Lenis and fortis in Bavarian: Broadening the perspective

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The discussion around the consonantal opposition of lenis and fortis dominates the phonology of the Bavarian dialects of German. Numerous scholars have commented on the topic (e.g. KUFNER 1961, GLADIATOR 1971, BANNERT 1976, ZEHETNER 1978, HINDERLING 1980, SCHEUTZ 1984, STÖR 1999) without coming to a final conclusion. This paper has two goals. First, it will be shown that the opposition is by far more complex than has been assumed and that there are a couple of dimensions of contrast that have not been noticed so far. Second, a new hypothesis will be proposed concerning the phonological nature of the opposition.

1. Phonological basics

The subdialect on which the following analysis is based is Western Central Bavarian. The region where this dialect is spoken roughly coincides with the districts of Upper and Lower Bavaria inside the German state of Bavaria. There is no reliable information about the number of speakers, which can be estimated, however, to be somewhere in the lower single digit million range considering the populations of Upper and Lower Bavaria. In general the differences between Western Central Bavarian and the other Bavarian dialects (Eastern Central Bavarian in the biggest part of Austria, South Bavarian in the south of Austria and in South Tyrol, North Bavarian in the Upper Palatinate district of Bavaria) do not affect the lenis/fortis opposition and are thus not treated here.
Below is the phoneme inventory of Western Central Bavarian.

p pʰ	t tʰ		k kʰ
p͡f	t͡s	t͡ʃ	
f v	s	ʃ	h
m	n		ŋ
	l		
	r		
	j		

i y	u
e ø	o
ɛ	ɔ
a	ɑ

i̯a y̯a		u̯e u̯a
e̯a (ø̯a)		o̯e o̯a
	ɜ̯e ɜ̯o	ɔ̯e
a̯e a̯o		

Tab. 1: Western Central Bavarian phonemes

The lenis/fortis opposition as traditionally viewed concerns indigenous voiceless obstruents, that is, stops /p t k/, affricates /p͡f t͡s t͡ʃ/ and fricatives /f s ʃ x/. The most salient features distinguishing the two types of consonants is their length, lenis consonants (LC) being short and fortis consonants (FC) long. In addition, there is a somewhat obscure type of consonant quality commonly labelled "strength". As far as Bavarian is concerned, there has been little consideration as to what strength could mean phonetically. Still, LC are often termed "weak", while FC are "strong".
A famous law discovered by PFALZ (1913) states that accented vowels are always long before LC but short before FC. In other words, the quantities of subsequent vowels and consonants in accented syllables are complementary. Below are some examples. The diacritics /ˋ/ and /ˊ/ are employed to designate lenis and fortis sequences, respectively.

lenis	/ˈrɑ̀e̯sn/ [ˈrɑe̯sn̩] 'to travel'	/ˈvèk/ [ˈβeːk] 'way'	/ˈòfa/ [ˈoːfɐ] 'oven'
fortis	/ˈrɑ́e̯sn/ [ˈrɑe̯sːn̩] 'to tear'	/ˈvék/ [ˈβekː] 'away'	/ˈófa/ [ˈofːɐ] 'open'

2. Broadening the perspective

Although the features mentioned above are the most salient ones, there are a lot more differences between LC and FC. The following have already been described in the literature:

- **Voice** (e.g. ZEHETNER 1978): LC may become voiced between vowels and resonants. The probability for voicing is greatest for the phonotagm V_V, followed by V_R and R_V on the same rank and finally R_R with the lowest probability. Plosives get most easily voiced, fricatives somewhat rarely and affricates never. For plosives in V_V (and for most speakers also in V_R and R_V), voicing is the usual case and thus considered as a regular allophony here. Examples: /ˈvaͤeta/ 'further' [ˈβaːe̯dɐ], /ˈʃiːɐ̯kln/ 'be squint-eyed' [ˈʃiːɐ̯gl̩n].
- **Degree of closure** (e.g. STÖR 1999): LC have a tendency towards a lower degree of closure than corresponding FC. Thus, lenis plosives easily get fricativised in V_V (alongside with voicing, thus /ˆp ˆt ˆk/ as [β ð ɣ]) and lenis affricates may come close to fricatives after nasals (thus /ˆp͡f ˆt͡s ˆt͡ʃ/ as [ᵖf ᵗs ᵗʃ] / [m n]_). Examples: /ˈnìpa/ '(to) over there' [ˈniːbɐ]~[ˈniːβɐ], /ˈtɑ̀nt͡s/ 'dance' [ˈtɑnᵗs].
- **Compressibility of vowels** (BANNERT 1976): Although accented vowels before LC (LV) are clearly long in slow, careful pronunciation, their quantity shows a much greater degree of variation than that of vowels before FC (FV). Especially in fast, careless speech the quantity of LV may often be as short as that of FV. Examples: /ˈòta/ 'or' [ˈoːdɐ]~[ˈodɐ], /ˈmùsi/ 'music' [ˈmuːsi]~[ˈmusi]
- **Syllable number** (KRANZMEYER 1956): As a consequence of a sound law called Central (and North) Bavarian Monosyllabic Lengthening, there is a strong affiliation between monosyllabics and LC. In the corpus I used for my Master's thesis, 83.7% of the final consonants of all monosyllabics are lenis. Examples: /ˈtɔ̀k/ 'day' [ˈtɔːk], /ˈlòh/ 'hole' [ˈloːx], /ˈpàt͡s/ 'mud' [ˈpaːt͡s].

Several other differences have not been mentioned so far:

- **Compressibility of consonants**: The quantity of FC shows greater variability than that of LC. The difference in compressibility is somewhat smaller than with LV/FV but still easy to perceive. Examples: /ˈpésa/ 'better' [ˈpesːɐ]~[ˈpesɐ], /ˈpɛ́li/ 'head' [ˈpɛlːi]~[ˈpɛli].
- **Potential length:** Beside speaking speed, there are also phonological factors conditioning the surfacing of length. Accented vowels are clearly long only before single LC, before single LC followed by inflection suffix or before LC+R+V. Also, FC in positions other than after an accented vowel are never long and can only be distinguished from LC by their voicelessness. However, these restrictions can by overridden by special pragmatic circumstances. One is delayed retrieval, where a speaker is already producing a word but then starts to think about the rest of the utterance, causing otherwise short LV and FC to get lengthened. The same thing may happen when a speaker has to repeat a word another speaker did not understand for the second time. Thus, it may be said that LV and FC are not always long, but always potentially long. Potential length does not apply to FV and LC. Examples: /ùnt/ 'and' [unt]~[uːnt], /ˈàpátn/ 'work' [ˈɑːbɐtn̩]~[ˈɑːbɐtːn̩].
- **Similarity to /ˈV#/**: Accented vowels at the end of words are long as are accented LV. Examples: /ˈrɔ̀ːt/ 'advice' [ˈrɔːt] like /ˈrɔ̀ː/ '(to) down here' [ˈrɔː], /ˈkɛ̀ːt/ 'goes' [ˈkɛːt] like /ˈkɛ̀ː/ 'go!' [ˈkɛː].
- **Similarity to /#C...ˈ/**: The quality of consonants in the beginning of words is usually unspecified. However, if a word ending in an accented vowel precedes a word starting with a consonant not immediately followed by word accent, this consonant behaves like a LC in all respects. Example: /ìn ta kaˈràʃ/ 'in the garage' [indɐgɐˈraːʃ].
- **Compactness**: Traditionally resonants are considered to be always lenis. However, quantity measures as well as sonograms show that some /m n l/ show differences very similar to L/F obstruents. An additional difference is that lenis resonants allow for the leftward spread of secondary gestures such as the lowering of the velum in /m n/ (causing nasalisation of the preceding vowel) and slight lip protrusion in /l/ (causing rounding of the preceding vowel; much less frequent than nasalisation). Examples: /ˈlàŋe/ 'long ones' [ˈlãːŋe] vs. /ˈréŋa/ 'to rain' [ˈreŋːɐ], /ˈʃpìlfi̯lm/ 'movie' [ˈʃpi̯lfi̯lm] vs. /ˈkʰílo/ 'kilo' [ˈkʰilːo].

- **Syllable affiliation**: When describing the syllable affiliation of intervocalic consonants impressionistically, FC seem to be ambisyllabic. Examples: /ˈmú͡ata/ 'mother' [ˈmu͡ɐt.ːɐ], /ˈtɛ́pàt/ 'silly' [ˈtɛpːɐt].
- **Length in clusters**: In consonant clusters, only the first consonant with lowest sonority according to the sonority scale L > N > F > P(f) can be potentially long, while all other consonants are invariably short. This consonant will be called R_0 in the following. Examples: /ˈʃárfa/ 'hot one' [ˈʃarfːɐ], /ˈhítna/ 'lodges' [ˈhitːnɐ].
- **Relation to cluster complexity**: The more complex clusters get, the stronger is their tendency to be generally fortis, especially if they consist of consonants with low sonority. Examples: /ht͡sk/ as in /ˈfúht͡sk/ 'seventy' [ˈfuxt͡sk] and /pst/ as in /ˈhe͡apst/ 'autumn' [ˈhe͡ɐpst] are always fortis.

3. Two concepts from Articulatory Phonology

The main problem with the L/F opposition is its formal diversity as opposed to its functional simplicity. Previous approaches have tried to solve this problem by assessing phonological relevance to only one dimension of contrast, notably to consonant length (as gemination in KUFNER 1961), to consonantal "strength" (STÖR 1999), to suprasegmental "syllable cut" (GLADIATOR 1971, ZEHETNER 1978), or to complementary length (BANNERT 1976). Some of these approaches (consonantal "strength" and "syllable cut") stay phonetically vague. None of them tries to incorporate more than some of the known dimensions of contrast, not to mention the unnoticed dimensions listed above. Finally, none except BANNERT tries to explain why and how the one dimension considered phonologically relevant motivates the others. It is, however, possible to integrate the majority of dimensions of contrast in an explanative account if one gives up searching in the acoustic domain. Below I will shortly introduce two concepts from Articulatory Phonology (BROWMAN and GOLDSTEIN 1986) that may serve to do so.

Articulatory Phonology views speech as a sequence of articulatory gestures. The abstract temporal structure of a gesture can be defined using a set of relevant points that GAFOS (2002) calls *landmarks* as shown below.

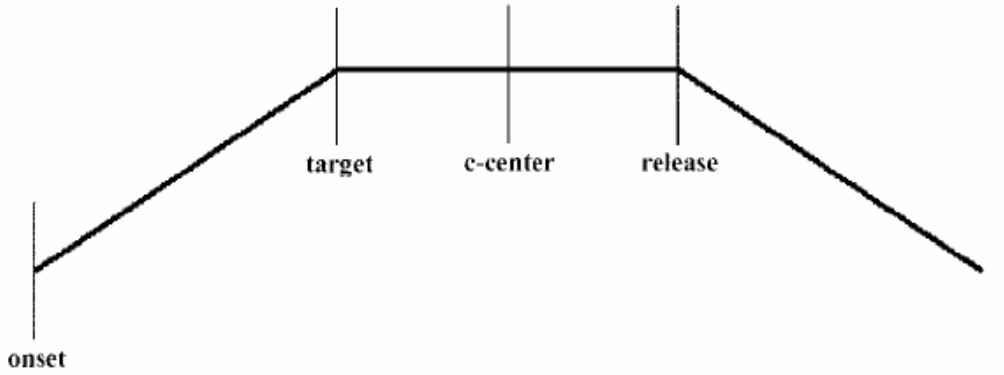

Fig. 1: Gestural landmarks (GAFOS 2002:8)

Landmarks can be used to describe the relative coupling (coordination) of gestures. BROWMAN and GOLDSTEIN (1988, 1990) mention three prototypical coupling patterns: center-onset coupling in #CV, release-target coupling in VC#, and release-onset coupling in C_1C_2. Fig. 2 illustrates these patterns.

Onset clusters display yet a different type of coupling, which has again been first noted by BROWMAN and GOLDSTEIN (1988). The consonants in these clusters are arranged in such a way that the the arithmetic mean of the centers of the single consonants is coupled to the vowel onset. Thus, the cluster as a whole acts like a single consonant. To explain this behaviour, being at odds with the usual coupling pattern for both #CV and C_1C_2, NAM and SALTZMAN (2003) assume what they call *competitive coupling*. This means that in #C_1C_2V, C_1 and C_2 are coupled to each other according to the C_1C_2 pattern *and* each C is coupled to V according to the #CV pattern. The best compromise between these competing couplings is the pattern actually found in #C_1C_2V. This is illustrated in fig. 3.

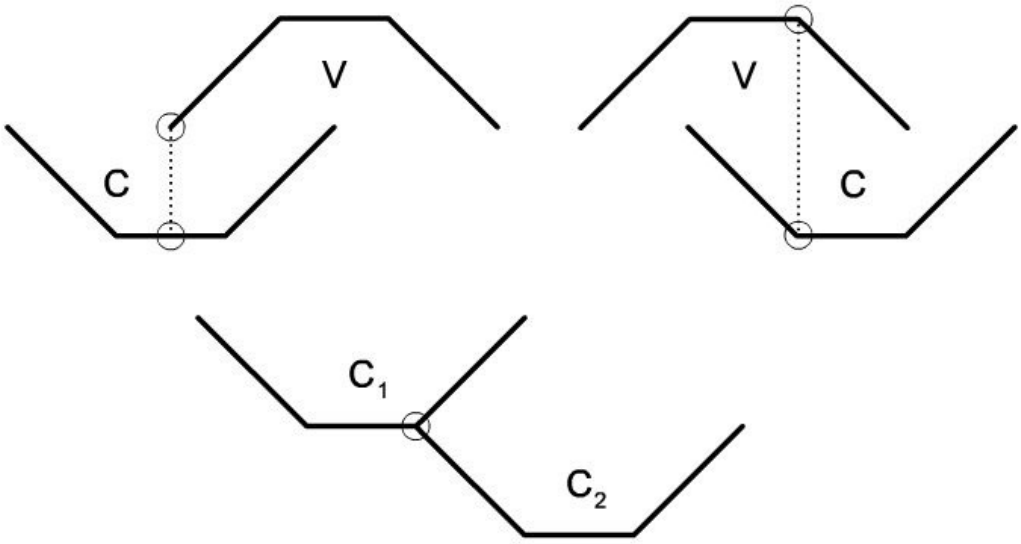

Fig. 2: Coupling patterns for #CV, VC# and C_1C_2

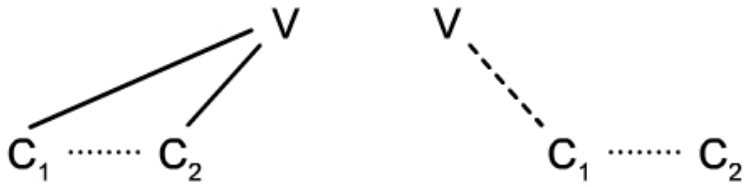

Fig. 3: Competitive coupling in #C_1C_2V vs. sequential coupling in VC_1C_2 (lines indicate coupling pattern)

4. Integrating and explaining the features of lenis and fortis

To explain the diverse behaviour of LC and FC, we assume that the release of a LV is coupled to the center of the primary closing gesture of the following LC, while in the case of fortis sequences the center of the FV is coupled to the target of the FC. This can be easily schematised as follows:

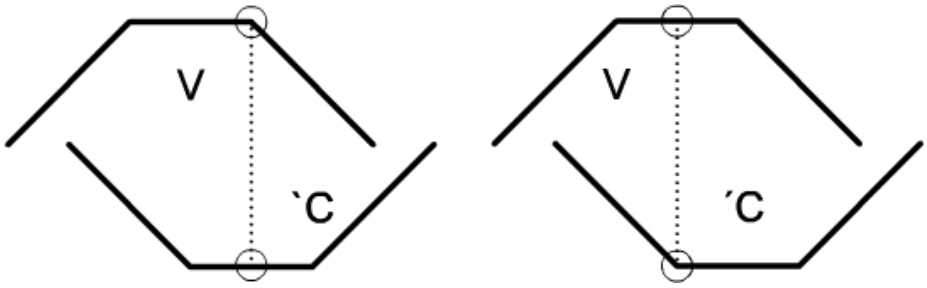

Fig. 4: Hypothetical coupling in lenis and fortis VC sequences

In addition, it is assumed that lenis clusters have lenis coupling for VC and standard coupling for C_1C_2, while fortis clusters have standard coupling CC and competitive fortis coupling between V and each C:

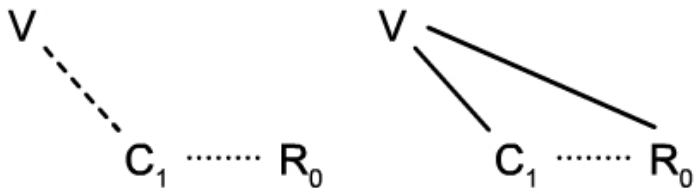

Fig. 5: Sequential vs. competitive coupling in lenis and fortis clusters

Most of the features of lenis and fortis discussed above can be motivated via these two assumptions:

- **Potential length:** In lenis sequences, the vocalic coupling point lies at the right edge of the vowel's plateau, so LV have plenty of space to unfold. Still, LC are necessarily short because the prolongation of their plateau to either side of the consonant's center would run counter to the coupling pattern, while prolongation to both sides would lead to a clash of vowel and consonant articulation on the left. Similarly, FV have to be short: If their plateau was prolonged to the left, the vocalic coupling point would no longer be in in the center as prescribed by the coupling pattern. However, it can neither be prolonged to both sides because the vowel and consonant gestures would then clash on the right side. FC are potentially long for the same reason that LV are.
- **Voice:** The shorter a consonant, the more difficult it gets to actively widen the glottis during its production. Instead, it is easier to leave the glottis "untouched". The fact that the vocal folds may keep vibrating during the production of LC in a voiced environment such as V/R_V/R suggests that no glottal action is specified for these consonants.
- **Degree of closure**: The shorter a consonant, the more difficult it gets to perform the full consonantal gesture, i.e. to produce a full closure in case of a stop. This motivates the frequent fricativisation of LC.
- **Similarity to /'V#/**: Where LV have a very late coupling point, vowels at the end of words have no right coupling point at all and thus have similarly much space to unfold.
- **Similarity to /#C...'/**: If we assume that in a V`CV sequence there are two active coupling patterns (lenis VC coupling and standard CV coupling), this sequence can easily be simulated if the release of an uncoupled word-final accented vowel gets close enough to the center of a following word-initial consonant. This does not explain, however, the role word accent plays in #C sandhi.
- **Compactness**: Allowance for leftward spread of secondary gestures is a common feature of syllable-final consonants (cf. KRAKOW 1999). In the case of LC, there is similarly much time for the consonant to build up, so secondary gestures not bound to the coupling point can easily spread leftward. This will not usually happen with FC which have to build up comparatively quickly and thus stay compact.
- **Syllable affiliation**: If we assume that in a V´CV sequence there are two active coupling patterns (fortis VC coupling and standard CV coupling, cf. fig. 6), this results in two independent coupling points on the FC (target and center). This may explain why FC are perceived as ambisyllabic, while the affiliation of intervocalic LC (using the consonantal center as a double coupling point) is rather unclear.
- **Length in clusters**: The competitive coupling in FC clusters compresses subsequent consonants and thus explains why only R_0 is potentially long. It does not explain why there are not potential lengths in LC clusters (although there is no place for lengths between V and C, lengths are theoretically possible between any two C here).

It is not claimed that all features of the lenis/fortis opposition result necessarily from the proposed coupling pattern, which would make this pattern the only informationally relevant feature. Rather, coupling motivates the other features, which means that this is the feature whose mastery makes it easiest to memorise and handle the other ones and is thus likely to be at the core of the lenis/fortis category.

It should also be kept in mind that the present theory is phonologically plausible but should be phonetically tested to gain empirical weight. Two features the theory has nothing to say about are the association of monosyllabics with lenis VC sequences and of complex clusters with FC.

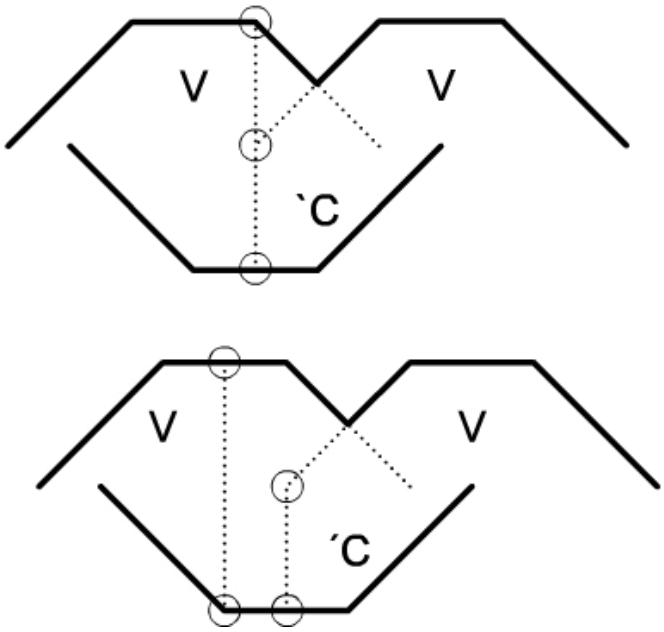

Fig. 6: Intervocalic lenis vs. fortis coupling

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