U* head will be more rounded than the *I*-headed vowel” might well be true. However, I do not dare to make a judgment call on this phonetic detail for Neuchâtel French which only has one /y/.

- (61) a. {I F} = /i/
 b. {U F} = /u/
 c. {I F U} = /y/

One may want to argue that the marking for ATR is not necessary since it is not distinctive in high vowels. In this case, one can simply delete the {F}-operator.

The trickier part is, again, the correct representation of consonants. The model of Rennison and Neubarth gives two possibilities to represent fricatives: either one combines an {F} head with an {F} operator, or one simply uses {H} as the head. Elements are generally not allowed to occur as head and operator in the same phonological expression, {F} being the only exception. As the authors point out, in languages which show a voicing contrast in stops that is characterized by an {H} operator, one might want to mirror this image in fricatives. In this case, a {H} element would already be needed for the voicing characterization and, therefore, lead to an analysis of fricatives with an {F} head. As we have discussed before, Neuchâtel French seems to show {H} in voiceless stops as well as {L} in voiced ones. Since fricatives show the same behaviour with regard to assimilations as stops, we should assume the same representations with regard to voicing. Now, it would in principle be possible to have voiceless fricatives that consist of an {F} head and an {F} operator, their voiced counterparts, however, being characterized by an {H} head. This seems very unlikely to me, as this would separate voiced and voiceless fricatives to the point that they could not form a natural class. Still, for completeness sake, I give both options in the following. As for /ʁ/, the system provides a straightforward way of capturing it.⁴⁶

- (62) a. {H R L} or {F F R L} = /z/
 b. {H I L} or {F F I L} = /ʒ/
 c. {H U L} or {F F U L} = /v/
 d. {R} = /ʁ/

⁴⁶The representations of /z/ follow the ones mentioned in the Rennison and Neubarth (2003). The other representations seem to me to be the most straightforward ones, following the definitions given above. There may well be other possibilities to derive these consonants.

Whichever of the two ways of representing fricatives we choose, there are no commonalities with the melodic expression of /ʁ/. Again, the only way of unifying these four sounds into one class is by referring to the absence of certain elements. Depending on the choice of representation of fricatives, all LeCs lack either {F} or {H}. For {H}, the same considerations come into play as before: other consonants also lack {H}. {F} on the other hand, is more difficult to tackle. Due to its abstract nature, quite a few sounds contain it. It is at this point that we need to take a look at Neubarth and Rennison (2005), since it offers a different view on the {F} element.

The proposal of Rennison and Neubarth (2003) has been adapted in Neubarth and Rennison (2005). The greatest changes are the reintroduction of the {A} element, the substitution of the F-element by an empty/identity element “_” and the abandonment of the {R} element. Moreover, Neubarth and Rennison introduce some subelemental properties which help to derive some gaps in the distribution of elements as well as the typological markedness of some melodic expressions. The details are not relevant for our discussion. What matters is that the ordering of elements is not random: The first element of the melodic expression is always the head. I will underline it for readability’s sake (as the authors do in some cases). There are three slots in an ME, separated by commas. The set of elements is: {A, I, U, H, L, _}. {A} takes over the functions of {R} as well as the vocalic parts of the old {F}. The empty/identity element corresponds to the consonantal function of {F}. It’s role in vowels will probably still be related to ATR, but this is not made explicit. Our representations for vowels will therefore be the usual ones, either with or without the empty element as operator. One interesting consequence of the markedness considerations of Neubarth and Rennison is that {I} is a more likely head in vowels than {U}, confirming our assumption for Neuchâtel French. The consonant system is rather similar to the one proposed in Rennison and Neubarth (2003), *mutatis mutandis*. There are still two possibilities to represent fricatives, either by a H head or with the empty element as head and operator. The reasons for choosing one over the other remain the same. Since the {R} element is now eliminated, {A} takes over the role as the element for rhotics as well. We end up with the following picture, which is similar but not identical to the one before. A special issue is the representation of /ʒ/, which is identical to the one of /z/, except for an additional element, either {U} or {I}. Again, there is no a priori way to decide which of the two should be chosen in a particular situation. We have, however, rather strong evidence in our case. /ʒ/ is the only of the LeCs which does not lengthen any vowel indiscriminately, but has its own selection properties. Only front vowels are affected by it. Neither back/rounded vowels, containing {U} nor low vowels, containing {A} are lengthened.⁴⁷ This peculiar affinity for front vowels, i.e. vowels that contain an {I} element, can only be expressed if we assume /ʒ/ to also contain the same element. Opting for a {U} element instead might explain why front and back/round vowels are treated differently — one could imagine some explanations along the lines of OCP violations or the like — but not the differences between front and low vowels. This is only achieved by assuming /ʒ/ to contain an {I} as the additional element.

- (63) a. {H, L, A} or {_, _, L, A} = /z/
 b. {H, L, A I} or {_, _, L, A I} = /ʒ/

⁴⁷This does not exclude a sequence of a long back mid or low vowel followed by a /ʒ/. As explained earlier, non-high vowels can appear as long vowels in any position. This is not evidence for lengthening, however. What we should not expect, and do not find to my knowledge, are cases of length-alternations of non-front-vowels depending on the position (final or non-final) of a following /ʒ/.

- c. $\{\underline{H}, L, U\}$ or $\{\underline{_}, L, U\}$ ⁴⁸ = /v/
- d. $\{\underline{A}\}$ = /ʁ/

The picture that emerges closely resembles the one before. A few slight differences arise in the definition of the place of articulation for the fricatives. The main difference is, however, not obvious. It is the definition of the identity element that has changed. In Rennison and Neubarth (2003), it is essential in the representation of obstruents as well as non-high and +ATR vowels. Since in Neubarth and Rennison (2005) the {A} element has made a comeback, the responsibility for non-high vowels no longer lies with the identity element. This makes voiced fricatives the only class of sounds that have an identity element as well as an {L} as operators. Other than that, all of their properties are shared by some other sounds, e.g. having an identity element as a head, containing an {L}, etc.⁴⁹ What about /ʁ/? It necessarily forms a natural class with the other liquid, /l/, since both contain {A} as the head. This is desirable since it motivates the almost identical distribution of liquids. It does not shed any light on the issue of the LeCs, however. Why these four segments, and just these four, should form a natural class, is as mysterious as before.

4.2.4 Backley (2011)

Backley (2011) uses six elements, which we all have seen already, but not in the same composition. The elements are: I, U, A, H, L, ?. In contrast to other approaches, e.g. Rennison and Neubarth (2003), the definition of the different elements is very much dependent on their acoustic patterns. We should, therefore, expect the makeup of segments to be slightly more transferable between languages.

The representation of vowels is, as one could expect, rather simple again. We find the same two elements, the combination of which results in /y/. Backley does not give any hints as to the headship question. We will, therefore, continue with our assumption that {I} is the head.

- (64) a. $\{\underline{I}\}$ = /i/
 b. $\{\underline{U}\}$ = /u/
 c. $\{\underline{I} U\}$ = /y/

With regard to ATR, Backley is rather minimalistic. He admits that in some languages, like Akan or Wolof, ATR has to be a segmental property since it partakes in harmony processes, is independent of length etc. Already for English he assumes the differences in quality between the short and long vowels to stem from the phonetic interpretation of prosodic properties and, therefore, does not assume different element structures. Considering that Neuchâtel French does not show any changes in tenseness/ATR-ness in the high, low and nasal vowels, and that it is unclear whether the difference in mid vowels

⁴⁸The authors put just {U} as a third option in parenthesis. In this table, they describe the consonant system of Standard German which does not have a /w/. I assume that in languages that differentiate between /v/ and /w/, {U} will only produce the latter.

⁴⁹I have now focused on the second option to represent fricatives. All of what has been said can be translated for the {H} head-fricatives as well. Their uniqueness lies in the combination of an {H} head with an {L} operator. This is not especially surprising, and each of those elements on their own form bigger natural classes. The only difference between the two ways of representing fricatives lies in the relation of those fricatives with plosives. {H}-head fricatives have no elemental similarity to plosives, the ones headed by the identity element share exactly this head with plosives. I do not see any evidence that would favor either view on this matter.

should be considered in this light, we can safely assume that no specific marking for tenseness/ATR is necessary.

The use of elements for the representation of consonants differs slightly from the other proposals we have discussed so far. The elements {I}, {U} and {A} are used to define the place of articulation. The overview in table 11 summarizes the matches between places and elements:⁵⁰

	as head	as non-head
I	palatal	coronal
U	labial	velar
A	guttural, coronal	coronal

Table 11: Places of articulation in Backley (2011)

This is a rather schematic and simplified overview. As Backley points out, even though the elements in his view have clear acoustic correlates, the exact representations might still differ from one language to the next, depending on the specific phonological system. Still, Backley gives some more clues on how to deal with more complex consonants. I will summarize his views on the classes of consonants relevant to our discussion, namely labiovelars, alveolars, palatals and rhotics.

Labiodentals certainly contain the {U} element, just like other labials. In fact, Backley assumes them to also have {U} as a head. Additionally, they contain a non-headed {A} which explains certain neutralization patterns.

The question of coronal consonants is complicated by the fact that they may contain an {I} or an {A}. Backley (2011, p. 92) makes the distinctions in figure 1.

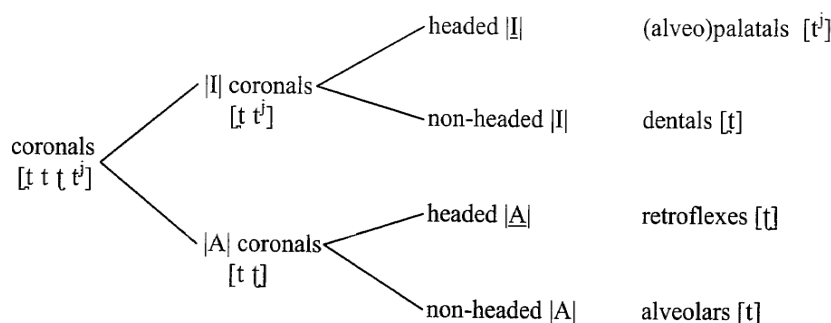


Figure 1: Coronal consonants in Backley (2011)

As Backley points out, French coronals are normally more alveolar than dental, despite conventional descriptions saying otherwise. We can, therefore, assume a non-headed {A} to form the basis of our LeC /z/.

Under the term palatals, Backley summarizes some articulatorily palatal sounds, e.g. [ɲ] or [j], as well as postalveolar/palatoalveolar sounds. There are many different palatalization processes that have as a result everything from coronal affricates to palatoalveolar fricatives. How exactly they are to be represented is quite difficult. Where Backley is certain, however, is the fact that [j] and [tʃ], and therefore their voiced counterparts, too, are headed by an {I}. The main reason is that these are often the result of

⁵⁰For details, especially concerning the representation of different coronals see Backley's chapter 3.

palatalization from alveolars and velars. Both of them seem to lose their respective elements in favor of an {I} head.

Having discussed place of articulation, let us turn to manner of articulation and voicing in Backley's approach. Three of the four LeCs of Neuchâtel French are fricatives. Hence, we will skip the discussion of stops and nasals and directly discuss fricatives. Similarly to some of the approaches above, the element {H} is responsible for raising frequency and, therefore, used in the representation of fricatives. The question of headedness is closely associated with voicing. Backley assumes that {H} as head indicates voicelessness for fricatives and stops in H-languages. Conversely, headed {L} expresses full voicing in obstruents. Backley's approach differs from the other ones we have discussed in that it allows more than one element to be a head. We can, therefore, assume the following representation for the three fricative-LeCs.

- (65) a. $\{\underline{U} \underline{L} A H\} = /v/$
 b. $\{\underline{L} A H\} = /z/$
 c. $\{\underline{I} \underline{L} H\} = /ʒ/$

Backley's view on rhotics is simpler. He assumes most rhotics to consist simply of the element {A}.⁵¹ Whether this {A} is a head or not is more difficult to determine. Languages which differentiate different types of /r/ might make use of different headedness configuration. In our case, there is not much evidence to go after. If we see heads as making "a greater contribution than dependents to the overall acoustic shape of a segment" (Backley, 2011, p. 41), we would probably categorize our Neuchâtel French /ʁ/ as headed. It is phonetically already a fricative, a rhotic could not be made more prominent.

- (66) $\{\underline{A}\} = /ʁ/$

As with the other theories discussed above, there is no way to form a natural class that encompasses the four LeCs and only them based on the elements present in their representations. As always, the three fricatives can be grouped together, here as the segments that have an {L} head and a {H} operator. The absence of certain elements will not help us either, since at least the approximants /j, w, l/ all contain only elements that also occur in our 4 LeCs, according to Backley's analysis.

4.2.5 Conclusion of Literature

4.2.5.1 Summary

The selection of frameworks focused on here is obviously impressionistic in nature. Many other approaches have been brought forward. The four approaches analyzed here present a complete and consistent theory each. An idiosyncratic mixture of different approaches, maybe not even explicitly referred to, is certainly not desirable. In the hope that the choice of frameworks made here is representative enough to give an overview over classical approaches to Element Theory, we will summarize the commonalities and differences in the following.

One major issue that permeates all the approaches discussed above is the relationship between phonological behaviour and acoustic signal. It can certainly be seen as progress that Element Theory has evolved from the rather unprincipled, mostly but not solely articulatorily defined features of SPE

⁵¹The tap /ɾ/ does sometimes not fall into this category, but this is irrelevant for our purposes.

(Chomsky & Halle, 1968) and has, instead, advocated for acoustically defined elements. This provides a clearer definition of each element and its contents as well as a more natural account of acquisition. Once phonological behaviour comes in, however, things get messier. Element Theory wants to capture not only the acoustic properties of sounds and provide them with a more abstract representation. It wants to capture phonological behaviour, like assimilations, reductions, harmonies and the like. In more general approaches, even phonological systems as a whole are to be defined via elements with some constraints, called Licensing Constraints, controlling them (see e.g. Charette & Göksel, 1996; Cobb, 1993; Kaye, 2001). A certain tension arises between this goal and the acoustic description of sounds. A segment might share acoustic properties with X, but phonological behaviour with Y. In such cases, one might either side with the acoustic evidence or with the phonological, or maybe try to satisfy both affiliations. The different approaches presented above fall onto different points on this spectrum. All agree that phonological behaviour is critical, however. This means two things for us and our questions: On the one hand, it allows for a more abstract theory that can then be adapted rather flexibly to concrete problems. On the other hand, one easily runs into problems of circularity when the elements that are supposed to explain the phonological behaviour are motivated by just that behaviour. Acoustic properties could, in principle, help to motivate or challenge those representations. In practice, however, the acoustic facts are often presented when they are needed, but omitted when they do not help the argumentation.

The biggest use of Element Theory in our case is its abstract nature. It can express other natural classes than would be available with simple articulatory or acoustic classes. As we have seen, however, the group of LeCs does not fall out as a natural class in any of the approaches. Let us summarize some commonalities. The treatment of the high vowels is uniform in all frameworks. They consist of the elements {I} and {U} and lack {A}. Due to the shared behaviour of /i/ and /y/ before final /ɜ/, as well as the lack of shared behaviour between /u/ and /y/, we have decided that the latter is probably headed by {I}. Fitting in nicely with this observation, all four theories agree that /ɜ/ includes an {I} element. The representation of /ʌ/ is also rather similar: all authors agree that it is best captured by the same element expressing coronality in /z/. Only Harris' views on a non-English /r/ are not so clear, as we have pointed out. But here too, {R} is most probably at the heart of the representation. There is disagreement on whether the element should be headed or not. As for the remaining questions, there are not many commonalities between the four approaches. We have assumed the fricatives to be marked as voiced, therefore giving them all an {L}. Only Backley assumes it to be a head in this context. Unfortunately, there is no way to capture a common characteristic of all four LeCs. A last resort might be to find a common absence of certain elements. This type of reasoning goes against the very principles of privative features — after all, the great difference to binary features is the impossibility to target the absence of a feature — but one might be able to argue that it is, in fact, all the other sounds that are phonologically active, not our four LeCs. But even here, there is no clear path. Most elements are used in the representations of the LeCs. The only one that is consistently missing is the stop element {?}. It is, however, certainly missing in voiceless fricatives too, as well as in the glides /w/, /ɥ/ and /j/. And depending on the framework, it might also be absent in /l/. The fact that in some varieties of French, /j/ apparently also causes lengthening, is interesting in this light. But in itself, this does not help us for Neuchâtel French. Are there other criteria by which the representations of the LeCs might be considered to form a group? One possible solution to this type of problem is offered by Zdziebko (2015), who discusses Aitken's Law in Scottish English, a process similar to the one we observe with Neuchâtel

French LeCs. We shall discuss his analysis in the next few paragraphs.

4.2.5.2 Zdziebko (2015)

The option that Zdziebko (2015) pursues in his efforts to explain Aitken's Law, also known as the Scottish Vowel Lengthening rule, refers to the complexity of the segments involved. Aitken's Law is quite similar to the lengthening we observe in Neuchâtel French before LeCs and might, therefore, be a helpful comparandum.

All dialects of Scottish English show the same lengthening pattern to some extent (Aitken, 1981, 1984). There are some different formulations of the rule. Typically, the following contexts are set to cause lengthening of a vowel:

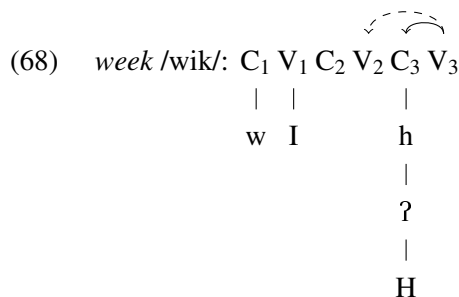
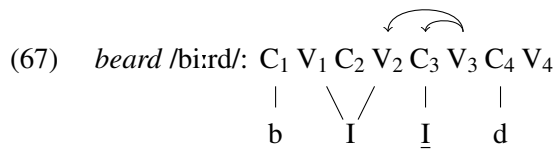
- before /r/
- before a voiced fricative
- before morpheme boundary
- in the open syllable of some words

According to Aitken (1984), almost all vowels are subject to this rule with certain differences between dialects. We will focus here on the description of Standard Scottish English (SSE) in Zdziebko (2015). The picture given there, influenced especially by the findings of Pukli (2006) is the following: The high vowels /i/ and /u/, though less regularly, appear as long vowels in the following environments:

- before /r/
- before the voiced fricatives (/v, ð, z, ʒ/)
- morpheme-finally
- before /g/ and /dʒ/

The similarities to Neuchâtel French are immediately obvious: Lengthening of high vowels before voiced fricatives and /r/. There are also some obvious differences, which we will discuss shortly. Still, it might be enlightening to look at the analysis of the Scottish English data.

Zdziebko's solution is to make the licensing of a long vowel dependent on the complexity of the following consonant. The second nucleus of a long vowel needs licensing from the vowel in the next syllable. Through licensing absorption, the intervening consonant can weaken the licensing potential of the vowel so that it cannot license the long vowel anymore. The consonants relevant in Aitken's Law are therefore the consonants simple enough in their makeup (i.e. consisting of two or less elements) to not absorb too much of the licensing potential of the following vowel. In (67) and (68), representations illustrating this process are given, taken from Zdziebko (2015, p. 157). In the first example, a long vowel is licensed, since the consonant /r/ consists of just one element. The licensing of the consonant and the second nucleus of the preceding long vowel is indicated by arrows. In the second example, however, the licensing of the consonant, again indicated by an arrow, takes up too much licensing potential. The second nucleus, necessary for a long vowel, can, therefore, not be licensed, resulting in a short vowel. This is marked by the dashed arrow.



Long vowels containing the element {A} are licensed in any case. The FN parameter ensures that final long vowels are licensed too.

The main claim of Zdziebko's approach is this: long vowels need licensing from the following vowel. The licensing potential of that vowel can be reduced by a complex intervening consonant, depending on the nature of the long vowel, this weakening of licensing power might be enough to make licensing impossible. What makes the lengthening consonants in Scottish English special then, is their simplicity.

What can we adopt from this analysis for our analysis of Neuchâtel French? The main similarity we find with Standard Scottish is the lengthening of a vowel before a specific set of consonants. The differences are:

- All vowels are lengthened before final LeCs in Neuchâtel French
- The LeCs in Neuchâtel French are only a subset of those in SSE
- Neuchâtel French lengthens only before LeCs if they are in final position
- One consonant in Neuchâtel French, /ʒ/, only causes lengthening on front vowels

The first point is probably the least problematic. Nothing in the system of Zdziebko hinges on the fact that non-high vowels behave differently. In fact, his conclusion is the following: "Vowels with a greater preponderance of A require weaker licensing to maintain double association" (Zdziebko, 2015, p. 160). This is not an exact measurement and one can easily imagine this fact being subject to cross-linguistic variation just as Zdziebko (2015, p. 159) himself sees the point of complexity to be variable: "Languages may select a point along the scale of substantive complexity of consonants after which the amount of licensing that reaches the preceding V is not enough to license double association of melody." It is striking that non-high vowels are indeed more permissive with regard to length in Neuchâtel French, as they can appear in their long form in non-final syllables, for instance. But with respect to LeCs, there are no differences between high and non-high vowels.

The second question regards the set of LeCs. Zdziebko's theory only predicts that long vowels have to occur before simpler consonants if they also occur before more complex ones. The cut-off point is language-specific. SSE draws the line at 2 elements, more than that and licensing absorption is too great. According to Zdziebko's representations of SSE vowels, 10 consonants qualify as having 2 or

less elements in their makeup: /j, w, r, ʃ, z, v, ʒ, g, dʒ, ɲ/. Of those, /ɲ/ does not have the lengthening distribution for historical reasons, according to the author. Why /j/ and /w/ don't cause lengthening is not clarified. I suppose that they do not occur in the relevant environments in SSE. The question of /dʒ/ is quite interesting since it has a complex makeup as a contour segment, i.e. two times two elements, one of them occurring twice, the other two being different. Apparently, this does not constitute too great of an absorption of licensing power. For our purposes, we can luckily dismiss this last case, since /dʒ/ only occurs rarely in loanwords in Neuchâtel French, as does /ɲ/. /ʃ/ does not exist at all. For the other consonants, bigger concerns arise. /w/ does not occur word-finally, but /j/ does, even if restricted in its distribution, and never causes lengthening in Neuchâtel French. /g/ certainly never causes lengthening, not even in other dialects of French. This leaves the four actually lengthening consonants. We might want to dispute one or two of the representations given by Zdziebko and replace them with our own, or slightly redefine the parameters of the threshold, e.g. how to count empty heads etc. These types of arguments could maybe help to get rid of /g/ as a consonant qualifying for lengthening. But nobody will try to argue for a different representation for /j/ than {I}. In SPE, Chomsky and Halle argue that the glides are neither consonantal nor vocalic segments. If French glides did not pattern with other consonants either, we would maybe be able to derive their absence from the set of LeCs. Unfortunately, I see no evidence to back this idea up. In an autosegmental framework like Government Phonology, where the distinction between vowels or consonants lies in the skeletal/syllable structure, there are just two options. Either, an element (or a set of elements) attaches to a vowel-position, or to a consonant-position.⁵² Examples like (35) show clearly that glides contrast with their corresponding high vowels. Therefore, they must be associated to consonant-positions, showing the same behaviour as the LeCs again. If glides cannot be distinguished from LeCs in this way, the problem with Zdziebko's proposal is still unsolved. In fact, I do not see a way in which one can make his proposal work for Neuchâtel French if a consonant with less complexity than the LeCs does not cause lengthening itself.

The question of the final position might be easier to explain for the high vowels than for the whole vowel system. Since high vowels only appear long in final syllables (except for the apparently irregular cases of /u:/), one could assume some general restriction on vowel length, having to do with stress, for instance. Long non-high vowels, however, do appear in non-final syllables, and still, LeCs only cause their lengthening when in final position. This suggests that it is something about the interaction of the final position and the LeC rather than a general restriction on vowel length that causes this distribution.

Lastly, the behaviour of /ʒ/ seems peculiar. From an element perspective, it is striking that a consonant containing the element {I} causes lengthening only on vowels with the same element. It obviously depends on the representation of the other LeCs if they contain an {I} or not, and it is not inconceivable to integrate such a condition in Zdziebko's framework. It is certainly not predicted by it. Having examined the differences between Neuchâtel French and SSE, Zdziebko's proposal for the latter seems untenable for the former. Not just the amount of unpredicted differences is bothersome. It is the fact that the LeCs in French do not form the class of the simplest consonants in the inventory that contradict the core prediction of his work: "A general prediction is that if a system contains long vowels before consonants of a greater substantive complexity, then, all other things being equal, it will also contain long vowels before less complex consonants." (Zdziebko, 2015, p. 159).

⁵²The exact mechanisms and representations involved differ widely across the literature. They do have the fact in common, however, that positions on the skeletal level are either vocalic in nature/associated with vocalic syllable positions, or consonantal in nature/associated with consonantal syllable positions.

This leaves us where we started: nothing sets the group of LeCs, as we have defined them here, apart. There are several conclusions we can draw at this point. It might be the case that we have gone wrong in the assumption that /ʁ/ is a rhotic, for instance. But if we analyze it as a voiced fricative, many other problems crop up, as we have discussed before. Another possibility is that these four sounds have nothing in common, but cause this behaviour for different reasons. To pursue this line of thought further, we will need look at the structural conditions for vowel lengthening to take place. Then, we might be able to see why it is those four consonants that stand apart in causing it. This will be the focus of the next section.

4.3 Length

So far, we have concerned ourselves with the representation of quality of high vowels and LeCs. This is only one side of the medal. The makeup of those segments does not tell us anything about their quantity. The goal of this chapter is to consider how length manifests itself in Neuchâtel French high vowels and how this might interact with the representation of quality discussed in the previous chapter. The data is quite straightforward and can be described via just three basic rules:

- High vowels are necessarily long before a final LeC.
- High vowels may or may not be long when they are in final position themselves.
- In all other contexts, high vowels are short.

We will start our considerations with high vowels in final position. This is due to two reasons. Firstly, the vowels are not influenced by surrounding consonants as in the other contexts. We can, therefore, take a closer look at high vowels in their own right, without having to worry about the role that other segments may play. Secondly, it is the only position where high vowels can be short or long. It is possible that these cases, in which vowel length is optional might tell us something about contexts where it is obligatory. The length of high vowels before final LeCs will be discussed thereafter.

4.3.1 Final Length

The final position is special for high vowels. It is the only pocket within the system where they have the “choice” of quantity, i.e. length is determined lexically/morphologically, not phonologically. Two separate, though related, questions arise. How is length in this context manifested underlyingly, and why does it only surface in this position? These questions may seem synonymous but they are not. If the final position just had some special characteristic which would make high vowels long, then both questions would be answered. However, this would not match the data. The fact that we have some long and some short high vowels word-finally shows that it is not (just) a characteristic of the context that is responsible. Some lexical/morphological properties have to play a role, too. Conversely, if we just had some lexical property that would sometimes force some high vowels to be long, we should expect this to happen in all sorts of positions, but it only happens in final position.⁵³ One may argue that this is just an accidental distribution, a result of diachronic processes. Although this position is tenable and consistent,

⁵³For the moment, I am not considering the exceptional cases of long /u:/ (see examples in (28) and (31)).

there are, in my view, good reasons to be less minimalistic. Such a clear-cut distribution as the one we are talking about, with almost no exceptions, has to point to some underlying pattern.

Another argument in favor of this view comes from non-high vowels. They may be long in any position. If it was the case that there was no underlying reason for the strange distribution of high vowels, one should expect that as an analogy to the other vowels, some long high vowels would have crept in into other positions. Nothing would be stopping them. Especially in the case of alternations caused by LeCs, we should expect reanalysis or paradigm leveling turning a few vowels into underlyingly long vowels, as we find with non-high vowels, if there was no reason for the shortness of high vowels in these contexts. It is therefore clear to me that there are in fact two properties to be looked for: one, the lexical/morphological property that makes some high vowels long without a phonological trigger, and two, the property of the final position, which allows such a lexical/morphological property to surface. It might well turn out that these two questions are more closely related than I have demarcated them here. For instance, it is very much conceivable that the lexical/morphological property can only emerge in final position, due to its nature. Still, there are two questioned to be answered here.

4.3.1.1 Verbs

So far, we have labeled the distribution of short and long high vowels word-finally as unpredictable. This is certainly true from a phonological point of view since we have minimal pairs. There are, however, some morphological tendencies that can be observed, mostly in the verbal system. Verbs of the first conjugation class whose stem ends in a high vowel consistently show a long high vowel in the first to third person singular present indicative and the third person plural, i.e. in those forms where no overt suffix is added.⁵⁴ I will give the paradigms of three verbs that are representative. They are headed by the infinitive.

- (69) a. /sie:/ ‘to saw’ (<*scier*>)
 1SG /si:/ 1PL /siõ:/
 2SG /si:/ 2PL /sie:/
 3SG /si:/ 3PL /si:/
- b. /pye:/ ‘to stink’ (<*puer*>)
 1SG /py:/ 1PL /pyõ:/
 2SG /py:/ 2PL /pye:/
 3SG /py:/ 3PL /py:/
- c. /lue:/ ‘to rent’ (<*louer*>)
 1SG /lu:/ 1PL /luõ:/
 2SG /lu:/ 2PL /lue:/
 3SG /lu:/ 3PL /lu:/

⁵⁴One might argue that the first person plural is actually no longer the standard form agreeing with the personal pronoun <*nous*>, but a form identical to the third person singular agreeing with the pronoun <*on*>, which expresses both, a generic subject and a first person plural subject. So, for instance, <*on voit la lune*> can either mean “One (can) see(s) the moon” or “We see the moon”. I would argue that the traditional form of the first person plural is still present enough, at least in formal speech, to qualify as the/a regular form. If one rather wants to regard the other form as regular, then the second person plural is the only form left with an overt suffix and without a long final high vowel in the first conjugation class.

There are two ways of viewing this phenomenon. In the first approach, one sees the length of the high vowel as underlying in the stem/root. In that case, it would only surface if it was in final position, in non-final position it would be suppressed. The second approach does not view the vowel to be long underlyingly. Rather, it is a short vowel that gets lengthened in those positions in the paradigm. Based on the data we have seen so far, there is no way to decide. There are some verbs, however, which point to a solution.

Some first conjugation verbs also have corresponding nouns built from the same stem/root. Crucially, they are sometimes also built via a null-suffix, i.e. segmentally identical to the first to third persons singular and the third person plural of the verbs. In some cases, those nouns also show a long high vowel, e.g. /si:/ meaning ‘saw’. This tends to support the first approach, namely that the length is underlying in the stem/root. However, there are also cases where the nouns do not show a final long vowel. I only give the noun and the first person singular in the following examples.

- (70)
- | | | | |
|----|-----------|---------------------|--------------|
| a. | /kʁi:/ | ‘to scream, 1SG’ | (<crie>) |
| | /kʁi/ | ‘scream’ | (<cri>) |
| b. | /abi:/ | ‘to dress, 1SG’ | (<habille>) |
| | /abi/ | ‘clothes’ | (<habits>) |
| c. | /saly:/ | ‘to salute, 1SG’ | (<salue>) |
| | /saly/ | ‘salute, hi’ | (<salut>) |
| d. | /atʁiby:/ | ‘to attribute, 1SG’ | (<attribue>) |
| | /atʁiby/ | ‘attribute’ | (<attribut>) |
| e. | /klu:/ | ‘to pin, nail, 1SG’ | (<cloue>) |
| | /klu/ | ‘nail’ | (<clou>) |
| f. | /tʁu:/ | ‘to hole, 1SG’ | (<troue>) |
| | /tʁu/ | ‘hole’ | (<trou>) |

The exact opposite also exists, when verbs of another conjugation class — where no final length is present in the first person singular — have a corresponding noun that does show length.

- (71)
- | | | |
|-------|----------------|---------|
| /vi/ | ‘to live, 1SG’ | (<vis>) |
| /vi:/ | ‘life’ | (<vie>) |

The examples are not especially numerous, but the emerging picture is clear. Length cannot be a property of the stem/root, since we would expect verbs and nouns to show uniform behaviour. Therefore, the length has to be added in the derivation somewhere. Since it is obviously not conditioned phonologically, it must be via a morphological process. This also fits the observation, that it is specific morphological categories that show length. The only condition we have to grant for that conclusion is that the nouns and verbs indeed go back to one stem/root from which they are both derived. I think that the semantics of the examples chosen here is so transparent that this should be our default assumption.

What about cases where the length agrees in nouns and verbs? We must assume that there is a class of nouns which shows the same behaviour with regard to length as first conjugation verbs.

How can this morphologically conditioned length be implemented formally? One option would be to write a morphonological rule that does the job (e.g. a readjustment rule in the terms of Distributed Morphology). For instance, such a rule could state that a final vowel becomes long if it finds itself in the morphosyntactically defined context of 1–3SG/3PL.PRES.IND. It would capture the facts accurately, but there are several disadvantages to this approach. First, it completely ignores one of our two questions from the beginning of this chapter: why does it only happen word-finally? The lengthening process described by the rule is completely arbitrary. No reason is given why lengthening does not take place in non-final vowels in the same morphosyntactic context. Secondly, allowing such rules to cover rather large parts of the language is extremely dangerous, since they are not constrained in any meaningful way. Lastly, such rules violate principles of modularity, at least if formulated in a crude way. We do not want morphological triggers to provoke phonological processes.

Luckily, there is another way to approach our situation, one that does not run into any of the problems of the first option. To illustrate the reasoning, let us go back to the paradigm of one of the verbs of the first conjugation class. This time, however, we will mark morpheme boundaries.

- (72) /si-e:/ ‘to saw’ (<*scier*>)
 1SG /si:- $\emptyset$ / 1PL /si- $\tilde{o}$:/
 2SG /si:- $\emptyset$ / 2PL /si-e:/
 3SG /si:- $\emptyset$ / 3PL /si:- $\emptyset$ /

Length occurs in just those cases, where no suffix is added. This does not seem coincidental. We cannot just assume there to be a suffix that is identical to the stem-final vowel, i.e. /-i/, because the same pattern also arises with other vowels. We need a more abstract type of representation. What I am proposing is that in the first conjugation, the first to third persons singular and the third person plural do not lack a morphological marking, but that their length is the marking. More specifically, they too are marked by a suffix, just like the first and second person plural, the infinitive, etc. The only difference is that this suffix consists only of syllabic structure. What type of representation one prefers here, is not too important for our purposes. To keep things as simple as possible, I will illustrate the idea using simple CV-syllables.

- (73) C V + C V
 | |
 s i
-

The melodically empty suffix is added to the stem which causes the stem-final vowel to spread into the empty vowel position of the suffix. This solution gives us several things at once. First, it explains the morphological pattern of vowel length. This is because the final length of high vowels is just a result of a melodically empty suffix. It therefore has to share the distribution of the suffix, which is morphological in nature. Second, we do not need any special type of mechanism to derive the length (like e.g. readjustment rules or the like), we only need to accept the possibility of empty syllabic material and the spreading of melodic material into those, both of which are commonplace assumptions in autosegmental frameworks of phonology. Third, it elegantly answers the two questions posed at the beginning of the chapter and it does so with a surprising simplicity. What is special about the final position is simply that it is at the end of a word, i.e. that suffixes attach to it. The same effect cannot happen word-internally, because French does not have infixes. As for the lexical/morphological property of those high vowels

that turn long in final position, it is not an underlying property at all. Instead, they acquire this special property in the course of derivation, where an empty suffix is added through morphological processes. In short, this solves the issue of the non-complementary distribution of long and short vowels in final position. What I am claiming is that long and short high vowels are, in fact, always in complementary distribution. In the one place where they seem not to be, namely word-finally, it is because the long vowels are morphologically complex, the short ones are not and so length is predictable again.

The theoretical advantages of this solution should be clear by now. But is it supported by the facts? Two predictions of it come to mind immediately. First, if in the first conjugation empty suffixes cause lengthening of the high vowels they ought to cause the same lengthening on other vowels as well. And second, if we want to do away with underlyingly long high vowels that way, then all final long high vowels must, in fact, be a sequence of a short high vowel plus an empty suffix. The first of those predictions is easy enough to test in principle. In practice, however, there is a lack of possible candidates. Verbs of the first conjugation class whose stem ends in a non-high vowel are extremely rare. I have only been able to find two suitable examples. They do, however, confirm our prediction.

- (74) a. /krɛ:/ ‘to create’ (<créer>)
 /kre:/ ‘1SG’ (<créé>)
 b. /aɡʁɛ:/ ‘to agree’ (<agréer>)
 /aɡʁe:/ ‘1SG’ (<agrée>)

The second prediction is more theoretical in nature. There is no direct way of knowing, of course, whether an empty suffix is present or not. In the case of first conjugation verbs, the distributional evidence and regularity are strong indicators. What about other final long high vowels? Let us first look at adjectives.

4.3.1.2 Adjectives

French adjectives are inflected for gender. The masculine form is usually the simpler form from which the feminine is derived via suffixes. The choice of suffix is, however, not predictable.⁵⁵ One group of adjectives does not show an overt suffix (in the orthography, an <-e> is added). In Standard French, the masculine and feminine forms are identical in those cases. For Neuchâtel French, this is not so clear. There is a clear suspicion that here, too, it is lengthening of the final vowel that is marking feminine agreement. The main issue is that gender agreement in adjectives is not consistently used by all speakers. One sometimes finds the “masculine” form used in a syntactic context that demands feminine agreement. This is the case for all types of feminine marking. If we are now dealing with an overt suffix, it is easy enough to see whether the masculine or the feminine form has been used. If, however, the suffix is not directly observable, but only through indirect evidence like lengthening, it is difficult to know if one is dealing with a masculine form with unusual length or a feminine form, marked with length. Experimental studies have been conducted to check for the distribution of such long vowels in Neuchâtel French (see Andreassen et al., 2010; Grosjean et al., 2007; Racine & Andreassen, 2012). Unfortunately, the two in-depth studies (Grosjean et al., 2007; Racine & Andreassen, 2012) do not investigate specific grammatical categories (like feminine adjectives) but orthographic conventions, i.e.

⁵⁵The anachronistic orthography of French provides clues.

words ending in <-e> vs. words that do not. Since the researchers tried to test minimal pairs, adjectives (and participles, which show the same characteristics of gender agreement) were a popular choice. The tests conducted were either production or perception tests, but always related to an orthographic form. Either the subjects had to pronounce a written form, or they had to write a form down that they heard. An orthographic bias can, therefore, not be excluded. However in one study (Grosjean et al., 2007), the authors also had a group of Parisian French speakers participate. They showed a significantly different behaviour to the one of the Neuchâtel French speakers. One may argue that the results were different because Parisian French shows no length contrast whatsoever, whereas Neuchâtel French does. This could lead the speakers to recognize the longer vowels better, or to be more likely to produce them. But the distribution could, in theory, still be solely due to orthographic influence. This seems like a rather unlikely possibility, given the compelling results. It also assumes a very strong orthographic bias that is even active in perception. Lastly, even if this strong bias were present, the bias still links an additional <-e> to vowel length, which shows that this must be a feature of the variety to begin with. For those reasons, the results strongly suggest that orthographical bias is not the whole story but that we are indeed dealing with a specific property of Neuchâtel French. They show that words ending in an orthographic <-e> were pronounced much longer than those without. This includes the feminine adjectives in comparison to their masculine counterparts. The examples given here are from Grosjean et al. (2007, p. 19). Since they do not provide transcriptions, I have taken the liberty to transpose their examples into the standard used throughout this thesis. The important variable, i.e. length, is obviously transcribed according to the authors results.⁵⁶

- (75) a. /ʒɔli/ 'pretty, MASC' (<ɰoli>
 /ʒɔli:/ 'FEM' (<ɰolie>
 b. /ny/ 'naked, MASC' (<nu>
 /ny:/ 'FEM' (<nue>
 c. /ẽ:du/ 'Hindu, MASC' (<hindou>
 /ẽ:du:/ 'FEM' (<hindoue>)

This looks very much like another case of a melodically empty suffix, this time expressing feminine agreement. If the adjectival stem ends in a high vowel, it is lengthened due to spreading of the vowel into the empty syllable. Crucially, adjectives and participles can show something, that verbs lack, namely stems ending in non-high vowels. We can finally test our prediction: If an empty suffix causes high vowels to spread into it and therefore lengthen, we should expect the same to happen to non-high vowels. And indeed, this is what the experimental studies have found. The examples, this time taken from Racine and Andreassen (2012, p. 180) are, as before, adapted to our transcription style.⁵⁷

⁵⁶In all of the studies mentioned above, length differences are measured, but not translated into phonological entities, i.e. long vs. short vowels. I have translated the statistically significant length differences in those terms in the transcriptions.

⁵⁷The distribution of mid vowels given by the authors contradicts the description of Neuchâtel French we gave in chapter 2.2. There might be different reasons for this discrepancy, including the rather unclear distribution of feminine agreement for some speakers. For this thesis, however, not much hinges on these issues and in the following I have reproduced the vowel qualities as they are indicated by the authors.

- (76) a. /ka:ʁe/ ‘square, MASC’ (< carré >)
 /ka:ʁe:/ ‘FEM’ (< carrée >)
- b. /vʁe/ ‘true, MASC’ (< vrai >)
 /vʁe:/ ‘FEM’ (< vraie >)
- c. /blø/ ‘blue, MASC’ (< bleu >)
 /blø:/ ‘FEM’ (< bleue >)

This further supports our hypothesis that what is causing the length of final high vowels in those cases is a melodically empty suffix into which the adjacent vowel spreads.

Adjectives give us yet another reason to adopt this analysis. As mentioned earlier, the feminine form of an adjective is not predictable given the masculine form. Different suffixes occur: /-z, -t, -d, -n (plus denasalization of the preceding vowel)/ among others. Most forms are not suppletive, however. This means that we do not necessarily have to assume that all feminine forms are simply stored. We can also specify the feminine suffix via a diacritic in the lexical entry of the adjectival stem. For instance, /pœti^l/ is marked as belonging to the “t-class”, i.e. the feminine is marked with the suffix /-t/. This diacritic could be defined in purely morphological terms. But there is also a phonological option. These types of consonants have generally been called latent consonants (in contrast to fixed consonants) in the literature, and have been assumed by different linguists for a long time for French, see Tranel (1995) for an extensive survey. In an autosegmental framework, one can easily imagine a representation where more melodic material is present than can fit onto the syllabic structure. Let us, for instance, imagine that the representation for the adjective <petit> (‘little’), instead of having an abstract diacritic for the morphological class, includes an additional consonant that has no place on the syllabic template.

- (77) C V C V
 | | | |
 p œ t i t

Here, an interesting parallel opens up. The same type of latent consonants, in whatever framework one wants to define it, has been invoked for another issue as well. *Liaison* is the phenomenon where certain consonants appear in order to avoid a hiatus at word boundaries.

- (78) /dø:/ ‘two’ (< deux >)
 /ami/ ‘friend’ (< ami >)
 /dø:zami/ ‘two friends’ (< deux amis >)

The explanation that is oftentimes given for this phenomenon (see Morin (2003); Tranel (1995) for overviews), is that a latent consonant is present in the representation of the first word, but can only surface when it finds a syllabic position to attach to — mutatis mutandis for different theoretical implementations.⁵⁸ This requirement is fulfilled by words beginning in vowels, since their initial onset-position is empty.

⁵⁸Note that Morin (2003) himself favors another solution.

- (79) C V C V C V
 | | / | | |
 d ø : z a m i

Interestingly, some adjectives also show *liaison*. And, indeed, the same consonant appears in the *liaison* context as in the feminine form.

- (80) C V C V C V C V
 | | | | / | | |
 p æ t i t a m i

If the adjective was just marked with an abstract, morphological diacritic that specified the feminine form of the adjective (or its declension class or the like), we would have no reason to expect the same consonant to appear in a morphologically unrelated form (like in the *liaison*-version of that adjective). If, however, there is an underlying /t/ present that just needs a syllable position to attach to, it is expected that in any context where such a position is provided the same consonant should occur.⁵⁹ Why is this relevant to us? Because the necessary requirement for the /t/ to surface in feminine adjectives must be something that provides it with a syllable position in the feminine form but which is not present in the masculine form. In other words, we are talking about an empty suffix.

- (81) C V C V + C V
 | | | | /
 p æ t i t

This is obviously only a preliminary analysis. Especially with regard to *liaison*, several difficulties arise regarding the productivity and phonological status of the phenomenon, see e.g. Morin (2003); Morin and Kaye (1982). The limited data discussed here, however, fits in well with some prominent strands within the literature. And for our purposes the analysis accomplishes two things: Not only does it make the possibility of empty suffixes even more likely, the more evidence from different places we gather. But it significantly simplifies the formation of feminine adjectives. Instead of needing a set of different suffixes, we need only one (for a large part of adjectives) — the melodically empty suffix. It causes length in final vowels and makes final consonants surface which would not have a syllabic position otherwise. All we need to grant is the possibility of melodic information in the lexicon, which does not appear unless some extra syllabic material is provided by context. Once we jump over that hurdle, we can discard abstract diacritics and the like. And we cannot only explain the feminine markings, but also the *liaison* forms of adjectives.

All of this taken together, it seems that feminine adjective formation is another, and even better example of an added empty suffix. And, again, we can reduce the long final high vowels to a morphologically complex structure.

⁵⁹There are some cases, where different consonants occur in feminine and *liaison* contexts. Most prominently, the feminine of /grɛ̃:/ ('big') is /grɛ̃:d/, but in *liaison* context, a /t/ appears instead of a /d/. In other cases, *liaison* shows completely different consonants, which seem to have been generalized from frequent *liaisons*. For a more thorough coverage, see the data in Morin (2003). For our purposes, it suffices to say that these cases exist, but do not constitute the majority. Especially such alternations as between /d/ and /t/ are rare. The question whether regular phonological *liaison* as presented here still occurs or if it is completely morphologized, as Morin (2003) suggests, is another question that we cannot tackle here.

4.3.1.3 Nouns

When we come to nouns, the picture is a bit more muddy. There is a tendency for feminine nouns to end in a long vowel. This, again, can be seen as a result of an empty suffix. In fact, one might even argue that the same suffix is at work as in feminine adjectives, but this is pure conjecture for now. It is striking that I have not found a masculine noun ending in a long high vowel so far. In contrast, most feminine nouns ending in a vowel show a long vowel. But there are some exception. Perhaps unsurprisingly, these are words that did not historically end in an /e/, as can also be seen from the orthography.

- (82) a. /tu/ ‘cough’ (<toux>)
 b. /pɛʁdʁi/ ‘partridge’ (<perdrix>)

All in all, the distribution of long final high vowels seems to at least broadly comprise a morphological class, namely the feminine. But due to the lack of alternations, it is difficult to find any additional evidence. In the case of nouns, we have to make a judgment call. Either, we accept that here too, we are dealing with an empty suffix that causes the length, even though we only have the distributional pattern as evidence. If we assume it anyways, this would allow us to explain all occurrences of long final high vowels. Or we take a more prudent approach and assume those cases to show a real, underlyingly long high vowel. This might be less speculative, but we lose our explanation for length in those contexts and are left with some random contrastive lengths in high vowels. I think that on theoretical grounds alone, the first option is preferable: It allows us to simplify the phonological system significantly by a single, rather unspectacular assumption. In many cases, this assumption is supported by independent evidence, like distributional facts, the behaviour of non-high vowels etc. As a result of the French morphology, there are also some cases where independent evidence is lacking. By Occam’s Razor, we should strive to find a universal rule to cover all cases rather than two different ones, all else being equal. If we accept the empty suffix in the first cases, we should, therefore, also accept, or at least not principally reject the same solution in the muddier cases. To invoke some economic considerations or even meta-theoretical principles like Occam’s razor to argue against a greater frequency of empty suffixes would be a misstep. Odden (2013, p. 259) makes this point forcefully:

“Often, Occam’s Razor is interpreted to refer to the extension of a science, that is, to say that the logically preferred theory is the one that claims that there are fewer entities in the world. According to that logic, a representational theory allowing 3,159 distinct segments to be described is held to be superior to a theory allowing 3,160 segments (as long as there aren’t more than 3,159 known segments). But Occam’s Razor is not a metaphysical claim about the nature of the universe, that there are few entities, it is a normative statement about the proper form of theories of the universe. A theory is a system of concepts, not a collection of things-in-the-universe, and Occam’s Razor is a statement about systems of concepts. The wording of Aristotle (*Posterior Analytics*) reveals the original intent behind Occam’s Razor: “We may assume the superiority *ceteris paribus* of the demonstration which derives from *fewer postulates or hypotheses*” (emphasis added), that is, the fewer theoretical *concepts*, the better.”

If we accept the concept of the melodically empty suffix, there is no reason to assume it to be rare. The only criterion that is relevant is if the suffix is learnable in the relevant positions. In other words, are there

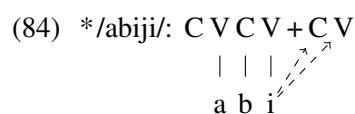
enough cues for a child acquiring the language to postulate the suffix? In the case of personal endings and feminine agreement on adjectives, the morphological distribution together with the alternations provides enough clues to strongly suggest an empty suffix. With nouns, we lack the alternations, a distributional pattern is still clearly visible. And, most importantly, phonology itself helps out. The fact that long final high vowels never appear without morphological conditioning anywhere else in the system is a solid clue not to assume them in nouns either without an empty suffix. This might seem like a circular argument but it is not. The reason to postulate the suffix is the distributional evidence and the parallel cases. As a result, one gets rid of underlyingly long high vowels. The heuristics used by children to construct a grammar are a different process altogether through which they try to approximate the data available to them as closely as possible. All this is just to say that it seems very probable to me that an empty suffix causing the final length in feminine nouns is learnable. Therefore, there are no theoretical reasons to oppose this analysis. One fact that needs to be emphasized at this point is that not all empty suffixes have to be the same morphologically. It would, indeed, be strange if one and the same suffix was used for expressing some personal endings in verbs as well as feminine gender on nouns and adjectives. But, just as there can be homophonous “normal” suffixes, like the English *-er* that can express several different functions, there can also be homophonous empty suffixes. How many morphologically distinct suffixes we need is a morphological question. The minimal assumption is probably two, one for the personal endings which are syncretic, and one for the feminine marking on adjectives and nouns.

4.3.1.4 Technical Implementation

Having presented the idea, let us look at a detail we have ignored until now, namely the question of glides. As we have discussed in section 3.3, Neuchâtel French often shows a full vowel where Standard French only has a glide (see ex. (36)). What is more difficult to ascertain is whether a verb like *<plier>*, which shows a full vowel, also inserts a glide after that vowel or not, i.e. /plije:/ or /plie:/. Additionally, it is difficult to say where the threshold lies between simple coarticulation effects and real phonological phenomena. I remain agnostic as to the status of the above-mentioned glides. In any case, our proposed system can deal with such cases if they turn out to be phonological phenomena. Let us illustrate this by using a word which has an etymologically warranted /j/, *<habiller>* (‘to dress’). The {I} element of the stem-final /i/ would simply spread to the C-position of the infinitive suffix.⁶⁰



This creates a further issue, however. Why, in the first person singular where an empty suffix is added, do we get the result in (85), and not that in (84)?



⁶⁰I omit the full representation in elements and of the long /e:/ for simplicity's sake.

- (85) /abi:/: C V C V + C V
 | | |
 a b i

The reason for this curious fact must lie in some general property of the language. There are no sequences of the glides /ɥ/ and /w/ followed by their corresponding vowel within the same syllable.

- (86) a. */.ɥy/
 b. */.wu/

Interestingly, the sequence /ji/ seems to occur in a handful of words.

- (87) a. /buji/ ‘boiled’ (<bouilli>)
 b. /fuji/ ‘mess’ (<fouillis>)

All these cases seem to consist of a (verbal) stem ending in /-j/ and a suffix /-i/. Since (verbal) stems ending in /w/ or /ɥ/ do not exist, as far as I can see, it is no wonder that we do not find the same sequence of glide+high vowel for these two glides. Formally, this can be captured quite easily. As Markus Pöchtrager suggests to me, we can assume that an {I} cannot be associated to a C-position and a following V-position in the same syllable. In those cases where we do find the sequence /ji/, there must be two underlying {I}s, one associated with the C-position, the other with the V-position. This is supported by the fact, that the vowel in those combinations is always a suffix which must have its own melodic content already. Cases where a suffix /-i/ is added to a stem ending in /-j/ are “morphological coincidences”, which explains their scarcity.

One question remains unanswered, however. If it is true that an {I} element cannot be attached to a C-position and a V-position, i.e. onset and nucleus, of the same syllable, there are three ways of repairing a structure like (84).

- No spreading takes place at all
- {I} only spreads to the V-position of the next syllable, as in (85)
- {I} only spreads to the C-position of the next syllable, as in (88)

The first of these options is unnecessarily restrictive, since it even rules out types of spreading that are not prohibited otherwise (see the other two options). The other two options are theoretically equivalent. They both sacrifice one association line in order not to violate the restriction on {I} elements discussed above.

If we follow the second option, we must simply assume that the vowel takes precedence in such cases. In other words, an {I} element will spread to a V-position if it has the possibility. Only if there is no empty vowel position to spread into in a syllable, will it consider the C-position. It might be the case that such a restriction also holds for other elements. This remains an open question, however.

The third option is more speculative. We would have to prevent the {I} from spreading to the following vowel. This could be done by assuming that spreading always takes place locally first. Since the C-position is nearer to the preceding vowel it would spread there first, making further spreading into the following V-position impossible:

floating. If we assume vowel-positions to have precedence in such spreading relations, as discussed above, this example is covered as well.⁶²

Two predictions seem to follow from this proposal. First, when no suffix were to be added, we should expect a final short /i/, since the {I} can only spread to one vowel position. Second, if a suffix were added that had an initial onset consonant as well as a vowel, properly governing the stem-final vowels position, the {I} element would have nowhere to land. The second prediction is difficult to test since there are no good candidates. The first prediction produces some contradicting results. The abstract noun of the verb <étudier> does not have an overt suffix but does not show a final /i/ either: /ɛtyd/ ('studies'). For other verbs, however, which behave identically with regard to verbal morphology, there exist nominal formations with final vowel. For instance /marʒe:/ ('to marry') has /marɪ/ ('husband'). At this stage, problems of derivational morphology creep in as well. It is generally difficult to judge which derivational formations are productive in (Neuchâtel) French. This could have an impact on the phonology as well, since lexicalized forms, for instance, might be the result of phonological processes of past centuries, not reflecting the synchronic phonology. Furthermore, we need to worry about the stage in the derivation at which certain suffixes are added. For instance, we may want to distinguish analytic and non-analytic morphology (Kaye, 1995). Whereas the former type is visible to the phonology, and is therefore treated separately by it, the latter is invisible. This means that the phonology does not recognize the resulting word as morphologically complex, making it undergo all phonological processes a simplex formation would undergo. One can easily see how these different morphological types might have a significant impact on our analysis of phonological data. These are morphological issues at their core, and we will not be able to deal with them in this thesis. The reason for bringing them up is to show that derived forms do not necessarily give us clear evidence concerning phonological questions. This is even more true for formations that are not overly productive, as the ones we have discussed above. This also means that there is, as far as I can see, no clear evidence confirming or contradicting the two predictions made at the beginning of this paragraph. A morphological analysis of the different derivational affixes would be necessary to be able to interpret the phonological data. This, I cannot offer in this thesis. Still, the evidence brought forward so far, and the fact that cases like the ones above do not flat out contradict it, are good indicators that our analysis of the final long vowels as morphologically complex is still tenable on the whole.

Two final comments should not be omitted before we move on to the LeCs. At several points we have argued that an empty suffix that lengthens a high vowel should have the same effect on a non-high vowel, for which we have found ample evidence. Given what we know about non-high vowels, however, we should also expect cases of them appearing long in final position without a triggering empty suffix. The reason is that we have observed non-high vowels to be long in all sorts of positions where long high vowels are illicit. In those positions, minimal pairs exist between the long non-high vowels and their short counterparts. This suggests that non-high vowels may be long underlyingly. We should, therefore, expect them to appear also word-finally. Though very intriguing, this question is beyond the scope of this thesis. A further analysis of the vowel system as a whole should certainly investigate it thoroughly.

The analysis of final vowel length as the result of empty suffixes might seem anachronistic to some

⁶²If one wanted to implement the second option discussed above, resulting in the structure in (88), which is then changed to a final /i:/ by an additional process, this would be possible, too. One would just need to either redefine the locality constraints, since it is not obvious how floating elements should be analyzed in this regard, or specify that association proceeds from left to right. This would leave the last V-position empty.

readers. It is true that the picture described here resembles the historical facts. All the orthographic <e>'s are not coincidental, but show an original vowel that has been lost through language change. One might, therefore, argue that what I have proposed is, in fact, a diachronic, not a synchronic analysis of the facts. In the end, this boils down to a difference of approach to synchronic data. The line we have pursued throughout this section was to consider regular and pervasive patterns as objects of synchronic (as well as diachronic) interest. Once the patterns become more vague and erratic, one certainly must consider shifting their position accordingly.

4.3.2 LeCs

The length of high vowels before final LeCs must be of a different nature. This is the case for two main reasons. First, the length is conditioned by phonological factors, not morphological ones. Second, the length occurs within a word, not word-finally, which excludes the possibility of a suffix causing it. There are also some parallels, however. In both cases, word-finality plays a crucial role, and in both cases the trigger for vowel length is to the right of the vowel.

Let us start by examining word-final position. It is true that it plays an important role for word-final vowel length as well as length before LeC. In the first case, it is superficially the word-final position of the vowel that can trigger vowel length. In the second case, only LeCs that are themselves in final position can trigger length on the preceding vowel. We have determined, however, that it is not the final position per se that triggers length on word-final long vowels, but rather the possibility of interacting with an empty suffix, which is only possible in final position. What about LeCs? We should not expect an empty suffix to play a role here, since the distribution is clearly phonologically determined, not morphologically. As a result, there are obviously morphological patterns that arise. For instance, the first to third persons singular and the third person plural in the first conjugation class add no overt suffix as we have seen in examples (22)–(25). In those cases, stem final LeCs will be word-final and therefore trigger length on the preceding vowel. However, the lack of minimal pairs makes it clear that we are dealing with an allophonic relationship, i.e. a phonologically, not morphologically determined distribution. This does not contradict our analysis of the empty suffix in the first conjugation class and elsewhere. This suffix simply has no special influence in these cases.

If it is not the possibility of interacting with a suffix that is relevant, why should the final position be so special? Two possible reasons come to mind. Either the final position affords some special structural properties to an LeC which allows it to display its lengthening capabilities. Or it is a suprasegmental property of the final syllable, which affects the LeC and/or the vowel in this syllable. Note that in both cases there must still be a special mechanism employed by LeCs, since they are the only consonants showing this behaviour. There is no a priori reason to prefer one of the two options over the other. Since the second one is more tangible and less abstract, let us start by examining it.

4.3.2.1 Stress

French stress is most often analyzed as falling on the last (full) vowel of the word, i.e. stress is oxytone (Batchelor & Chebli-Saadi, 2011; Côté, 2005; Dell, 1995; Fagyal et al., 2006; Léon & Léon, 1997; Tranel, 1987). Generally, French stress is rather weak in comparison with other languages (Batchelor & Chebli-Saadi, 2011; Côté, 2005; Tranel, 1987). To make it even more elusive, stress does not surface on all words but mostly on the final word of a phrase (Batchelor & Chebli-Saadi, 2011; Côté, 2005; Léon

& Léon, 1997; Tranel, 1987).

Word-final stress would give us a nice explanation why it is only final LeCs that cause length. Not the LeCs need to be in final position to cause lengthening, but the vowels in stressed syllable. There are a few arguments against this idea, however. If this was the case, we should expect final clusters consisting of an LeC and another consonant to also cause lengthening. Why? Because the vowel would be in stressed position and adjacent to an LeC. This is not the case, not even if both consonants are LeCs themselves.

- (91) a. /livʁ/ ‘book’ (<livre>)
b. /maʁʃ/ ‘march’ (<marche>)
c. /aspɛʁʒ/ ‘asparagus’ (<asperge>)

These examples also show that syllable structure cannot be responsible for this unexpected behaviour. Whereas the second and third example show a coda-onset cluster following the vowel, the first example involves the onset cluster /vʁ/. It has, therefore, the same syllable structure as vowels that are followed by a simple final LeC. The question why in the case of the onset cluster no lengthening occurs remains unanswered if we assume stress to be the deciding factor.

Secondly, it is true that high vowels are only long in final syllables. This is not the case for other vowels, however. They appear long in all syllables, but are only lengthened by LeCs in final syllables. For them at least, there cannot be a restriction on their length based on stress. If stress was the determining factor, we should expect unstressed non-high vowels to show a different distribution to stressed ones. However, when followed by any non-LeC, the behaviour in final or non-final syllable is identical. It is only the LeCs that trigger special behaviour of the preceding vowels. And only in this case is the final position of relevance.⁶³

Lastly, the data concerning word stress are not clear for Swiss French in general. The literature either suggests that it is the penultimate syllable that bears (more) stress (Avanzi et al., 2012; Knecht & Rubattel, 1984), or that the intonational contour stretches across the two final syllables, with a rise on the penultima and a fall on the ultima (Andreassen et al., 2010; Miller, 2007; Métral, 1977). Both descriptions differ significantly from the facts observed for Standard French.⁶⁴ These facts could be interpreted to either mean that Neuchâtel French (as well as other varieties of Swiss French) stresses the penultimate syllable. The other option would be to see the intonational contour described by the second group of authors to be another way of marking final stress. This seems to be the position of Métral (1977) as well as that of Jean Lowenstamm (p.c. with Markus Pöchtrager). Whether there can be an answer to this question or not is moot to discuss here. The fact of the matter is that the empirical data for (Neuchâtel) French concerning stress are unclear. Either there is no stress at all, or final stress, or stress on the penultimate syllable. And even if we could convince ourselves of final stress as the rule, we are still faced with the issues discussed before. All the evidence taken together, it seems clear to me that it cannot be word-stress that is responsible for the restriction of LeC-lengthening on final syllables.

⁶³Note that non-high vowels may be long before an LeC in word-internal position, just as they may before any consonant in any position. It is only before a word-final LeC that they have to be lengthened, however. Before a word-internal LeC, one will find short non-high vowels as well as long ones.

⁶⁴See Avanzi et al. (2012, p. 93) for the acoustic signals of a phrase uttered by a Parisian speaker juxtaposed to the same utterance by a speaker from Neuchâtel. The results are clear.

Instead, it must be a property of the lengthening mechanism itself. It can only apply when the relevant consonant is in final syllable. This suggests a structural condition.

4.3.2.2 Front Vowels and /ɜ/

Let us go back to the beginning of this chapter. We explained the cases of final length through an empty suffix into which the final vowel spreads, creating a long vowel. Things are much less clear when it comes to LeCs. As discussed before, we cannot assume an empty suffix to be present again in all cases. But even if we put the distributional differences aside, the mechanism involved in LeC-lengthening looks very different to final lengthening. It seems to require a following consonant to provide the added length. More than that, there needs to exist a close relationship between vowel and LeC, as can be seen most clearly for /ɜ/. It is this final point that we shall come to first, since it might help us to illuminate the relation between the vowel and the final LeC.

It is more than a weird coincidence that it is front vowels that are lengthened specifically by /ɜ/. The representations of consonants discussed in the previous chapter differ significantly, but they all agree that /ɜ/ is the only LeC containing an {I} element. That front vowels are also defined by the same element is widely accepted. Thus, there must be a closer interaction between vowel and LeC, not just on the level of syllable structure, but also on the melodic level. Interestingly, this close relationship is only visible for /ɜ/. The other LeCs lengthen all vowels indiscriminately. We may now ask the question if this is a special characteristic of /ɜ/ or whether it might be the case that all LeCs have, in fact, such a relationship with their preceding vowel. In this second case, we need to ask, what it is that /v, z, ʁ/ share with all vowels, that /ɜ/ does not possess, but which parallels /ɜ/'s “{I}-ness”. What we are looking for cannot simply be a certain element, since there is none that is shared by all vowels and LeCs except for /ɜ/. Syllable structure alone will not be enough either, since it would not distinguish between /ɜ/ and the other LeCs. We need to look somewhere else. The presence of an {I} element may well be responsible for /ɜ/ interacting with front vowels, but what makes it not interact with other vowels? Where does the difference lie compared to the other LeCs? Depending on whose representations we use, the answers differ significantly. If we follow Harris (1994) and Neubarth and Rennison (2005), then /ɜ/ is simply the most complex out of the four LeCs, containing four elements. Backley (2011) assumes /ɜ/ to consist of only three elements (/v/ containing four), but for him, /ɜ/ is the only LeC not to have an {A} element in its makeup. Lastly, /ɜ/ does not show any idiosyncratic properties in Kaye (2000) and Rennison and Neubarth (2003), except the already discussed presence of {I}. What can we make of that? It is not clear why the presence of an {I} element should hinder lengthening of back vowels when all other elements seem to be neutral in this regard. That {A} has some connection to length is not new (Pöchtrager, 2006), and can even be seen in Neuchâtel French: Non-high vowels, i.e. vowels containing an {A} element, can be long in any position. How this should be implemented concretely for the LeCs, however, is not entirely clear. One would have to assume that the {A} element in the LeC somehow creates some “extra space” for the preceding vowel to spread into. But why this should only happen in word-final position, and only to the LeCs and not to any consonant containing an {A} is not immediately clear. We will discuss ideas along those lines in detail in section 4.4, but the view of syllable structure we have followed so far does not provide for any mechanism to implement this supposed process formally, in any case. The question of complexity of consonants might be most promising at first glance, if we in fact assume /ɜ/ to have the same representation as /z/ plus an {I}. There might even be slight empirical

evidence to suggest this representation. The phrase <Je sais pas> ('I don't know') might be shortened regularly by eliding the schwa and devoicing the initial /ʒ/ by assimilation. There is, however, also an idiosyncratic, additional shortening that is possible in colloquial speech, as given in (92c).

- (92) a. Unreduced form: /ʒœ=sɛ pa:/⁶⁵
 b. Regular reduction: /ʃ=sɛ pa:/
 c. Idiosyncratic reduction: /ʃɛ pa:/

The same holds for the phrase <je suis> ('I am').

- (93) a. Unreduced form: /ʒœ=sɥi/
 b. Regular reduction: /ʃ=sɥi/
 c. Idiosyncratic reduction: /ʃɥi/

The idiosyncratic reduction of these phrases might best be analyzed as the {I} element spreading from the postalveolar fricative to the alveolar one, thereby causing assimilation. The resulting /ʃ/ would then consist of the representation of an /s/ plus {I}.⁶⁶ Since these are isolated phrases, we might discount them as irregular forms, arising through the diachronic treatment of such frequent phrases. In this case, they could tell us nothing about the synchronic phonological system. Whether one accepts this argument or not, if we assume the postalveolar fricatives to be the most complex LeC, we might be able derive its different behaviour from there. Its special relationship with front vowels could, ideally, still be captured by the presence of an {I} element.

At this point, we come back to the proposal by Zdziebko (2015), already discussed in section 4.2.5.2. He argues that the complexity of a segment plays a role in the lengthening process. For Neuchâtel French, this could not be argued, since too many other consonants are as complex as or less complex than the LeCs. Within the LeCs, however, this might still be an option worthwhile discussing. If Zdziebko is correct in assuming that long vowels need licensing and that this licensing is (partly) absorbed by the following consonant, then /ʒ/ absorbs more than any other LeC due to its complexity. This should prohibit lengthening. Since front vowels are still lengthened before a final /ʒ/, one would need to assume that the presence of an {I} element counteracts this effect somehow. For instance, it would be possible that front vowels are in need of less licensing. Why this should be the case, is unclear to me. It would certainly be an ad-hoc assumption. It may also be at odds with other assumptions about licensing, e.g. that it is non-high vowels that need less licensing.

The biggest issue concerning licensing absorption is another one, however. Licensing and its absorption can allow or disallow an underlying length to be expressed, it cannot forcibly introduce it in certain contexts. Alternations in the verbal system (ex. (22–25)) show that the vowels lengthened by LeCs are not long in non-final syllables. This leaves two options. Either they are long underlyingly but shortened in non-final syllables, or they are short underlyingly and lengthened before a final LeC. That the second option must be correct can be shown by looking at non-high vowels, as discussed in section

⁶⁵Whether the vowel of <pas> is really long will depend on the syntactic and/or prosodic context.

⁶⁶This process could, of course, also be formulated if one used different representations for the consonants involved. However, if the elements present in /s/ are not just a subset of those present in /ʃ/, one would need to assume some of the elements in /s/ to be deleted, replaced or the like. A priori, this seems like a more complex operation.

3.4. Non-high vowels may be long in non-final syllables. They show the underlying length of a vowel faithfully in non-final syllables. Since there are also length alternation in non-high vowels (ex. (38) and (40)), we must be dealing with a lengthening process before final LeCs. This means: We need some specific mechanism to *introduce* length before a final LeC, not *preserve* it. Licensing and its absorption cannot achieve this.⁶⁷

The elemental makeup of the LeCs does not seem to give us any clues regarding lengthening capabilities. Neither can we derive this property from the specific elements present in LeCs, nor from the overall complexity of the melodic expressions. We can at least take comfort in the fact that others have struggled with the same question: “I do not have a clear understanding of why the consonants {z, v, ʒ} and no other consonants (except for r) have a lengthening effect on a preceding vowel.” (Charette, to appear, p. 23)

4.3.2.3 Syllable Structure

Let us look at it from another angle. So far, we have been assuming very simple CV-syllables, as there was no need to go into more detail. At this point we might want to specify our assumptions more clearly. Fortunately, this does not complicate our picture that much. Good arguments have been made in the literature that final consonants should be regarded as onsets of syllables rather than codas, followed by an empty nucleus (see e.g. Harris & Gussmann, 1998; Kaye, 1990). This gives us the following minimalistic representation for a word like /pi:ʁ/ (‘worse’), without length being indicated yet.

(94) C V C V
 | | |
 p i ʁ

The vowel needs to acquire its length from somewhere. There is only one possible source: the final empty V-position. On the face of it, this should be impossible. The intervening /ʁ/ should block the vowel from spreading into this final V because of the no-crossing constraint. But even if there was a way to circumvent this constraint, and to allow spreading of the vowel to take place, the wrong result would ensue. Since the two vowel positions the melodic expression of /i/ would now be attached to are separated by an intervening consonant, no long vowel should arise, but two short vowels, as illustrated in ex. (95).

(95) C V C V → /piʁi/
 | | | ↑
 p i ʁ

For the vowel to be lengthened, a more complicated series of events would need to take place. The only feasible pathway I can envision from the structure in (94) to the form /pi:ʁ/ would be along the following lines. First, the consonant would have to be able to spread into the final empty nucleus, creating a long final /ʁ:/:

⁶⁷This does not disprove Zdziebko’s analysis, nor the idea of licensing absorption in general, of course. It just shows that the lengthening patterns we observe in Neuchâtel French are not consequences of these mechanisms.

$$\begin{array}{c}
 (96) \quad CVCV \rightarrow /pi\mathfrak{v}/ \\
 \quad \quad | \quad | \quad | \quad ^\wedge \\
 \quad \quad p \quad i \quad \mathfrak{v}
 \end{array}$$

Then, this length would need to be transferred to the preceding vowel. In practice, this would mean that the / $\mathfrak{v}$ / loses its association to one position, which is then taken over by the vowel. This would result in the bizarre structure in (97).

$$\begin{array}{c}
 (97) \quad CVCV \rightarrow /pi:\mathfrak{v}/ \\
 \quad \quad | \quad | \quad ^\wedge \quad ^\wedge \\
 \quad \quad p \quad i \quad \mathfrak{v}
 \end{array}$$

Every step in this hypothetical derivation is riddled with problems. First, it is not clear why consonants should be able spread into vocalic positions.⁶⁸ We would need to stipulate that LeCs had this ability, without any corroborating evidence, as far as I can see. Second, the transfer of length between the hypothetical geminate consonant and the vowel is unmotivated, as well. Gemimates do occur in Neuchâtel French. It is true that they only arise as the result of loss of /ə/ or through word-external sandhi. Still, one would need to specify why they should be impossible word-finally, especially in sentence contexts, where sandhi-conditions might be conducive to the conservation of gemimates (e.g. before a vowel-initial word). Third, we would need to postulate that vowels can spread into empty consonant positions, causing them to lengthen. This would be a most problematic assumption, since empty consonant position occur elsewhere in the language without causing preceding vowels to lengthen.⁶⁹ It is, therefore, fair to say that the structure in (97) is highly unlikely to be accurate since several ad hoc assumptions would be necessary to uphold it.

Spreading melodic material into the syllabic material already available is obviously not the way to go. What we do want to say instead is that the nucleus before the LeC branches (see also Charette, to appear). This way, we could provide the necessary syllabic position for lengthening, and still avoid the issues associated with the structure in (97). In turn, we would need to specify the conditions under which nuclei would have to branch. This turns out to be a tricky task. If we assume all nuclei in final syllables to branch, we would need to motivate their shortening in most cases. This is basically the approach Zdziebko takes, and as we have seen earlier, it is not particularly suitable for Neuchâtel French. The second possibility is that nuclei only branch when followed by a final LeC. Although descriptively accurate, we are stuck with the same problem as before: How can we motivate and formally implement this special behaviour of LeCs? At this point it becomes obvious that the formal tools we have to our disposal are not sufficient. Neither forcing of branching by a following consonant per se, nor the choice of consonants that seem to do so (the LeCs) can be motivated meaningfully by the tools of classical Government Phonology. As Charette (to appear) points out, however, GP 2.0 might come to the rescue.

⁶⁸In Element Theory, (broadly) the same elements are used for consonants and vowels, so it should be possible for certain elements associated to a consonantal position to spread into a vocalic position. In the vocalic position, however, these elements would be interpreted differently than in the consonantal position. The result would be a consonant followed by a vowel, both containing the same elements, never a geminate consonant. Moreover, any such process would leave traces somewhere else in the language. I see no evidence for it anywhere. Syllabic consonants, which could be seen as consonants taking up a nuclear position, do not exist in Neuchâtel French.

⁶⁹Several contexts come to mind in which this is the case. The most straightforward examples might be cases of two consecutive vowels within a word. Take, for instance, the word /æ̀vɛ:/ (<aérer>) meaning ‘to ventilate’. No lengthening of the initial vowel takes place. That the onset of the second syllable is truly empty must be assumed, since no glottal stop, glide or the like separates the two vowels.

4.4 GP 2.0

4.4.1 Length and Voicing

GP 2.0 (Pöchtrager, 2006, 2018, 2021; Živanović & Pöchtrager, 2010) reduces the set of elements even further. This is achieved by replacing some of the functions originally performed by elements by structural properties. For consonants, much of what concerns the manner of articulation is reanalyzed in this way, as is phonation and some places of articulation. We have seen how quality and structure interact in the lengthening of vowels before final LeCs. The LeCs are best characterized via manner of articulation and voicing. So conflating these two categories with structure seems a promising endeavour. To introduce the theory in all its details here would be a detour too big to make. Instead, we will focus directly on the relevant points for our discussion.

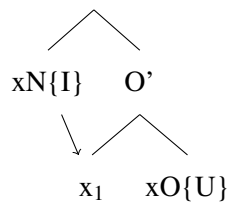
The first and maybe — for us — most important idea introduced by Pöchtrager (2006) is in the representation of onsets. Onsets can have different layers of structure, determining their manner of articulation. As an example, we will show the representations of /w, v, b/ in (98), since they all just involve the element {U}.

- (98) a. $xO\{U\} \rightarrow$ zero-layered structure: /w/
 b. $O' \rightarrow$ one-layered structure: /v/
 $\begin{array}{c} \diagup \quad \diagdown \\ x_1 \quad xO\{U\} \end{array}$
 c. $O'' \rightarrow$ two-layered structure: /b/
 $\begin{array}{c} \diagup \quad \diagdown \\ x_1 \quad O' \\ \diagup \quad \diagdown \\ x_2 \quad xO\{U\} \end{array}$

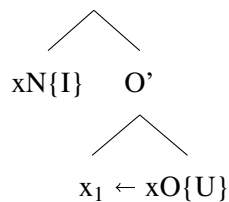
For fricatives, the head of the onset, called xO is complemented by a sister. It is this sister that introduces an additional length unit. For stops, it is the empty position one layer higher, the sister of O' , that performs this task.⁷⁰ Since these units — as all unannotated x 's — must be licensed, they need to be m-commanded. M-Command (short for melodic command) fulfills a function comparable to autosegmental association lines, in that it expresses how far a certain melodic property extends. It is defined as a relationship holding between a head, the m-commander, and a non-head, the m-commandee. The heads available for m-commanding the unannotated x 's are the onset head xO and the nuclear head of the preceding vowel, xN . A position takes over the melodic interpretation from its m-commander. This is illustrated by the arrows in the following examples, slightly adapted from Pöchtrager (2006, p. 69). If the highest, and in this case only unannotated x is m-commanded by the preceding xN , the result is a long vowel followed by a lenis consonant. If it is m-commanded by the xO , it results in a short vowel followed by a fortis consonant.

⁷⁰The lower empty position in stops, x_2 , has to be licensed. This is achieved via a mechanism called control, which holds between xO and x_2 . Since this is of no greater importance in our case, I have omitted visual representations of control in all examples.

(99) a. N' $\rightarrow /i:v/$, as in New York City English *give*



b. N' $\rightarrow /i:f/$, as in New York City English *whiff*

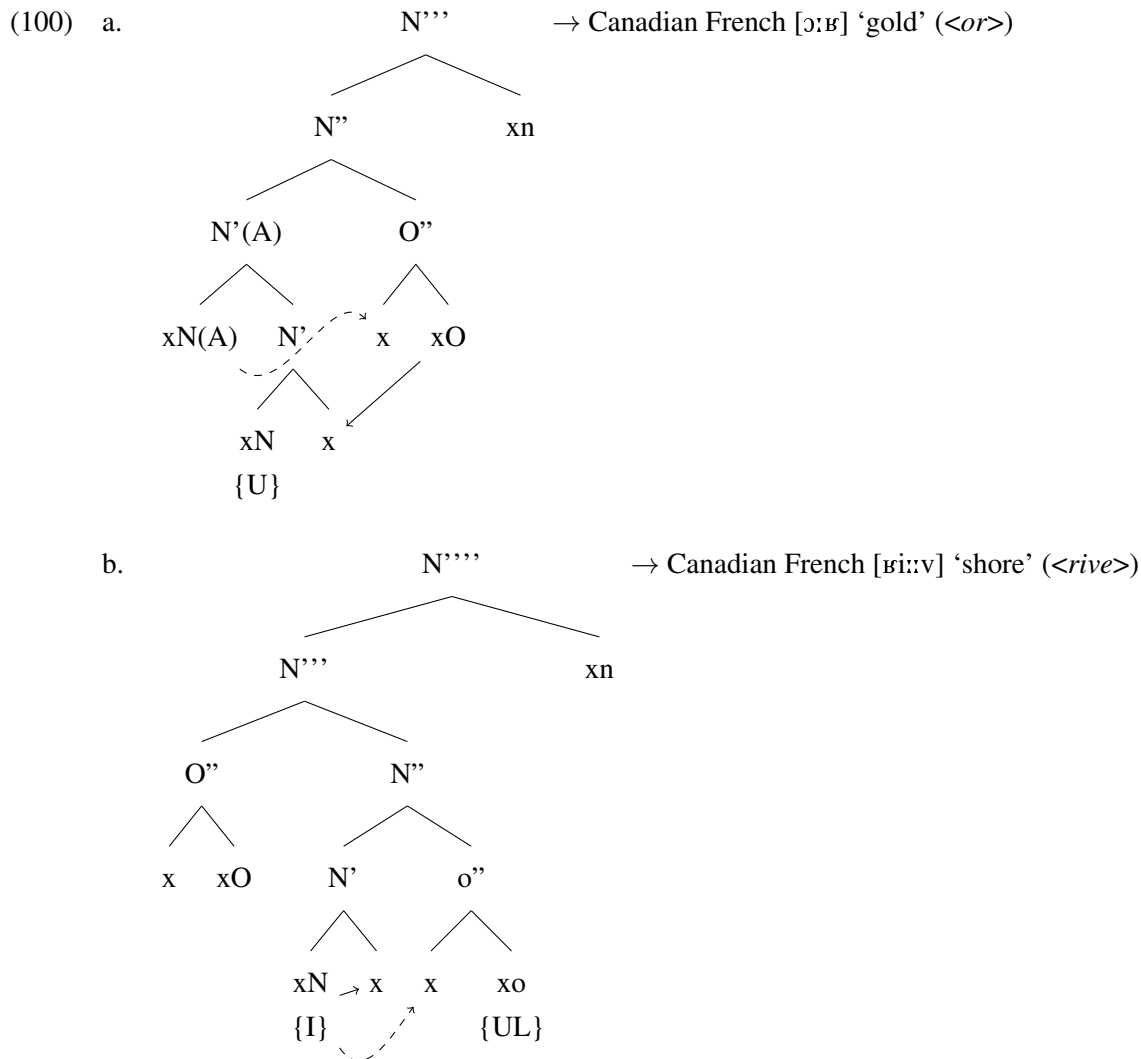


Applied to Neuchâtel French, this would give us two things at once for our data: On the one hand, it would explain how vowels before final LeCs are lengthened, namely by m-command of x_1 by xN . On the other hand, it would motivate the choice of LeCs: only lenis consonants cause lengthening because fortis consonants would have to m-command x_1 themselves, prohibiting the lengthening of the vowel. The main issue with this analysis concerns voiced stops. They should cause lengthening, too, as they are lenis themselves and leave x_1 available for m-command by xN . In principle, one could just make an ad-hoc assumption for Neuchâtel French that x_1 in two-layered structures (=stops) does not provide vowels with extra length if they m-command it, unlike in one-layered structures (=fricatives), but this would be circular.

In his master's thesis, Tremblay (2024) tries to solve this problem for Canadian French, using GP 2.0. He does so by assuming that all lenis consonants cause lengthening on a preceding vowel, not just the LeCs. He does, however, also assume that $/v, z, ʒ/$ but not $/R/$ ⁷¹ cause overlength on preceding high vowels, realized as extra length but mostly tenseness on the vowel. The different behaviour of the voiced fricatives in this regard is explained by the notion of active versus inactive consonants, introduced by Tremblay (2024) himself. The difference between these two groups lies in its relationship with the preceding vowel. Whereas active consonants are able to p-license the vocalic complement of the preceding vowel, inactive consonants are not. In the latter case, the vowel itself m-commands its sister, leading to an overlong vowel. The following trees as well as the transcriptions stem from Tremblay (2024, pp. 56–57).⁷²

⁷¹This is his phonemic transcription of what we have transcribed as $/ʁ/$.

⁷²Tremblay uses two xNs to represent non-high vowels.



These structures are quite complex, but the important points for our purposes can easily be broken down. In example (100a), we see a long vowel followed by an active consonant, [ʁ].⁷³ Vowel length is the result of m-command between the head of the vowel and the sister of the onset head, as already shown in (99a). In (100), it is marked by a dashed arrow. Since the following consonant is active, it can p-license the sister of xN, preventing it to be used by the vowel for extra length. This is indicated by a simple arrow. We therefore end up with just a long vowel. In (100b), however, the consonant is inactive. As before, xN m-commands the sister of the onset head, providing the vowel with length (dashed arrow). The inactive consonant is not able to p-license the sister of xN, however. Therefore, xN itself m-commands it, leading to an extra length unit for the vowel (simple arrow). The result is an overlong vowel.

In principle, such a solution would be possible for Neuchâtel French, too. Several points lead us to abandon such attempts, however. First, the data of Neuchâtel French are just too different. High vowels show no contrast in tenseness nor other evidence for overlength. The LeCs do not behave differently amongst themselves with regard to their lengthening results. If anything, /ʁ/ is the most consistent of all the LeCs. And most certainly, non-LeCs do not cause lengthening. Secondly, even if one wanted to map

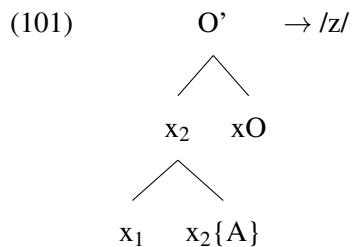
⁷³When discussing Tremblay's structures, I will use his choice of brackets, even though it differs from the usage in the rest of this thesis. This is because his phonemic transcriptions are somewhat different from his phonetic ones. In order not to misrepresent Tremblay and his transcription choices, I have decided to adopt his notations here.

Tremblay’s “overlong-long”-contrast onto our “long-short”-contrast, several steps would be necessary that are themselves improbable. Tremblay assumes that all lenis consonants behave identically in that their empty onset position is m-commanded by the preceding vowel. To differentiate LeCs from all other lenis consonants, we would have to rely on the difference between active and non-active consonants. This, however, makes our usage of GP 2.0 quite useless; the same notion could be implemented in a classical GP framework. The issue with this option is the same as before. First, there is no non-arbitrary way to define such a distinction between LeCs and non-LeCs, every attempt that captures this group of sounds and just this one is ad hoc. Secondly, we would need to assume (as Tremblay apparently does) that all nuclei, at least in final syllables, are branching underlyingly. Otherwise, the inactive consonants would have nothing that they fail to p-license. This assumption in itself is very unlikely for Neuchâtel French, as can be seen with non-high vowels. Long and short non-high vowels contrast before final non-LeCs which means that the difference lies in the branching or non-branching of the nucleus, which must be an underlying property in these cases. Why should high vowels be always long/branching underlyingly, especially since they are the vowels that occur long the least often? All in all, the analysis Tremblay (2024) proposes might well account for the Canadian French data, but it is not suitable for Neuchâtel French.

This leaves us with the same problem we have faced for classical GP-theories as well: The class of LeCs does not fall out as a natural class. We will come back to this issue when discussing the representation of /ʁ/ in section 4.4.4.

4.4.2 Place of Articulation

Let us now turn to the representation of place of articulation for our LeCs. For /v/, we already have a complete representation, since the voicing and manner of articulation are defined by the structure seen in example (98b), and the place of articulation by the {U} element. Things get more complicated for the other LeCs. Within GP 2.0, there are two general ways of representing coronals. This is not due to specific properties of coronals themselves, but of the element representing them: {A}. In earlier works on GP 2.0 (e.g. Pöchtrager, 2006) this element is still present and fulfills the role that {U} does for /v/. The representation of /z/ is more complex than that of other consonants, so as to differentiate it from other coronal fricatives. The following structure is taken from Pöchtrager (2006, p. 174).

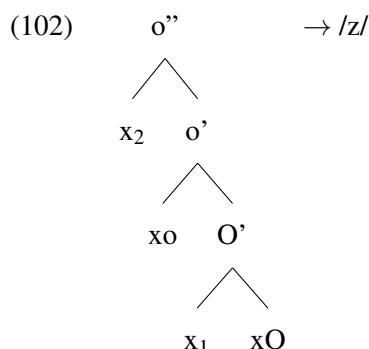


This structure is an adjunction structure, i.e. a structure where one node splits into two, in this case x_2 .

More recent versions of the theory (e.g. Pöchtrager, 2018, 2021) emphasize the connections between {A} and structure. As with elements like {H} and {?}, the idea is to eliminate the element altogether and replace it with structure.⁷⁴ This makes the representations slightly more complicated. In example

⁷⁴The reasoning for and the implementation of the elimination of {A} here is very different to the superficially identical

(102), the representation of /z/ is given, following Pöchtrager (2021).⁷⁵



The lower of the two projections, headed by xO, corresponds to the representation of other fricatives. To represent coronality, this structure is now embedded in a higher projection, headed by xo. The highest specifier, i.e. the sister of o', takes the same role as before: if it is m-commanded by the preceding vowel, the vowel is lengthened and the consonant lenis. If m-command is exercised by the head of the onset, we get a fortis consonant without lengthening of the preceding vowel.

To represent /ʒ/, an additional {I} element is necessary. Where to place it is not entirely clear. One could simply assume it to be in the head of the lower projection. At least as a result of spreading from adjacent segments, elements can also sit in the sister of the lower head (Pöchtrager, 2021). Whether one would want this as an underlying representation is not clear a priori. And then there is the question of the higher projection. In principle, it offers enough space to house elements itself. One has to wonder, however, what the correct interpretation of such a representation would be. After all, we are dealing with two onset heads on top of each other. The lower one expresses the manner of articulation, i.e. stop or fricative. I am not sure what it would mean for the melodic information to be anchored in the other projection. Even if we discard this option, we are still left with the question whether the {I} in our case sits in the head position of the lower projection or its sister, x₁. I do not think that there is any decisive evidence for either option. If we assume it to be in x₁ rather than xO, an interesting line of reasoning opens up concerning phonological binding.

4.4.3 Binding

Živanović and Pöchtrager (2010) and Pöchtrager (2015) discuss the notion of binding in phonology.⁷⁶ Binding is thought to work similarly as it does in syntax: Certain nodes enter into a binding relation, if several criteria are met, e.g. that one of them c++commands⁷⁷ the other. Then, depending on the contents of each node (i.e. the elements present or not), binding is licit, resulting in a grammatical outcome, or illicit, resulting in an ungrammatical structure. In practice, this is used, for instance, to motivate the presence and absence of certain diphthongs, i.e. the combination of certain elements following each

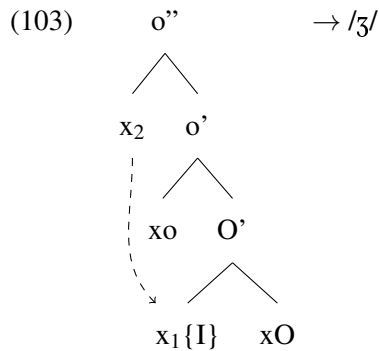
step in Rennison and Neubarth (2003). Whereas the latter authors conflate different elements into a single functional element, Pöchtrager captures the connection between {A} and length by replacing this element by structure.

⁷⁵For ease of exposition, I have numbered the x's.

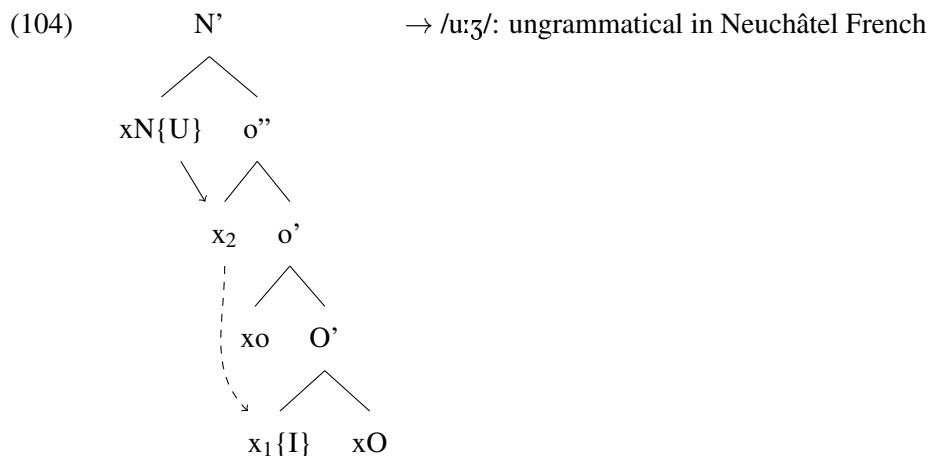
⁷⁶It has to be said that these articles focus on diphthongs, not binding within consonantal representations. It is not self-evident that the same definitions can be applied without modification to our case.

⁷⁷The definition of c++command is slightly cumbersome. For our purposes, it suffices to say that it includes proper c-commanding relations as well as relations similar (but not identical) to what is known as m-command in syntax (not to be confused with m-command (= melodic command) as it is used in this thesis).

other within a larger projection (NP). Živanović and Pöchtrager (2010, p. 370) define that for two heads to enter into a binding relation, both need to be “non-head terminal nodes”. Coming back to Neuchâtel French, if we assume that {I} sits in x_1 in the representation of Neuchâtel French /ɜ/, we might expect that a binding relation with the higher specifier x_2 should be possible. In this case, the general conditions on binding would apply. Most prominent among them is the inability of {U} to bind {I}. So, if a non-head terminal node containing {U} c++commands a non-head terminal node containing {I}, an illicit structure should be the result. Now in our case, the higher specifier does not contain any melodic material, so binding, indicated by a dashed arrow should be licit in any case.

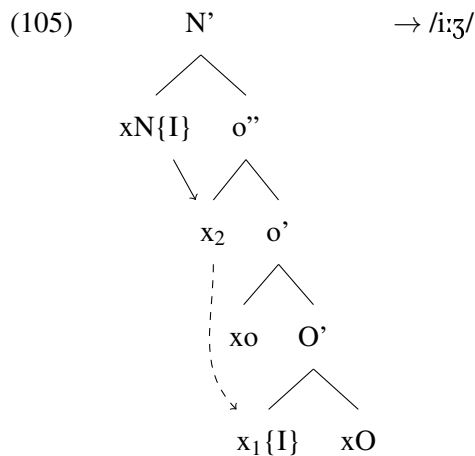


But remember that x_2 , the node binding x_1 , is the position that is m-commanded by a preceding vowel for it to gain length. That the position is m-commanded does obviously not mean that it is filled with the melodic content of the vowel. Still, if x_2 is m-commanded by a node containing a {U}, something seems to go wrong:



In example (104), the nucleus position containing the element {U} m-commands x_2 , which in turn binds x_1 . It looks like x_2 behaves like it contains a {U} element when it is m-commanded by one as far as binding is concerned. Accordingly, the structure in (104) is ungrammatical, since {U} may not bind {I}. Instead, it seems like x_2 is left alone, i.e. not m-commanded, and neither lengthening of the vowel nor strengthening of the consonant takes place, resulting in the sequence /uɜ/. In cases where {I} is the head of the vowel, however, lengthening occurs. One must assume, therefore, that no illicit binding occurs. This could either be because m-commanded positions, like x_2 , only behave as though they contained the element(s) of their m-commander with respect to {U}, which would be an ad hoc assumption, or

we would have to assume that self-binding, i.e. {I} binding {I} is licit, contrary to a claim made for Japanese in Pöchtrager (2015).



Again, let me emphasize that the structures we are discussing do not contain the elements {I} or {U} in their highest specifier, they are m-commanded by positions that do. This highest specifier position seems to be taken over via m-command by preceding vowels, if the melodic head of the vowel could be a binder in this position, i.e. if it does not contain a {U} element. Even though a relationship between m-commander and m-commandee so close that it influences binding relations is not envisioned by Živanović and Pöchtrager (2010) and Pöchtrager (2015), it is not completely implausible either. After all, Pöchtrager (2006, p. 68) writes: “An m-commanded point receives the same interpretation as its m-commander.”

When we are dealing with /a/ as the preceding vowel, again, no lengthening takes place. Here, explanations on the basis of binding seem to break down. This is because nothing prevents an unannotated terminal, i.e. a terminal containing no elements, from binding an annotated terminal.⁷⁸ If one still wanted to pursue this idea further, some special stipulations would be necessary. The following definitions would be workable in theory.

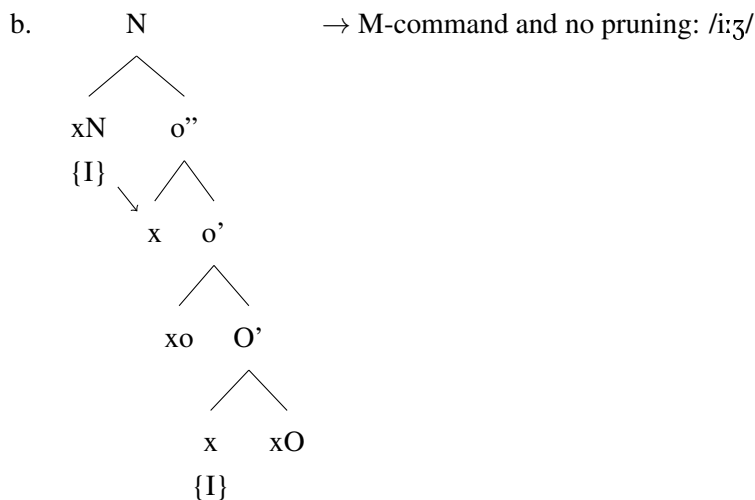
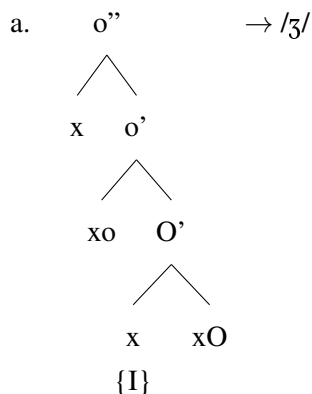
- An {I}-annotated non-head terminal node can only be bound by a higher non-head terminal associated with the same element
- A node is associated with a melodic expression if it contains it directly or is m-commanded by a head containing it directly
- If a non-head terminal node c++commanding another non-head terminal node containing {I} cannot fulfill the above requirements, it is pruned

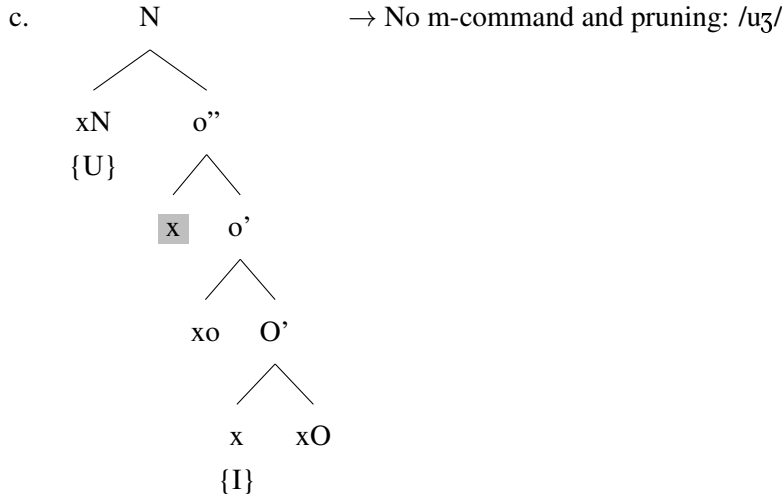
Such a stipulative set of requirements would capture our case quite well. The first requirement makes sure that only positions associated with an {I} can bind the x-slot of the {I} element in /3/. The second one defines that the binding node does not have to contain the element itself, but can also be m-commanded by a head containing it. This makes sure that the structure in (104) is ungrammatical and no

⁷⁸In Živanović and Pöchtrager (2010), the authors do exclude a structure of this sort. This is, however, not due to some restrictions on binding but on Putonghua itself, which requires the sister of a terminal xN to be unannotated. This can, obviously, not be the case in Neuchâtel French. The sister of the terminal head, xO in our case, is the position we need to be filled by {I} for our idea to work.

lengthening of /u/ takes place, whereas (105) is allowed and causes lengthening of the vowel. The third requirement defines what happens if there is no {I} available. In this case, the highest specifier, which is the one c++commanding the lower specifier containing {I}, is pruned. This is necessary because otherwise, this position could be m-commanded by the head of the onset, creating a fortis consonant. This would, of course, be an undesired result. Note that this type of pruning is only relevant in the case of /ɜ/. For all other lenis fricatives, which are LeCs, this position is always m-commanded by the preceding vowel and always causes lengthening. In fortis fricatives, this position is m-commanded by xO. It is only for /ɜ/ that we need this position to be pruned, so as to avoid lengthening of the preceding vowel as well as fortification of the fricative when preceded by a back vowel.

(106)

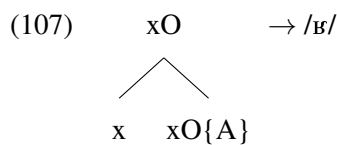




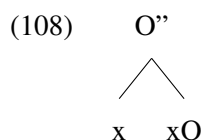
These considerations are completely ad hoc, of course. To see if they are workable in practice, one would need to examine the theory of binding in detail as well as all the data motivating it in the first place. Moreover, Živanović and Pöchtrager (2010) introduce a different definition of m-command to the one we have been using. Even though it is possible that the above argumentation can also be upheld using this other definition, it is not indisputable. Only when all these questions are addressed could one confidently say, whether the above stipulations are compatible with the original theory of phonological binding or just an overzealous aberration from it.

4.4.4 /ʁ/ and the other LeCs

The structure of /ʁ/ is conceptualized as an adjunction structure in Pöchtrager (2006) rather than a simple projection as we have seen for other fricatives. The reasons for this do not concern us here. It suffices to say that this structure is licensed by the presence of {A} and is necessary to create an additional point in the structure (x) while still differentiating rhotics from fricatives.



As with sibilants, more recent approaches are trying to get rid of the {A} element. Tremblay (2024) assumes the following representation.⁷⁹



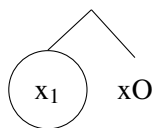
What is interesting for us is the fact that, apart from the relationship between the nodes, this structure is identical to the one seen for /v/ in (98b), i.e. both are one-layered structures. Importantly, glides are

⁷⁹The labeling conventions of nodes are slightly different in Tremblay's thesis. The differences are not relevant for our discussion here. I have taken over his notation, including O double bar as the mother node of xO.

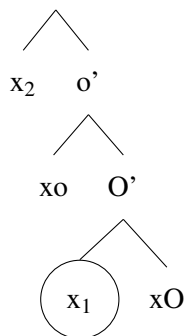
zero-layered structures according to Pöchtrager (2006), and /l/ is two-layered, as are stops. What about sibilants? As we have seen, their structure is the most complex out of all the fricatives. Pöchtrager (2006) assumes them to be two-layered, but only with one empty position, since we are dealing with an adjunction structure on the lower level, see example (101). Meanwhile, Pöchtrager (2021) assumes the structures that we have seen in example (102). Here, we do have a higher structure with two empty positions. These representations are of a slightly different type, however. We are dealing with two separate onset projections, one embedded in the other. This is distinct from the representation of stops for instance, where one and the same head projects twice and creates two empty positions. We can, therefore, tentatively conclude that what sets the LeCs apart is the fact that their lower head projects exactly once, creating one empty sister-node. In (109), I give the structures without elements. The crucial position is encircled.

(109) a. $xO \rightarrow$ Glides: no projection

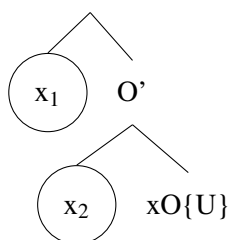
b. O' $\rightarrow$ Non-sibilant fricative or /ʁ/: lowest head projects once



c. o'' $\rightarrow$ Sibilants: lowest head projects once



d. O'' $\rightarrow$ Stops or /l/: lowest head projects twice



As we can see, only fricatives and /ʁ/ have exactly one empty position in their lowest projection, glides have none, stops have two.⁸⁰ It is, however, not easy to technically derive the behaviour of the LeCs from this characterization. As we have discussed before, possible mechanisms to enforce lengthening in just those cases are all very stipulative. Still, this is the first time we have managed to define the LeCs based on their representational properties.

One important issue concerning the LeCs has not been discussed so far. In chapter 4.2.1, we spent some time teasing apart the values for voicing of the different LeCs, as well as other consonants. Much

⁸⁰This holds for lenis as well as fortis consonants. They can be easily distinguished by their different behaviour concerning m-command.

could be explained by assuming a three-way split. Voiced obstruents were considered voiced, i.e. marked with {L}, voiceless obstruents voiceless, i.e. marked with {H}, and /ʁ/ neutral, i.e. containing neither element. This classification has been abandoned in the GP 2.0 representations just discussed. The reason is that the difference between fortis and lenis obstruents could be expressed by the m-command of an empty structural position. This allowed us to motivate the different behaviour of lenis and fortis fricatives: If the position is m-commanded by the preceding vowel, which is exactly what we want in lengthening cases, the consonant will be lenis no matter what. This is fine for voiced fricatives. The nature of /ʁ/ is different, however. There are several approaches one could take to modify its representation. A preliminary representation of /r/ given in Pöchtrager (2006) assumes /r/ to be zero-layered. This would explain its in-between status with regard to voicing, since there would be no empty position to be m-commanded either by the preceding vowel or by the consonant head itself. However, we would also lose any possibility to capture the lengthening properties of /ʁ/. Instead, we could add an {L} element to the representations of voiced fricatives to distinguish them from /ʁ/. Since the difference between voiced and voiceless fricatives can be sufficiently represented by m-command-relationships, i.e. can be conceptualized as a lenis-fortis contrast, there does not seem to be any independent evidence motivating this step. Given this lack of evidence, it seems most sensible to stick with the representations proposed before, even though they do not capture all the idiosyncrasies of /ʁ/.⁸¹

Lastly, we need to discuss the role of the final position of the LeCs. Only there do they cause lengthening of a preceding vowel. This problem is dealt with extensively in Pöchtrager (2006). We do not need to work through the whole explanation, but the basic idea is this: In a structure where a nucleus follows the onset that might cause lengthening, this following nucleus is closer to the empty x-slot than the preceding vowel is. This means that it takes precedence in licensing this position. However, it does not do so via m-command — we would expect lengthening of the following vowel then — but via p-licensing. This makes the position unavailable for the preceding vowel to spread into, and we do not get any lengthening. Note, that this explanation is built into GP 2.0, i.e. it is not an additional stipulation for our purposes, and that it does not make reference to word stress. This last point is especially convenient in our case, since Neuchâtel French stress is an area where the data is very much unclear, as discussed earlier.

4.4.5 Summary

In summary, GP 2.0 has made some contribution to our understanding of LeCs, their behaviour and their representations. The fact that final voiced consonants cause lengthening on a preceding vowel is readily accounted for by GP 2.0. It achieves this by postulating a more complex structure of consonants, including an empty position in fricatives and rhotics, which can either be m-commanded by the head of the onset itself, creating a fortis consonant, or by the preceding vowel, resulting in the lengthening of the vowel and a lenis consonant. The same mechanism should, however, also apply to voiced stops. What sets the LeCs of Neuchâtel French apart is the fact that their lowest head only projects once, creating only a single empty position (even though a higher head might additionally provide extra space). This generalization seems to describe the representations correctly, as far as I can see, but does not

⁸¹One issue we have not discussed is obstruent devoicing. In classical GP terms, we analyzed it as the spreading of an {H} element. In GP 2.0, however, this element has been replaced by structure. How such assimilations should then be analyzed is a general question for the theory. Since it does not bear directly on the topic of this thesis, we will leave the question unanswered here.

provide a clear explanation for the special behaviour of LeCs. Some idiosyncratic mechanisms are surely imaginable that would allow exactly those structures to partake in the m-commanding relationship with the preceding vowel, to the exclusion of all other consonants. I have not been able to find any theoretical or empirical evidence for any such assumptions, making them stipulative. I will, therefore, remain agnostic as to the technical nature of the lack of lengthening caused by final non-LeC voiced obstruents. With regard to the special status of /ʒ/, i.e. that it only causes lengthening of front vowels, GP 2.0 does not provide a ready-made answer. We have, however, observed some interesting parallels with the notion of phonological binding within structures of the GP 2.0 type. It is important to stress that the hypothetical operations proposed in this chapter to derive lengthening for only front vowels are tentative. What they show is that binding could, in principle, provide a route to explaining the special behaviour of /ʒ/. In its proper definition, however, binding cannot directly solve this issue. The special assumptions necessary to make this parallel work entail mostly theoretical question which we will not be able to address here. Whether the parallel will hold up remains to be seen.

4.5 Irregular Cases of /u:/

It is striking that /u/ shares some properties with the other high vowels as well as with non-high vowels. The distributional facts on the whole pattern well with /i/ and /y/. There is, however, a number of examples where the apparently irregular length of /u:/ reminds one of the distribution of long non-high vowels. These exceptions do not contradict anything discussed in the last few chapters. So far, we have only looked at what causes length for high vowels in final syllables, not what prevents it in non-final syllables. To tackle this question, we need to demarcate what our goals and assumptions are for a theory of the phonology of Neuchâtel French.

4.5.1 Lexicon or Phonology?

The basic question is this: since non-high vowels may be long in any position, why do high vowels behave differently? Two lines of reasoning can be pursued here. Following the comments on structure and the element {A}, we can conclude that, similar to many other languages, non-high vowels in Neuchâtel French have an inherent propensity for length, or can be licensed more easily. The other way to approach the question is more minimalist in nature. What is the role of grammatical rules? Put very generally, they derive outputs from inputs. The inputs are the lexical items and their representations which are learned during language acquisition based on the input the learners receive. If the learners do not receive any input containing underlyingly long high vowels, they will not acquire them. Since they are not acquired, their absence does not need to be derived via a phonological process (see Hale and Reiss (2008) for similar lines of reasoning in other contexts). Accordingly, one could analyze the absence of underlyingly long high vowels as a gap in the input, rather than a principle of the grammatical system. The difference to the other processes discussed so far lies in the missing “productivity” of the lexicon. Whereas the LeCs and empty suffixes trigger alternations that require some type of process to be derived, the missing underlying lengths are just missing and never phonologically active in any way.

Although generally valid, this second approach misses one crucial aspect of the vowel system of Neuchâtel French, namely the regular nature of the distributional facts. This in itself would not be enough to discard historical sound change as the source of the pattern. After all, sound changes are

famously regular. What is astonishing in our case is the two-class system observed in the vowels. Non-high vowels occur in their long form wherever they want, long high vowels are very restricted in their distribution. Moreover, both groups partake in the same types of alternations, before LeCs and word-finally. If there was no underlying ban on long high vowels in non-final syllables, we should expect processes of analogy to take place here, creating similar patterns as in the non-high vowels. As discussed in the data section, we have cases of alternating vowel length in non-high vowels, but also underlying length, even if followed by LeCs. In a world where the lack of long high vowels in non-final syllables or before final non-LeCs was just due to diachronic change, without any recognition in the synchronic grammar, we would certainly expect at least some examples analogous to the behaviour of non-high vowels. This is why the regularity of the pattern is so remarkable. We do not find any exceptions of this type for /i:/ and /y:/.

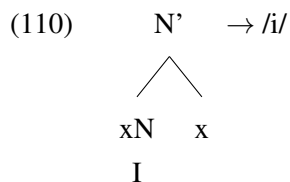
/u:/, however, shows a different behaviour. We see that the general distribution of /u:/ is very similar to that of the other high vowels, but a few exceptions creep in. There are some instances of /u:/ before final non-LeCs and in non-final syllables. In non-final syllables, /u:/ seems to appear only verb stem-finally, i.e. in a position where it will sometimes occur in final syllables. These occurrences look like cases of analogy to me. They appear on the fringes of the system and in cases where syllable position alternates. Now, I do not know the historical origin of all those exceptions. It might well be that some of them actually have etymological reasons. In this synchronic stage, however, they look like deviations. The question is how we interpret such cases. In a system that tolerates a certain degree of irregularity, this poses no problems. Government Phonology, however, postulates the principle of universality (Kaye et al., 1990), which states that a phonological process must take place if its conditions are met. If the differences between high and non-high vowels are a result of grammatically defined phonological behaviour, /u(:)/ should, therefore, not show such exceptions. Since it does, we must assume that /u(:)/ is not/no longer bound by the restrictions for the other high vowels and shows signs of aligning with non-high vowels.

Let us recap. We have argued that the divide between high and non-high vowels cannot just be the result of historical sound change, since the pattern in the high vowels is so regular despite analogical pressures from non-high vowels or potential paradigm leveling. Instead, we should assume some synchronic phonological mechanism to uphold the differentiation. Government Phonology posits that phonological processes must take place if their conditions are met. Since /u(:)/ shows a (slightly) different behaviour to the other high vowels, we must, therefore, assume that its underlying structure is (slightly) different.

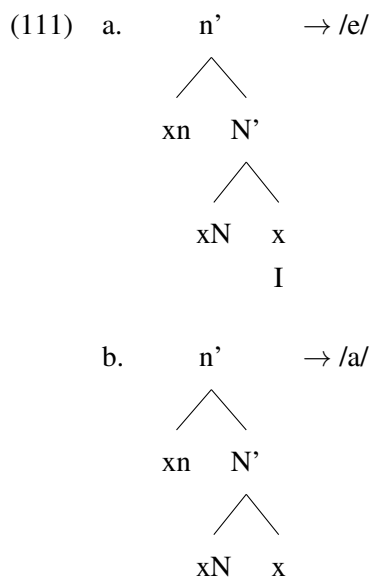
4.5.2 The Representation of /u(:)/

It is striking that /u(:)/ shows a mixture of the behaviours of high and non-high vowels. If we want to encode the difference concerning underlying length in the grammar between (front) high and non-high vowels, we have three options in principle. Either, we prohibit high vowels from being long underlyingly, or we specifically allow non-high vowels to do so, or we do both. The last option is not favorable for reasons of economy. The first two options are generally equivalent, but the data give us some hints. It is the non-high vowels that can be long underlyingly, i.e. all the vowels containing an {A} element. The high vowels are only characterizable by their lack of this element. It is most appropriate to assume, therefore, that it is the {A} element that introduces some properties that make length available. Obvi-

ously, there is still the need for an underlying principle/threshold that decides what is necessary for a vowel to be (potentially) long, since other languages have no issue with underlyingly long high vowels. That {A} has some connections to length/structure has already been mentioned. Within GP 2.0, this has been formalized (see Pöchtrager, 2018, 2024). Here, every vowel can consist of maximally two heads, projecting maximally twice each, i.e. four layers of structure. The intricacies of how to decide which heads project are not relevant to our point. What is of interest is the fact that high vowels consist of only one layer of structure, see Pöchtrager (2024, p. 8).⁸²



In (110), the element {I} defines the vowel as being a front vowel. {U} would result in a back rounded vowel, both in a combination. The one layer of structure is interpreted as a closed vowel. Compare this representation to that of mid and low vowels in Pöchtrager (2024, p. 8).⁸³



Non-high vowels show (at least) a second layer of structure. This second layer corresponds to the aperture of those vowels, but also “provide[s] extra room” (Pöchtrager, 2018, p. 50) which could be interpreted as length. This latter assumption is also made by Pöchtrager, judging by the described behaviour of {A}, but not worked out in detail. In any case, once {A} is reinterpreted as structure, non-high vowels will automatically contain more room and could, therefore be more inclined to be long. We need to be careful at this point, however. There also exist short non-high vowels. It can, therefore, not be the case that this extra structure always results in length. The mechanism would have to be more subtle. The issue is certainly reminiscent of the lengthening of front vowels before final /ʒ/. In both

⁸²In the following, I will use the notational conventions of Pöchtrager (2024).

⁸³Once there are more layers of structure, several representations are possible. I give the representations Pöchtrager gives for European Portuguese. The details do not concern us here. Only the number of layers is of interest to us.

cases, there is an empty position that can result in length, but there are restrictions on the type of vowel that can access this position. The difference is, of course, that in the case of lengthening before /ʒ/, the conditions are purely phonological. By contrast, the length of non-high vowels in non-lengthening contexts is lexically marked. One would need to postulate an optional use of this empty structure as length. The choice whether this possibility is exploited or not would then be a lexical question, settled during acquisition for each underlying form. If we accept this interpretation of the facts, what about /u/? In classical Government Phonology, we would not expect it to contain an {A} element. Since GP 2.0 allows up to four projections of a vowel, we could postulate that /u/ simply has two layers compared to the one layer of /i/ and /y/. Normally, one would expect this to result in a mid vowel. We could, however, define that this second layer in Neuchâtel French still results in a high vowel. This is, obviously, completely stipulative. Moreover, one would still expect some correlation with vowel height to be noticeable in that case, i.e. the vowel to be more open than the other high vowels.

Another option would be to assume length in irregular cases of /u:/ to be of a different nature, e.g. to stem from a branching nucleus. Then, we would lose any connections to the other vowels, however, needing some idiosyncratic mechanisms for licensing this specific type of length for just this vowel. It is true that asymmetries between the elements have been observed that could support an idiosyncratic solution to the problem. This would, however, amount to saying that /u/ is different because {U} is different — not a very deep insight.

Lastly, one could try to implement a similar approach to what we sketched out for the lengthening of vowels before final /ʒ/. In this case, we would need to assume that actually all vowels have enough structure to be long, but that front vowels, due to their containing {I} would not be able to “access” this higher space. The reason would have to be looked for in the binding relation between the empty position providing length and the head of the vowel. This contradicts the definition in Živanović and Pöchtrager (2010) which states that binder and bindee need to be non-head terminal nodes. The second issue concerns the number of layers present in high vowels. For this approach to work, high vowels already need a second layer of structure, creating space for the potential lengthening of /u/. Again, it would be possible to assume high vowels to have two layers, closed mid-vowels to have a third layer, open mid-vowels a fourth, and low /a/ three or four layers. This is all possible within the theory, but poses questions about the phonetic interpretation of those vowels. We would need to redefine the threshold between high and mid vowels for Neuchâtel French as lying between the second and third layer. To redefine the theory in this way, however, is to bereave it of its direct connection to aperture. If we translate the above ideas back into a system with an {A} element, they would amount to saying that all vowels had an {A}, but that some of them did not express it because a stronger {A}/more {A} was needed to be perceptible acoustically. Although possible, this type of analysis defeats the object of trying to correlate the acoustic signal with the representation of vowels. A completely abstract phonology would, of course, be an option. But then we could just invent some phonological primitive that does the job. We would not have to distort the complex structural makeup of GP 2.0. In both cases, the theory put forward would be highly stipulative.

We find ourselves in a position where we can write a rule for the idiosyncratic behaviour of /u:/, but cannot derive it from any underlying principles without being hopelessly circular. This rather depressing state of affairs closes this section.

4.6 Summary

Let us come back to the four main question we asked at the beginning of this chapter:

- Why are long high vowels restricted to final syllables?
- Why are long and short high vowels in complementary distribution in all but one context, namely word-finally?
- Why/how do the lengthening consonants cause lengthening on preceding vowels and why only when they are in final position?
- What is the nature of the asymmetry between back and front vowels?

We now have some answers, although they might not be completely satisfying. Concerning the first question, we argued that the final syllable is not integral to the processes but that the correlation is, in fact, epiphenomenal. In the case of final long high vowels, the length is added by a melodically empty suffix that attaches to the stem ending in a high vowel. Since there is no other position it can attach to, the length will have to arise in the final syllable. For length before final LeCs, the mechanism proposed in Pöchtrager (2006) is based on an empty position in the final consonant that will only be unlicensed when in final position, i.e. not followed by a realized nucleus.

The second question can also be answered quite clearly: Complementary distribution actually holds in all positions. Final long high vowels, that seem to form minimal pairs with their short counterparts, are, in fact, morphologically complex. Underlyingly, they are short vowels, followed by a melodically empty suffix into which the vowel spreads and is thus realized as long. These vowels do not, therefore, form real minimal pairs with short final high vowels, since the latter lack the empty suffix.

To define the group of LeCs on objective/independent grounds has proved a difficult task. Several properties seem to play a role, e.g. voicing, frication, lack of stop properties, but do not exclusively pick the four consonants out that are LeCs in Neuchâtel French. Within GP 2.0, a better approximation was possible, defining the LeCs as those voiced consonants, whose lowest head projects exactly once. Although descriptively adequate, this does not provide an answer for their special behaviour. As mentioned before, the lengthening they cause can be captured within GP 2.0 as the preceding vowels m-commanding the single empty slot these consonants provide. This should, however, also hold for other consonants, at least all voiced stops. The fact that only fricatives (and /ʁ/) have exactly one layer of their lowest projection does not explain this difference in behaviour. Some mechanism is surely imaginable that can do so, but I cannot see what additional evidence could support any such ideas. Lastly, the finality of the LeCs is a built in condition from the get-go, as discussed above. This prediction supports our basic analysis of the lengthening before LeCs within GP 2.0.

The last question is probably the most difficult to answer. On a very superficial level, the difference between back and front vowels lies in the presence of an {I} element in the latter group. This probably explains its lengthening before /ʒ/, the only LeC containing an {I}, and might also have something to do with the irregular lengths observed for /u:/ but not for /i:/ or /y:/. Any technical implementation of this correlation is, however, difficult to formulate. With certain special assumptions, phonological binding could be made to work, at least for the cases of lengthening before final /ʒ/. Irregular cases of long /u:/ remain rather mysterious. It looks like these long vowels form a bridge between the restricted behaviour of /i:/ and /y:/ on the one hand, and the unrestricted long non-high vowels on the other. Whether this is

just a diachronic tendency (if at all) or reflects a synchronic state is hard to tell. Such a behaviour would certainly not be expected by the theories we discussed.

5 Conclusion

The goal of this thesis was twofold. On the one hand, a thorough description of the high vowels of Neuchâtel French, of their distribution, alternations, and length was to be given. On the other hand, I tried to show how these patterns could be interpreted and formalized within one of the most elaborate autosegmental theories of phonology, Government Phonology. In the course of these two endeavours, several questions have arisen and we shall now take a look back and review our answers.

The segmental inventory of the high vowels of Neuchâtel French is rather simple, consisting of three vowels, /i, y, u/, that are contrastive in all positions and are never reduced. Alternations of these vowels with other segments are very rare and restricted either to opaque historical correspondences, like in the case of nasal vowels, or to changes in syllable structure, seen in the (rare) alternations of the high vowels with their glide-counterparts. The more interesting patterns arise with respects to the high vowels' length. Only two broad contexts allow the high vowels to be long. First, before a final lengthening consonant (LeC), second in word-final position. While in the latter context length is optional and, therefore, potentially contrastive, it is obligatory in the former. The set of consonants causing this obligatory lengthening is /ʁ, v, z/ for all vowels, and in addition /ʒ/ for front vowels. For /i(:)/ and /y(:)/, exceptions are marginal. /u(:)/, however, shows a few cases of unexpected length, culminating in some long /u:/s occurring in non-final syllables, a context in which /i:/ or /y:/ are never found. These cases of /u:/ seem to be restricted to the final position in verbal stems, showing up in non-final position only when followed by a suffix.

The theoretical analysis of these patterns has proved rather difficult, but some conclusions can be drawn.

First, the representations of high vowels and LeCs were examined using different approaches within Element Theory. For the vowels, the representations are straightforward, consisting of the elements {I} and {U} while lacking {A}. The LeCs are more difficult to pin down. I have argued that the voiced fricatives are marked with an {L} element indicating their voicing, whereas /ʁ/ is neutral in this respect, i.e. it contains neither {L} nor {H}. Other than that, most questions regarding the representations of LeCs in classical Element Theory remain open. Their lack of stop-properties seems to characterize the group best, but does not exclusively pick out these four consonants. Attempts to derive their behaviour from the complexity of their representations were unsuccessful altogether.

With regard to length, the question of final lengths was discussed first. The apparent contrast between long and short high vowels appearing only in final position is a rather peculiar fact. And, indeed, we have argued that it does not exist underlyingly. That is, an underlying final high vowel will always be short. Length can only appear through the addition of a melodically empty suffix, into which the final vowel can spread and, therefore, become long. The hypothesis that final length in high vowels is the result of such a suffix is supported by the distribution of these vowels which is clearly morphological in nature. Furthermore, the assumption of an empty suffix in those cases may explain some other features of French morpho(phono)logy as well, e.g. the appearance of different markers in feminine adjectives.

Length before final LeCs is more elusive. The distribution is clearly phonologically conditioned,

presupposing a phonological cause. Even though the set of lengthening consonants is easily defined descriptively, their internal makeup in terms of elements does not show any overarching commonality that is unique to them. Equally, the mechanism by which these LeCs contribute length to a preceding vowel is not clearly formalizable within classical Government Phonology. For these reasons, we turned to GP 2.0. This recent development in Government Phonology supposes a closer relationship between the quality of segments and their structural properties, making it possible to formalize lengthenings of the kind we see in Neuchâtel French. In fact, the mechanism is quite straightforward. An empty position in the structure of a lenis consonant can be taken over (m-commanded) by the preceding vowel. Crucially, this can only happen word-finally. Where this approach breaks down is the choice of LeCs. GP 2.0 would predict at least all voiced obstruents to behave this way. The only commonalities the four LeCs and only the four LeCs share are the facts that they are voiced (in contrast to our standard representations, where /ʁ/ was neutral) and that their lowest head projects exactly once. How this constrains the lengthening mechanism is, however, unclear to me.

The idiosyncratic behaviour of /ʒ/ can be approximated by the formal mechanisms provided by GP 2.0. However, some special stipulations regarding phonological binding are necessary to disallow any segment not containing {I} (as a head) to m-command the empty structural position of their following onset, if this onset has itself an {I} in a non-head position.

Lastly, the unexpected cases of /u:/ were discussed. They seem to form some sort of halfway-point between the other high vowels and the non-high vowels. We have suggested a few ways in which this could potentially be mapped onto their representation, but all of them suffer serious problems.

All in all, the system of Neuchâtel French high vowels can be simplified significantly by the theoretical analyses proposed in this theses. Not only can we get rid of the apparent length-contrast in final position, but the final syllable as a relevant category for high vowels becomes unnecessary. The fact that lengthening arises in only this syllable for high vowels can be derived from the lengthening mechanisms assumed in this thesis, without reference to prosodic structure whatsoever. Why length is excluded in all other cases for high vowels can be explained if we adopt the structural description of vowels provided by GP 2.0.

Obviously, high vowels are only one part of the vowel system of a language. We have only touched on the properties of non-high vowels. Certain aspects of our analysis can be adopted quite easily for them too, e.g. the representation of final length (although non-high vowels may have additional underlying lengths in this position as well). Other aspects will have to be revised and made more sophisticated to account for additional data, e.g. other asymmetries in the LeCs, not seen in high vowels. Lastly, there will be some wholly new issues to deal with, like alternations in vowel quality, which are notorious in mid vowels. What I hope this thesis has done is to lay a basis on which one can build to address these other problems as well, and to show that even seemingly simple patterns in a well-understood language like French pose infinite little mysteries that can at least be partly unraveled by theoretical (and meta-theoretical) considerations.

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Abstract

This thesis investigates the high vowels of Neuchâtel French, a dialect of French spoken in the canton of Neuchâtel in western Switzerland. The first part provides a detailed description of the distribution and phonological behaviour of the three high vowels, /i, y, u/, and their long counterparts, /i:/, /y:/, /u:/. In the following, the main focus lies on the quantity of the high vowels, which is, contrary to their quality, allophonic and predictable in all but one context. The only exception is the final position, in which minimal pairs between long and short high vowels arise. In the second part of the thesis, these patterns will be formalized using a theoretical basis that mostly goes back to classical Government Phonology (Kaye et al., 1985, 1990) and GP 2.0 (Pöchtrager, 2006, 2018). I argue that the minimal pairs between long and short high vowels exist only at the surface level. Vowel length in these cases is caused by the combination of a short final vowel and a melodically empty suffix, into which the vowel spreads. This analysis is supported by the morphologically conditioned distribution of these long vowels. Phonologically conditioned long high vowels have a different origin. They occur before certain final consonants, namely /b, v, z/ and for front vowels /ɜ/ as well. This distribution follows from assumptions of GP 2.0 if the consonants in question are provided with the correct representations. Length is the result of a structural position within the onset, which is m-commanded by the preceding vowel if the consonant is lenis and in word-final position. I also argue that the special behaviour of /ɜ/ can be derived if one makes some additional assumptions about phonological binding (Živanović & Pöchtrager, 2010). Some occurrences of /u:/ do not seem to be subject to the above conditions, which sheds some light on the asymmetry between front and back vowels.

Deutschsprachiges Abstract

Die vorliegende Arbeit untersucht die Hochvokale des Neuenburger Französischen, einer Varietät des Französischen, die im Kanton Neuenburg in der Westschweiz gesprochen wird. Im ersten Teil wird eine detaillierte Beschreibung der Verteilung und des phonologischen Verhaltens der drei Hochvokale /i, y, u/ und deren langer Gegenstücke /i:/, /y:/, /u:/ gegeben. Das Hauptaugenmerk wird daraufhin vor allem auf die Quantität der Hochvokale gelegt, welche, im Gegensatz zur Qualität, in allen Kontexten bis auf einen allophonisch und vorhersehbar ist. Die einzige Ausnahme bildet die Position am Wortende, wo Minimalpaare zwischen kurzen und langen Hochvokalen auftreten. Im zweiten Teil der Arbeit werden diese Muster mithilfe eines theoretischen Fundaments, das größtenteils auf klassische Rektionsphonologie (Kaye et al., 1985, 1990) und GP 2.0 (Pöchtrager, 2006, 2018) zurückgeht, formalisiert. Ich argumentiere, dass die Minimalpaare zwischen langen und kurzen Hochvokalen nur an der Oberfläche existieren und die Langvokale in diesen Fällen auf eine Kombination aus Kurzvokal und einem melodisch leeren Suffix, in welches der Vokal streut, zurückgehen. Diese Analyse wird durch die morphologisch konditionierte Verteilung dieser Langvokale unterstützt. Die phonologisch konditionierten langen Hochvokale haben einen anderen Ursprung. Sie treten vor bestimmten finalen Konsonanten auf, nämlich vor /ʁ, v, z/ und Vordervokale zusätzlich vor /ʒ/. Eine solche Verteilung folgt aus Annahmen von GP 2.0, wenn den relevanten Konsonanten die korrekten Repräsentationen zugeordnet werden. Die Länge entstammt einer strukturellen Position innerhalb des Onsets, die vom vorherigen Vokal m-kommandiert wird, wenn der Konsonant selbst lenis ist und in wortfinaler Position steht. Ich argumentiere auch, dass sich das Sonderverhalten von /ʒ/ ableiten lässt, wenn man bestimmte Zusatzannahmen zu phonologischer Bindung (Živanović & Pöchtrager, 2010) trifft. Einige Vorkommen von /u:/ scheinen allerdings nicht den obigen Bedingungen unterworfen zu sein, was gewisse Rückschlüsse auf die Asymmetrie zwischen Vorder- und Hintervokalen zulässt.