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ON MAINTAINING AND EXTENDING CONTRASTS: NOTKER'S *ANLAUTGESETZ*[1]

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Abstract

Native speakers deal with their phonological system without any knowledge of a lost contrast. To avoid neutralisations, speakers can only make use of their present phonological system of contrasts. Speakers of Old Alemannic (the dialect of Notker der Deutsche) had no contrast in voicing or FORTIS/LENIS after the Second Consonant Shift had reduced the pre-OHG voiceless stops to fricatives and affricates. They had instead a QUANTITY contrast, which they utilised to distinguish between an old coronal stop and a new one developed from *þ, thereby introducing a word-initial contrast only in coronal stops. This contrast was again later **extended** to other places of articulation through generations

[1] We would like to express our deepest appreciation to the Stiftsbibliothek in St. Gall, Switzerland, especially Theres Flury and her co-workers at the library. We were allowed not only to see and handle the Notker manuscripts but also to digitally copy the *De nuptiis Philologiae et Mercurii* (*Die Hochzeit der Philologie und des Merkur*) by Martianus Capella (filed under Codex Sangallensis 872, dating from the 11th century). We gratefully acknowledge the generous permission to reproduce parts of the manuscript in the Appendix of this paper. Very special thanks go to Henning Reetz, who masterminded the whole St. Gall operation. Earlier versions of this paper were presented at the annual meeting of the Linguistic Society of America in San Francisco in January 2002, at the Spring meeting (2002) of the Philological Society in London, at a colloquium at Stanford University in October 2002, and at the Joint Meeting of the Forum for Germanic Language Studies and the Society for Germanic Linguistics in London in January 2003. We are very grateful for the comments we received at these meetings, particularly the feedback from Martin Durrell. The research was partly supported by funds from the Deutsche Forschungsgemeinschaft (Sonderforschungsbereich 471 and the Lebniz Prize).

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while adapting loans from donor languages which had a contrast in voicing. No **new** contrast was added due to loans. As a result, modern Alemannic dialects such as Thurgovian have a QUANTITY contrast in stops in all positions of a word.

1. Introduction

The phonological inventory of a language represents a system of contrasts which is part of every native speaker's grammar. The system of contrasts may, of course, change through generations. Once a contrast is lost native speakers have no access to it. For all future changes, the native speaker must deal with his/her present system of contrasts. In Thurgovian, a modern Alemannic dialect spoken in the canton of Thurgau in Switzerland, the phonological system in stops comprises three places of articulation all of which have a geminate/singleton contrast in all positions in the word — initial, medial and final (Kraehenmann 2001, 2003). About a thousand years earlier, the system did not include a QUANTITY contrast in word initial position for labials and dorsals, but for coronals. Neither did it have a voicing contrast which was lost in pre-OHG times. However, a sandhi process, reflected in the writing system of Notker der Deutsche (960–1021), suggests that there was an allophonic quantity alternation for these places of articulation. The extension of the QUANTITY contrast to all places of articulation came about as a consequence of loans.

This paper is about contrasts — their representation, maintenance and extension in phonological systems across time. As an illustration of our general theoretical claims, we use old and modern dialects of Alemannic. We construct Notker's phonological inventory and system of contrasts based on his writing system, on comparative dialectal evidence, on our knowledge of the phonological changes in older stages, and on the present-day correspondences in the modern descendant of Thurgovian. We hope to demonstrate that Notker had an excellent sense of contrasts and used it meticulously so that there was no danger of confusing allophonic alternations with real phonological contrasts.

We will show that Notker had no access to old contrasts of VOICE which had been neutralised in pre-OHG. In his phonological system, he used only QUANTITY to maintain contrasts. We will also contend that these data are witness to a general principle, viz. that existing phonological contrasts constrain the way in which loans are adapted — contrasts may be extended, but no new contrasts may be added due to borrowing.

Notker der Deutsche or Notker Labeo was a scholarly monk in the Benedictine monastery of St. Gall in the northeast of Switzerland. The manuscripts he produced, written in the 10th century Alemannic dialect of Old High German, have always been a source of interest to both philological and linguistic scholars. Our interest here focuses on his practice of using alternating letters for word initial stop consonants depending on the sonority of the preceding consonant. Notker used the letters <b> and <g> word initially when following a word ending in a sonorant and <p> and <k/c> if the preceding word ended in an obstruent.[2] This rule is known as Notker's *Anlautgesetz* (law of initial consonants) (Grimm 1880: §365; Wilmanns 1897: §65–66; Valentin 1962: 347–348). Illustrations of the examples in (1) from the manuscript are given in the Appendix.

(1) Notker's *Anlautgesetz* examples with <p>∼<b> and <k/c>∼<g>

a. íh **p**egínne (Nc03519) ín in díu óugen **b**egínnet (Nc09720)
I begin *in the eyes begin-3*P.SG
'I begin' 'it begins in the eyes'

b. er férros**t** **k**ât (Nc10721) dıu súnn**a** **g**ât (Nc02311)
he far-SUP *goes* *the sun goes*
'he goes the furthest' 'the sun goes'

Word finally the letters <p> or <k/c> were never used — only <b> and <g>. The situation was different for the coronal consonants where both <t> and <d> can be found word initially and word finally. Examining the oldest extant Notker manuscript in

[2] This is the rule formulated in its simplest way abstracting away from punctuation details. See also note 11.

the St. Gall library, *De Nuptiis Philogiae et Mercurii* by Martianus Capella, we found that compared to zero occurrences of <p> or <k/c>, <t> occurs more than two thousand times at the end of a word.[3] The total word initial and final distribution of stops is given below.

(2) Distribution of stops in Notker's *Martianus Capella* manuscript

Letters	<p>	<b>	<k/c>	<g>	<t>	<d>
Initial	122	390	251	1015	1415	2515
Final	0	65	0	205	2210	125

The distribution of the labial and dorsal stops implies that Notker had no contrast involving the alternation of the word initial spelling. Rather, the complementary distribution clearly indicates an allophonic alternation, a remarkable phenomenon since such alternations are rarely found in writing. The coronal stops, however, are different. Here the alternation reflects a more complex pattern involving a contrastive relationship rather than an allophonic one. Using the alphabetic notation, the phonological system for Notker's word initial stops could then be summarised as follows.

(3) Notker's word initial alternations

Allophonic alternation: no contrast

		Anlautgesetz contexts
<b	g>	after sonorants
<p	k/c>	elsewhere

Phonemic contrast

<t	d>

[3] All the data we discuss in this paper are taken from this single manuscript. We restricted ourselves only to the *Martianus Capella* since this was the oldest and we could then avoid across-manuscript variations which would allow us to give a more coherent account of the phonological system.

The vital issue here is the nature of the contrast that Notker wished to represent. Was it a voicing contrast as depicted by the Latin alphabetic system he employed, or was it a FORTIS/LENIS contrast, or not a manner contrast at all but a QUANTITY contrast? A compelling treatise in support of the FORTIS/LENIS contrast has been put forward by Penzl (1971).[4] Contrary to this approach, on the basis of synchronic as well as diachronic evidence we will argue in support of a QUANTITY contrast. However, before renewing the debate, to better understand Notker's system of contrast, we first take a look at the synchronic phonological system of a direct descendant of his dialect, viz. the modern Alemannic Swiss German dialect of Thurgau.[5]

The phonological system of stops in Thurgovian maintains a quantity contrast for labials, coronals and dorsals in all positions in a word (Kraehenmann 2001, 2003). There is no voicing contrast. Utterance initially, the contrast is neutralised. The word initial

[4] We particularly refer to Penzl (1971) given that this incorporates his earlier articles in 1955 and 1968. There are many others who proposed a FORTIS/LENIS account based on VOICE: e.g., Wardale (1894), Wilmanns (1897), Valentin (1962). There are others like Heusler (1888) and Schild (1894), who compared sandhi processes in the modern Swiss German dialects with Notker's *Anlautgesetz* and defend the view that the alternations – both then and now – are based on degree of strength (''stärkegrad''), not on voicing. In a discussion on the various hypotheses by his predecessors, Weinberg (1911) concludes that degree of strength must be the source of Notker's alternating spelling. Moulton (1979: 245), to our knowledge, is the first one on record to tentatively suggest that Notker's opposition may have been based on ''LENIS-and short'' versus ''FORTIS-and-more or less-long''.

[5] As Martin Durrell suggested to us, Notker may well have been bilingual. Certainly he, like all of the monks in the scriptum, must have known Latin very well. However, as Moulton (1979: 243) points out, we do not know exactly how his Latin sounded. Indeed, Moulton admits ''I personally like to think that Notker pronounced Latin with a dreadful Swiss accent – dreadful to others, that is, though of course not to Notker and his fellow monks at St. Gall, for whom this 'Swiss' pronunciation of Latin would have been the only 'natural' one – Anlautgesetz and all.'' Our issue here is Notker's status as a native speaker of Old Alemannic. Our contention is that Notker was indeed a native speaker of this dialect of High German and that he had a particularly fine ear which enabled him to use the Latin alphabet to compose in his own dialect, illustrating its fine grained phonological system. He had a clear concept of language as a system rather than a collection of sounds, which is manifested in his ability to use the Latin alphabetic system to depict allophonic sandhi phenomena as well as phonemic contrasts of his German dialect.

singleton/geminate contrast is realised in phonological phrase medial position when the preceding word ends in a sonorant (i.e. an open syllable or a syllable closed by a sonorant consonant; Kraehenmann 2001: 132–137).

(4) Thurgovian contrast in stops in word initial, medial and final positions

p	t	k
pp	tt	kk

(5) Examples of initial singleton/geminate contrast in Thurgovian

a.	/pp/ – /p/	/t͡sʋaippaːʁ/	'two pairs'	/k͡xaipaːʁ/	'no bar'
b.	/tt/ – /t/	/k͡xain ttaŋkk/	'no tank'	/k͡xaintaŋkk	'no thanks'
c.	/kk/ – k/	/kxaikkɔttlɛt/	'no cutlet'	/kxaikɔttə/	'no godmother'

Recall that the distribution of stops in Notker suggested that about a 1000 years earlier the phonological system reflected no contrast in the labials and dorsals but only in the coronals. Supporting this observation is another noticeable difference between the labials and dorsals in Notker as against the coronals, viz. that although there are few deviations from the *Anlautgesetz* for the former, a much larger number of exceptions are found for the coronals. We took all the words with initial stops in Notker and determined their present-day counterparts in Thurgovian to see what the modern correspondences of those with and without *Anlautgesetz* would be. A surprisingly large number of Notker's words actually do have correspondences: only 3 words with labials, 4 words with coronals and 5 words beginning with dorsals (excluding the *ge-* prefix) have no modern counterparts. The table below gives the total occurrences of the stops in Notker, the percentages violating the *Anlautgesetz* (i.e. < b d g > after obstruents or < p t k > after sonorants) with an additional column giving the corresponding modern sounds for Notker's words approximately 1000 years later. The table only gives the general picture — we discuss the details in §2.

(6) Violating *Anlautgesetz* and the Modern Thurgovian sound correspondences

Total word-initial occurrences in Notker		Violating *Anlautgesetz*	Thurgovian (Modern Alemannic)
<b> ~ <p>	451	12 (2.6%)	/p/
<g> ~ <k>	313	5 (1.6%)	/k/
<d> ~ <t>	3837	252 (6.6%)	/t/, /tt/

Clearly, where Notker had an allophonic alternation, the Thurgovian words which survived all begin with a singleton. Where he had a phonemic contrast, some of the Thurgovian words have a single /t/ and some begin with a geminate /tt/. That is, Notker's phonemic contrast in coronals maps onto a quantity contrast in its descendants.

A number of questions immediately arise.

(i) What was the synchronic phonological status of the stops in Notker's time? If he had a single series of stops for the labials and velars such that <p> ~ <b> and <k> ~ <g> mirror an allophonic alternation, but that <t> ~ <d> represent a phonological contrast, was this a contrast in voicing (as the alphabetic alternation suggests), FORTIS/LENIS (as in Standard German), or in quantity (as in the modern Alemannic dialect of Thurgovian)?

(ii) If Thurgovian inherited only word initial singletons in labials and dorsals from its OHG ancestor, how did it develop a quantity contrast in initial position in these places of articulation? Such a contrast is clearly marked in languages of the world, even more so for a Germanic language. A quick glance at the modern vocabulary shows that such words with initial geminates are essentially all borrowed, from the middle ages onwards: /ppaːʀ/ < Old French/ Latin 'pair', /ppatəl/ < English 'paddle', /kkupp/ French 'cup (of ice-cream)', /kk͡aut͡ʃ/ < English 'couch'. But then, why should borrowing lead to the introduction of such a marked phonological contrast?

Within a more general framework of assuming that 'language change' is change in the grammatical system which is severely constrained by general principles, we address both these issues in detail. We will maintain that 'regular' change is brought about by

the language learner building his/her grammar (Dresher 1978, 2000; Kiparsky 1968, 2000; Lahiri 1982, 2000; Lahiri & Dresher 1983/84; Lightfoot 1999).[6] However, 'regular' borrowing is actuated by the adult speaker, and hence effects of borrowing are severely constrained by the synchronic system of the adult grammar (cf. Trask 2001).[7] As such, we will try to establish that contrasts cannot be introduced in the phonological system as a result of borrowing — they can only be extended.

In section 2, we will discuss in detail the facts in the Martianus Capella focusing particularly on the Anlautgesetz, and compare the vocabulary in Notker with that of Modern Thurgovian. In section 3, we go back to West Germanic and trace the developments from this stage till Notker's time. We will argue that Notker's synchronic inventory of stops included initial geminates and that this development came about due to an effort to maintain the only remaining contrast within the coronals since the voicing distinction had already been lost.[8] We then show that borrowing only led to the

[6] Croft (2000), among others, has claimed that language change is brought about by other means than language acquisition. With respect to phonological change, Croft argues that processes in language change do not mirror processes in language acquisition: e.g., consonant harmony is present only in child language, vowel harmony only in adult language. However, equating processes in a child's grammar with the adult grammar is misleading. In addition, the examples given are dubious. For instance, Levelt (1994) and Fikkert & Levelt (2002) have shown that what is known as 'consonant harmony' is actually an initial default word template with only vocalic place features ([LABIAL]vs. unspecified) which spread to both the onset and the coda (if any exists). Vowel harmony can only exist in child language when the child has words containing more than one syllable. At that point, however, the language learners have acquired the contrasts, and if they are faced with a language that has vowel harmony, they will apply the rules. This is not the place to discuss all the objections raised by Croft, but we feel that, given an in-depth phonological analysis, the model of language change we endorse can still be upheld. Our claim is that phonological contrasts may only be added in the course of acquisition and not through the incorporation of loan words by speakers who already have a native system at their disposal; this does not mean, nor imply in any way, that social context never plays a role.

[7] Trask (2001) claims that borrowing can lead to new contrasts. His example is of voicing in English fricatives. Old English had allophonic alternation between initial 'f' *feld* and medial 'v' in *ofen*. Romance loans like *vine* led to the introduction of initial 'v' and hence a new contrast. However, the feature VOICE was already contrastive in OE for other obstruents - this was essentially extended to the fricatives.

[8] Dutch and Low German have neutralised the original contrast between WGmc *þ and *d which is now [d], but the original voicing contrast between *t and *d prevails.

extension of initial geminates to other places of articulation. In the next section (§4), we turn to the final stops. We argue that the voicing contrasts of coronal fricatives due to Verner's Law were neutralised earlier and that Notker had to maintain only one pair of non-sibilant stop/fricative contrast. We conclude by paying tribute to Notker's amazing aptitude of making use of the Latin alphabet to articulate a phonological grammar which used an entirely different set of contrasts.

2. Notker's Anlautgesetz

As we saw in (2), there is a clear asymmetry in Notker's use of his Anlautgesetz for labials and dorsals on the one hand and coronals on the other. One of the reasons for this asymmetry is of course, that there are two West Germanic (WGmc) sources for the coronal stops (Grimm 1880: §365; Wardale 1893: §115; Jellinek 1897: 84; Wilmanns 1897: §65; Weinberg 1911: 3; Valentin 1962: 347; Penzl 1971: 103–104), but only one each for the labials and the velars. Breaking up the alternations in terms of their WGmc source, we find again an asymmetric picture.

(7) Two sources of Notker's <d>~<t> alternation

WGmc source	Total occurrences in Notker	Violating *Anlautgesetz*	Thurgovian (Modern Alemannic)
*b	<b>~<p> 451	12 (2.6%)	/p/
*g	<g>~<k/c> 313	5 (1.6%)	/k/
*þ	<d>~<t> 3635	155 (4.2%)	/t/
*d	<d>~<t> 142	97 (68.3%)	/tt/

The asymmetry is two-fold. If the WGmc source was *b, *g, or *þ, the percentage of occurrences violating the *Anlautgesetz* is less than 5 percent. If however, the source is *d, then the violations are close to 70%. Indeed, for these words Notker used predominantly only <t>. Correspondingly, in those words where Notker felt free to alternate the voiced and voiceless letters, Modern Alemannic has phonologically a single stop consonant. In comparison, where Notker rarely used the *Anlautgesetz*, Thurgovian has a geminate

stop. Before we draw any conclusions about the nature of Notker's phonological contrast, we will examine his words with Thurgovian counterparts in more detail.

2.1. Description of the alternations

In this manuscript, a total of 512 words begin with labial stops, of which 390 are written with <b> and 122 are written with <p>. The details are given in (8) where we only consider the Germanic words. Notker had 4 loan words in this manuscript which began with a labial (numbers in square brackets indicate number of occurrences): <bríef> ~ <príef> [6], <bíscof> [5], <blânôn> [1] and <púrpurîn> [2]. The first three words occur in correct *Anlautgesetz* contexts, while <púrpurîn> occurs always after a sonorant. In Thurgovian, of all the words that do have correspondences, <púrpurîn> and one other begin with a geminate /pp/.[9] All others have a /p/: for example, Notker's word <bréhhan> ~ <préhhan> 'to break' is now /pʀɛxxə/ in Thurgovian.

(8) Initial labials
Words 48, total occurrences in 512: <b> = 390 <p> = 122

a. Alternating words (27)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
<b>	27	329	329	2.7	*b
<p>		122	110		

b. Non-alternating words (21)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
<b>	21	61	60	1.6	*b
<p>	0	0	0	0.0	–

[9] Martin Durrell comments that Notker's <púrpurîn> could be an example of a loan which foreshadows the later development and may have already had an initial /pp/.

c. Thurgovian correspondences

No synchronic correspondence: 2 words (5 occurrences)
< blânôn > 'make level', < bríttil > 'bridle'
Sound correspondence to Notker's labials: /p/ (1 exception with /pp/[10])

Since we are interested in Notker's allophonic alternations, we divided up the distribution by letters and possible violations. Of the 27 words where Notker alternated initial < b > ~ < p >, the ones written with < b > all followed the *Anlautgesetz*. Of those written with < p >, 12 occur in a sonorant context thereby violating the *Anlautgesetz*. Most of these exceptions are words with initial consonant clusters: < plâuuin > [3], < plícchan > [1], < prúnno > [1], < prénnjan > [1], < pléich > [1], < píugan > [1], < péteta > [1], < pe- > [1], < páldo > [2]. It was not that Notker always wrote his consonant clusters with < p >, but obviously these were the first to not undergo the *Anlautgesetz*. Of the four without clusters, the < p > comes after a sonorant followed by a dot, which could have meant that they were utterance initial.[11] The words in which there is no alternation all except one occur after sonorants and are written with < b >. That is, they follow the *Anlautgesetz* and it is a mere accident that they did not occur in obstruent contexts where a < p > would have been appropriate.

Out of the 1266 total occurrences of words with initial dorsal stops in Notker a large portion comes from the participial prefix *ge-*. Although the prefix itself also undergoes the *Anlautgesetz* regularly, we kept this separate because in the modern language the morpheme is a clitic consisting of a single consonant. Of all the dorsals, modern Thurgovian has no synchronic counterpart in 5 of

[10] The exception is:

Gmc*b	*Notker*	*Thurgovian*	*Gloss*
	< **b**úozjan > ~ < **p**úozjan >	/**pp**yəssə/	'to do penance'

[11] In this manuscript, we find 3 types of dot͡s: on the bottom of the line, somewhere in the middle, and then on top of the line. The dots do not always indicate the end of a sentence or phrase. We have marked all occurrences in our database but have not included them in the calculations. In this instance where the < p > words follow sonorants, the dot is either in the middle or the bottom of the line, and all end utterances. Since Notker is not consistent with the *Anlautgesetz* utterance initially, we only mention this in the text and not in the tables.

the words. An example of Notker's alternating spelling would be <**g**rás> ~ <**c**rás> which is now Thurgovian /**k**ʀas/ 'grass'. There are 5 loan words, 1 of which alternates in spelling, <gérminôn> ~ <kérminôn> [2], the latter violating the *Anlautgesetz*. All the others are spelt with <g> and follow the *Anlautgesetz*: <gímma> [4], <gadem> [2], <glócca> [1], <grífil> [2]. The word <cnôto> from PGmc * *knóþon* is always spelt with a <k> since the cluster *kn remains unchanged throughout and was not affected by the OHG Consonant Shift. In the count below, this word and loans are not considered.

(9) Initial dorsals

Words 28, total occurrences	1266:	<g>	=	1015	<k/c>	=	251
Prefix *ge-* total occurrences	900:	<g>	=	706	<k/c>	=	194
Without *ge-*, 27 words	366:	<g>	=	309	<k/c>	=	57

a. Alternating words (17)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
<g>	17	259	258	1.6	*g
<k/c>		54	50		

b. Non-alternating words (10)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
<g>	9	50	46	9.4	*g
<k/c>	1	3	2		

c. Thurgovian correspondences

No synchronic correspondence: 1 word (3 occur.)
<gómo> ~ <cómo> 'man'

Sound correspondence to Notker's dorsals: all /k/

In the non-alternating contexts, the 3 violations of <g> (i.e. <g> in an obstruent context) come from one word <gágene> (German *gegen*). The single violation of <k> is from <kéron>.

Of the alternating words, the word <géban> occurred once in an obstruent context. There were 4 violations of <k> where <crûozta> [1], <cûot> [1], <káhes> [1], <cúrtil-> [1] occur in sonorant contexts. All the occurrences of <k> after a sonorant occur when the sonorant is followed by a dot.

Now we turn to the coronals. Notker had 6 borrowed words in the manuscript which began with coronals: <tâmo> [1], <tábella> [5], <témparâtun> [1], <túrnen> [1], <témperota> [1], and <tráccho> [1] ~ <dráccho> [2]. As we saw in (7), almost 70% of the words which came from WGmc *d violated the *Anlautgesetz*. To get a clearer picture, in (10) we have broken up the occurrences in several parts. First we discuss the entire set of alternating words and then divide them up into non-function words and function words (including pronouns and adverbs).[12]

(10) Initial coronals

Words:	68	total occurrences	3930
Function words:	22	total occurrences	3532
Non-function words:	46	total occurrences	398

a. Alternating words (all: 44)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	% violations	Gmc source
<d>	7	15	14	6.7	*d
	37	2500	2466	1.4	*þ
<t>	7	127	31	75.6	*d
	37	1195	1074	10.1	*þ

[12] There are in all 22 forms (including inflected items) of various function words: <tánnân> ~ <dánnân>, <târ> ~ <dâr>, <tîn> ~ <dîn>, <tóh> ~ <dóh>, <tíh> ~ <díh>, <tír> ~ <dír>, <tú(u)> ~ <dú(u)>, <túrh> ~ <dúrh>, <to(o)> ~ <do(o)>, <táz> ~ <dáz>, <tíz> ~ <díz>, <tíse> ~ <díse>, <témo> ~ <démo>, <tén> ~ <dén>, <tí(i)en> ~ <dí(i)en>, <tér> ~ <dér>, <téro> ~ <déro>, <tés> ~ <dés>, <téste> ~ <déste>, <tí(a)> ~ <dí(a)>, <tí(i)e> ~ <dí(i)e>, <tíu> ~ <díu>.

b. Alternating non-function words (22)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
< d >	7	15	14	6.7	*d
	15	120	118	1.7	*þ
< t >	7	127	31	75.6	*d
	15	43	41	4.7	*þ

c. Alternating function words (22)

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
< d >	22	2380	2348	1.3	*þ
< t >		1152	1033	10.3	

d. Non-alternating words (24)[13]

Spelling	words	occur.	corr. *Anlautgesetz* contexts	%violations	Gmc source
< d >	0	0	0	0	
< t >	22	91	15	83.5	*d
	2	2	2	0	*þ

e. Thurgovian correspondences

No synchronic correspondence:	4 words (339 occurrences)
	< dígi > ~ < tígi > 'request', < dîeh > ~ < tîeh > 'thy', < démo > ~ < témo > 'ART. DAT.SG.', < dés > ~ < tés > 'ART.GEN.SG.'
Sound correspondence to Notker's coronals:	< t > : /tt/ < *d < d > : /t/ < *þ

[13] There are 5 words with < t > which come from Gmc *tr- which was unaffected by the Consonant Shift. These do not follow the *Anlautgesetz*.

From these numbers it is clear that not only does Notker disregard the *Anlautgesetz* when the source is *d, the maximum number of violations constitute the use of <t> after a sonorant (see the shaded numbers above). We provide some examples of such violations below, and some illustrations from the manuscript are in the Appendix.

(11) Initial coronals

(i) Examples of <t> ~ <d> from *þ

a. After obstruents		b. After sonorants	
íst tánne	(Nc04712)	*sie dánne*	(Nc16902)
'is then'		'she then'	
sî síh tóh	(Nc07903)	*únde dóh*	(Nc13206)
'she herself nonetheless'		'and nonetheless'	

(ii) Examples of <t> from *d

a. Following *Anlautgesetz*		b. Violating *Anlautgesetz*	
túro uuárt tâte	(Nc13110)	*dîe tâte*	(Nc05608)
'doorkeeper deed (DAT.SG)'		'the deed (DAT.SG)'	
mánig tág	(Nc06122)	*dér tág*	(Nc10421)
'many days'		'the day'	
únmôzig tûont	(Nc13013)	*díe tûont*	(Nc02105)
'restless do (3P.PL)'		'these do (3P.PL)'	
mînes hóubetes tóhter	(Nc04802)	*díu áltesta tóhter*	(Nc01113)
'my (head's) daughter'		'the oldest daughter'	

Note that the coronals of the function words are all from WGmc *þ and they all alternate. Further, all the words which violate the *Anlautgesetz* coming from WGmc *d — and are still extant in Thurgovian — now begin with a geminate /tt/ without exception. Clearly for Notker the deviations were themselves very systematic. There can be no doubt that for him the *Anlautgesetz* reflects an initial allophonic alternation for the labials and dorsals. But for the coronals, he clearly had a contrast and this is also reflected in his writing system: he uses <d> ~ <t> for words which underwent allophonic alternation, but only <t> for words where there was no such alternation (Penzl 1971: 161). Putting together the WGmc

source, whether or not Notker followed his *Anlautgesetz*, and the Thurgovian counterparts, we come to the following picture in (12).

(12) Notker's initial stops and the Thurgovian counterparts

WGmc source	Notker's spelling	complying with the *Anlautgesetz*	Thurgovian
*b	< b > ~ < p >	yes	/p/
*g	< g > ~ < k/c >	yes	/k/
*þ	< d > ~ < t >	yes	/t/
*d	< t >	no	/tt/

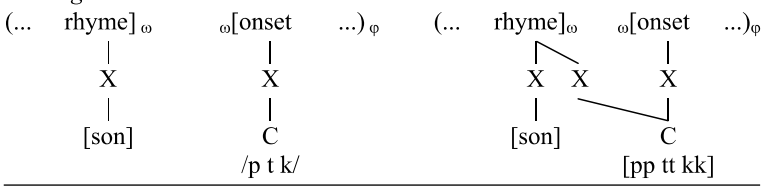
We have established that Notker had a contrast in the coronal stops. What is not clear, however, is the nature of this contrast and indeed, what exactly his allophonic rule refers to. The traditional candidates to account for Notker's contrast have been VOICE or a FORTIS/LENIS distinction. Our claim, instead, is that Notker had a QUANTITY contrast in coronal stops. Under this hypothesis his sandhi process was also a rule of gemination (similar to *Raddoppiamento Sintattico*) across a word boundary if the preceding word ended in a sonorant. This process was allophonic for labials and dorsals, but neutralising for the coronals. Notker's phonological inventory and the *Anlautgesetz* are given in (13).

(13) Notker's initial geminates

Phonological contrast in initial position

p	t	k
	tt	

Anlautgesetz



The *Anlautgesetz* introduces non-contrastive labial and dorsal geminates and neutralises the QUANTITY contrast for coronals phrase-medially when the preceding word ends in a sonorant. On

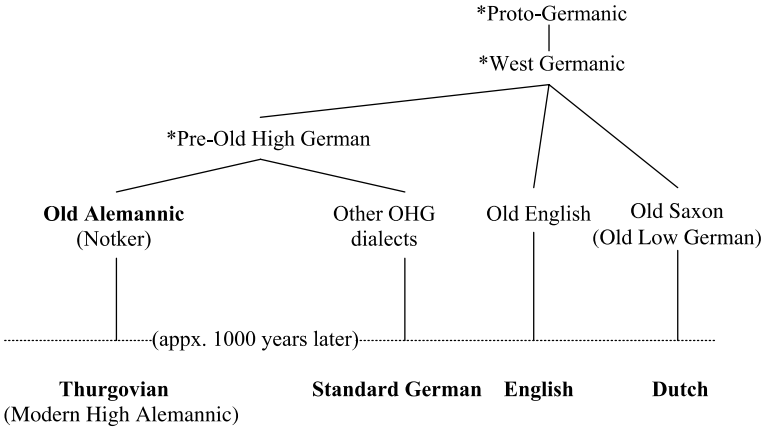
this account, Notker used the letters <b d g> for the geminate allophones [pp tt kk] after sonorants, but <p t k> elsewhere (possibly also utterance initially). For his underlying geminate, Notker used non-alternating <t> which did not normally undergo the *Anlautgesetz*. This is a very striking conclusion and means that he was very conscious of wanting to distinguish between the sandhi-derived geminate (written with a <d>) and his underlying geminate (written with a <t>).

In what follows in the rest of the paper we will provide synchronic and diachronic evidence in support of our claim. We first turn to the motivation for choosing QUANTITY as the basis for Notker's coronal contrast. The most obvious motive for the claim is based on the fact that the modern descendant not only has a quantity contrast (Kraehenmann 2001, 2003), but it has a one-to-one correspondence with Notker's coronal contrast: for precisely those words where Notker's *Anlautgesetz* did not operate, viz. non-alternating <t>, the modern Thurgovian corresponding consonant is a geminate /tt/. Else, the Thurgovian correspondences for all other Notker's stops are singletons (see (12)). If FORTIS/LENIS was the contrast that Notker was trying to reflect in his system, we would have to show why and how the modern language changed to one of QUANTITY so systematically. But this is not the only argument. In the following sections, we will draw evidence from (a) the development of the consonantal system from West Germanic to Old Alemannic, (b) the incorporation of loans and (c) the lack of final devoicing in modern Thurgovian to support the claim that Notker's contrast was indeed one of QUANTITY and not of FORTIS/LENIS.

2.2. Proto-Germanic to Notker: VOICE to FORTIS/LENIS or QUANTITY contrasts?

Given that the terminology can be rather misleading, we begin by drawing a family tree with the language labels that we will be referring to. The tree is grossly simplified and is meant only to indicate approximate time frames of the particular dialectal stages we are discussing in comparison to the standard languages.

(14) Simplified family tree relevant for Notker to Thurgovian



QUANTITY as a means of expressing phonological contrasts is familiar in many languages. All attested older stages of the Germanic language family are known to have had both vowel and consonant length contrast (cf. Lahiri, *et al*. 1999 for a review):[14] OE *ǣnne* 'one'; OHG *slāffen* 'to sleep', etc. Frequently, however, at later periods of Old English and Old High German stem constraints prohibited a long vowel followed by a geminate. When such a situation arose, either the geminate was reduced to a single consonant or the vowel was shortened: OHG *slāffen* > *slāfen*, OE *ǣnne* > *enne*.

None of the 'standard' dialects of the modern West Germanic languages maintain an underlying contrast in length for both consonants and vowels. In Dutch, English, and German, vowel quantity distinction is maintained, but not consonant length. In dialects of Swiss German like Thurgovian, however, both consonant and vowel quantity coexist: 'soup' [suppə] vs. 'living room' [ʃtupə]; 'to honk' [huːppə] vs. 'hood' [huːpə]. This contrast in itself is nothing

[14] Abbreviations used throughout the text:

F = French	OCel = Old Celtic
IE = Indo-European	OF = Old French
PGmc = Proto-Germanic	OE = Old English
WGmc = West Germanic	OHG = Old High German

Gmc = Germanic (no distinction being made between PGmc and WGmc)

extraordinary. As we saw above, the medial contrast is a fairly robust one in many languages. What is different about Thurgovian is, of course, the fact that it has a geminate/singleton contrast also in both initial and final position.

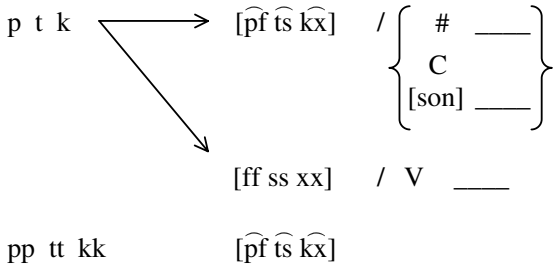
The West Germanic inventory of stops contrasted in VOICE and maintained a geminate/singleton distinction in medial and final position (Braune & Eggers 1987, von Kienle 1969).

(15) WGmc phonological inventory of stops

p	t	k	
b	d	g	[VOICE]
-pp	-tt	-kk	
-bb	-dd	-gg	[VOICE]

A special process of consonant mutation occurred in pre-OHG as compared to Old English and Old Saxon (OS), which is generally known as the *OHG Consonant Shift* or the *Second Consonant Shift*.[15] This consonant mutation affected all the voiceless consonants of the language which were not in an obstruent cluster. Thus, /s/ + /p t k/ remain unchanged (cf. Penzl 1971).

(16) *OHG Consonant Shift* (WGmc to Pre-OHG)



[15] We are assuming the standard view. Others as in Vennemann (1985), have assumed that the affricates are possibly the older sounds and not an OHG innovation. However, this is not crucial for our purposes. What is important for us is that OHG itself had these affricates. The precise order of the change is immaterial, i.e., whether all initial stops become affricates directly or fricatives first and then affricates. What is crucial, is that after the Consonant Shift, there was no voicing contrast within the stops any longer since the original voiceless ones had either become affricates or fricatives in the High German system.

Although in Standard German, the velar affricate [k͡x] became either a stop or a fricative, reflexes of this change can be clearly seen once we compare standard forms of Old High German and Old English with their modern counterparts. The Thurgovian forms are always given in phonetic script to avoid any doubts about their actual pronunciation.

(17) German - English comparisons of the *Second Consonant Shift*[16]

a. Original Germanic postvocalic voiceless stops after vowels [p t k] > [ff ss xx]

OHG	offan	scif, skef	fuoz	wazzar	zeihhan	loh
OE	open	scip	fōt	wæter	tācen	loc
German	offen	Schiff	Fuß	Wasser	Zeichen	Loch
English	open	ship	foot	water	token	lock
Thurgovian	[offə]	[ʃiff]	[hass]	[wassəʀ]	[t͡saixə]	[lɔxx]

b. Original Germanic initial and postsonorant voiceless stops [p t k] > [p͡f t͡s k͡x]

(orthographic OHG pf, ph = [p͡f], z = [t͡s], ch = [k͡x])						
OHG	phunt	champf	zehan	herza	chus	danc, þanc
OE	pund	camp	tien	heorte	coss	þanc
German	Pfund	Kampf	zehn	Herz	Kuss	Dank
English	pound	camp	ten	heart	kiss	thank
Thurgovian	[p͡funt]	[sump͡f]	[t͡sɛː]	[hɛʁt͡s]	[k͡xuss]	[taŋk͡x]

c. Original Germanic medial voiceless geminates [pp, tt, kk] > [p͡f t͡s k͡x]

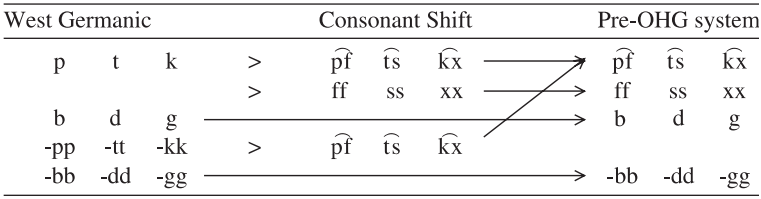
OHG	aphul, apfal	sizzen	stecko, stehha
OE	æppel	sittan	sticca
German	Apfel	sitzen	Stecken
English	apple	sit	stick
Thurgovian	[ɸ͡pfəl]	[sit͡sə]	[ʃtɛkkə]/[ʃtɛk͡xə]

The examples above indicate accurately the drastic consequences of this change for the phonological system of plosives. After the

[16] The following points are relevant for standard German orthography: final <ff> and <ss> are used after short vowels; <ch> stands for [x] or [ç] depending on the quality of the preceding vowel irrespective of duration. Thus, the orthographic double consonants reflect the original sounds some of the time: New High German *Gott* comes from WGmc **god*, but *Bett* comes from WGmc **bedd*.

Consonant Shift, OHG no longer had any contrast between voiced and voiceless stops. There is a claim that the voiceless consonants which underwent the Consonant Shift were actually aspirated (Fourquet 1954, Iverson & Salmons 1995). We would then hypothesize a stage between West Germanic and Pre-OHG where the distinction was between LENIS *b *d *g and FORTIS *p^h *t^h *k^h where the latter became affricates and fricatives in the same contexts given in (16). This hypothesis does not affect our discussion. The crucial point here is that Notker's dialect of Old High German also underwent the Consonant Shift and, like the other dialects, Notker's phonological system could not have had any contrast between voiced and voiceless stops, nor between LENIS and FORTIS stops. The contrast that remained was that of QUANTITY along with the new contrast in manner (stops vs. affricates). Placing the West Germanic plosive inventory with the Consonant Shift we get a pre-OHG phonological system.

(18) Development from WGmc to Pre-OHG



It is obvious that after the Consonant Shift there was no voicing contrast left. We have written the plosives as 'b d g' only because they reflect their West Germanic source. We turn now to the traditional analysis, particularly that of Penzl (1971), discussing further changes that lead to Notker's system.

2.2.1. A FORTIS/LENIS analysis

In what follows, we pay particular attention to Penzl (1971) who has one of the most detailed analyses of the German dialects including Notker. Under Penzl's account, after the *Consonant Shift*,

two further related changes seriously affected the phonological system of Pre-OHG. The first was a change affecting the entire stop series *b *d *g which became /p t k/ (which he dates around 700 AD), where first *d > /t/ followed by the dorsals and the labials (p. 162). The Germanic geminates *bb *dd *gg also became /pp tt kk/.[17] The second change, about 100 years later, led to Pre-OHG *þ > d. These rules are given in (19), comparing their effects in standard Modern English and German.

(19) Contrasting development of Pre-OHG *d and *þ

	a. Pre-OHG *d > t				b. Pre-OHG *þ > d			
English	daughter	day	dish	/d/	thank	three	thin	/θ/
German	Tochter	Tag	Tisch	/t/	Dank	drei	dünn	/d/

One of the reasons in support of this chronological order is that if the fricative had become a stop first, the 'new' coronal stop would have merged completely with the 'old' stop and the rule changing *d > t would apply to both sets of stops: 19 (b), Gmc *þri > *dri > !*tri. Penzl argues that the change was a mixture of push and drag. The change of the LENIS series to the FORTIS series led to an vacated slot (Penzl 1971: 173) which was partially filled by the coronals by the change of the *þ > d. The phonological systems at each stage are given below.

(20) Pre-OHG developments and the phonological inventories at each stage (following Penzl (1971))

a. after Consonant Shift			b. after *b *d *g > p t k			c. after *þ > d		
p͡f	t͡s	k͡x	p͡f	t͡s	k͡x	p͡f	t͡s	k͡s
-ff	-ss	-xx	-ff	-ss	-xx	-ff	-ss	-xx
-bb	-dd	-gg	-pp	-tt	-kk	-pp	-tt	-kk
b	d	g	p	t	k	p	t	k
	þ			þ			d	

[17] The QUANTITY contrast theoretically could have existed in word medial and final positions in pre-OHG as it did in OE. However, Notker had no geminates in word final position since there were always vocalic inflectional suffixes: Notker <síppa> vs. <rúkki>. We will, therefore, assume that only a medial contrast was relevant.

Notker's system was built on the inventory given in (20c) and we can now see how such a system could easily lend itself to the *Anlautgesetz*. Indeed, under Penzl's account (also see Szulc 1974: 135), Notker's phonological inventory was that of (20c) where the phonemic distinction was that of FORTIS/LENIS (p. 104). As Penzl points out, Notker's <p> and <k> alternated with <b g> allophonically (Peuzl 1971:103–104), but the coronals had a phonemic distinction: the alternating <t> ~ <d> having developed from *þ, and the non-alternating <t> from *d.

There are a few problems with this analysis. First within a system like (20a), the coronal stops are not any different from the labials and the dorsals. All places of articulation have a quantity contrast word medially. Further, there is no contrast in voicing, or in FORTIS/LENIS, except that after /s/ the consonants are always [p t k]. This of course does not mean that the consonants are pronounced 'voiceless' or 'voiced' — it is simply that neither VOICE nor FORTIS/LENIS as phonological features are contrastive in the system. However, once a rule such as (19a) (*b *d *g > p t k) is introduced in the language, we are assuming that 'b d g' are different from 'p t k'. On the other hand, Penzl assumes that now there is a complete neutralisation with the consonants that used to be pronounced after /s/. The contrast in QUANTITY in word medial position for all places of articulation remain. What is certain, however, is that the phonological system in (20b) has even less of a contrast like VOICE or FORTIS/LENIS, since the phonetic difference after /s/ is neutralised. Why then, at the stage where the phonological system of (20b) is prevalent, should there be any 'push' for the coronals to fill in any 'empty' slot for the LENIS consonant? The system has no FORTIS/LENIS contrast, and hence, no conception of empty slots exists.

The second problem is more crucial. Once the *þ changes to /d/, the system in (20c) says that /p t k/ constitute one set and /d/ another, and they should pattern accordingly, but this is not what happens. The problem lies in the lack of correlation between the development of Notker's phonological system as discussed earlier and the Germanic sources that we could trace back from the violations of the *Anlautgesetz*. To make this point clear, we first give Penzl's version of Notker's phonemic inventory of the stops

and place it alongside (12) which we repeat here for ease of comparison.

(21) Germanic sources corresponding to violations of *Anlautgesetz* and the hypotheses concerning the development of new contrasts

a. Development of Notker's stops with feature FORTIS/LENIS

*after**b d g >	p t k	*after**þ > d (NOTKER)	
-pp -tt -kk		-pp -tt	-kk
p t k		p t	k
þ		d	

b. Notker's initial stops and the Thurgovian counterparts [earlier 12]

WGmc source	Notker's spelling	complying with the *Anlautgesetz*	Thurgovian
*b	< b > ~ < p >	yes	/p/
*g	< g > ~ < k/c >	yes	/k/
*þ	< d > ~ < t >	yes	/t/
*d	< t >	no	/tt/

As we can see from comparing (21a) with (21b), the non-alternating coronal stop in Notker goes back to Germanic *d not Germanic *þ. And this is the consonant which must have been the source of the new contrast whose modern counterpart in Thurgovian is /tt/. That is, it is not Notker's /p t k/ which comes from pre-OHG *b *d *g which patterns as a set in the *Anlautgesetz* but the coronal stop from the old *þ which is what goes together with /p k/ while the /t/ from *d stands out. Penzl, and indeed most traditional analyses, suffer from this contradiction. As a result, Penzl has a section (Peuzl 1971:162, §17.3b) where he discusses the possible return to LENIS of the FORTIS consonants /p k/ to put them together with /d/ < *þ since they pattern together. The problem is not Penzl's 'system of opposition', nor is it the chronological order of the changes he suggests. The apparent contradictions disappear if one simply considers the phonological system of contrasts as a whole and not piecemeal.

We need to make a further point regarding the contrasts in Notker's system in (21a). Within Penzl's system, Notker has a FORTIS/LENIS analysis of the stops as well as a QUANTITY contrast within the FORTIS stops. The implications of this inventory would be as follows. Regardless of any FORTIS/LENIS distinction, the QUANTITY contrast is maintained in word medial position. In addition, there is a FORTIS/LENIS contrast only for coronals, but in all word positions – initial, medial and final. Under this hypothesis, the simplest interpretation of the *Anlautgesetz* would be that the FORTIS labials and dorsals alternate allophonically with the LENIS equivalents in the relevant contexts. In the same contexts the lenis coronal consonant alternates with its FORTIS counterpart. The FORTIS coronal phoneme, however, does not alternate. As we will argue, the story is much simpler if we allow only a QUANTITY contrast.

2.2.2. Notker's quantity contrast

First, let us recollect what we know about Notker's synchronic system. Notker permitted himself to represent in writing an allophonic sandhi process involving initial labials, dorsals, and coronals, all of which can easily be traced back to their Germanic sources *b *g *þ. The exceptions to his *Anlautgesetz* involve only coronal stops and those, too, when examined historically, are 'systematic'. That is, the 'violating' non-alternating coronal stop is invariably traced back to Germanic *d (cf. Penzl 1971: §9.4). If this is so, then we must accept that the Germanic *d is the source of the phonological contrast in Notker which prevented him from using it in his *Anlautgesetz*. We will sketch out the scenario which we think fits the facts. First we should examine the change of *þ > /d/ (19b) which suggests that an interdental fricative changes in manner and voicing. But such a change is in fact not restricted to High German. What probably happened is a general Defricativisation of the interdental fricative. Indeed, given that the interdental fricative is a marked sound, this is no surprise (Maddieson 1984, Ladefoged & Maddieson 1999). Other than English and Icelandic, most Germanic dialects changed the *þ to a stop at some point. The integration of the stop to the phonological inventory of the

language depended on the system of contrasts of each language. Compare the examples below.

(22) Modern correspondences of Germanic *þ

English	thank	thirst	thing	thief	[θ]
German	Dank	durst	Ding	Dieb	[d]
Dutch	dank	durst	ding	dief	[d]
Thurgovian	[taŋkk]	[tur∫t]	[tiŋ]	[ti͡əp]	[t]

Now we need to see how this interacts with (19a) where *b *d *g > p t k. We believe that there was no such rule at all. As we saw in (18), after the Consonant Shift, there was no contrast in voice or FORTIS/LENIS for the stops. If we assume that the change (19a) is introduced first, it is difficult indeed (as we admitted earlier) to explain what 'd' and 't' could really mean. If on the other hand, we assume that what is at stake is the lack of contrast, there is no need for any further rule like (19a) at all. After the Consonant Shift comes the Defricativisation of *þ and the rest simply follows.[18]

We can write the rule of Defricativisation as in (23) and trace the developments from West Germanic to Notker in (24). In (24a) the system after the Consonant Shift has no contrast in FORTIS/LENIS and therefore we write the stops as <p t k> representing /p t k/. Thus, (24a) is the same as (18) with the incorporation of the lack of contrast we discussed below (18).

(23) Defricativization of Gmc *þ

*þ > stop

[18] Moulton (1987) argues, contrary to Penzl (1971), that *þ > d happened before 'old' *d > t (p. 81). This is similar to our approach except that he still assumes that there was a contrast where *b and *g were different from the FORTIS*þ *k. His change *þ > d is still a 'Lenisierung' and not simply a change in the manner of articulation. The problem still remains as to where the FORTIS/LENIS contrast comes from if the OHG Consonant Shift had removed it.

(24) West Germanic to Notker with Defricativisation

a. Consonant Shift leading to no contrast in FORTIS/LENIS or VOICE

West Germanic				Consonant Shift			Pre-OHG system		
p	t	k	>	p͡f	t͡s	k͡x	p͡f	t͡s	k͡x
			>	ff	ss	xx	ff	ss	xx
b	d	g					p	t	k
-pp	-tt	-kk	>	p͡f	t͡s	k͡x			
-bb	-dd	-gg					-pp	-tt	-kk

b. Pre-OHG system followed by Defricativisation

after Consonant Shift			*after* Defricativisation		
-pp	-tt	-kk	-pp	-tt	-kk
p	t	k	p	t	k
	p			t	

Defricativisation would lead to a potential neutralisation in the coronal stops in many of the Germanic dialects, and the neutralisation remains for instance in Dutch. For early OHG, at least for Notker's system, the neutralisation is prevented by the 'old' /t/ becoming a geminate /tt/. The change is an attempt at maintaining an old contrast, now neutralised by an independent change. This is graphically shown in (25).

(25) Notker' system: extending a contrast

a. *after* Consonant Shift (no voicing contrast)			b. *after* Defricativisation				c. extending contrast		
-pp	-tt	-kk	-pp	-tt	-kk		-pp	-tt	-kk
p	t	k	p	t	k	>	p	tt	k
	p			t				t	

Thus, we contend that the speakers of Old Alemannic, one of them being Notker, maintained the old contrast by extending an existing contrast of quantity. The 'old' coronal stop was treated as long to distinguish it from the 'new' one. The maintenance of the contrast is only possible in word initial position, because in word medial the geminate/singleton contrast already existed. The consequence was, however, more far reaching. A contrast in quantity existed in medial position. Now, a new contrast, but only for

coronals, was introduced word initially. The actual phonological system would be as in (26) indicating that /t/ and /tt/ contrasted in all word positions while dorsals and labials only contrasted in QUANTITY in word medial position.

(26) Notker's phonological system: final version

-pp	tt	-kk
p	t	k

How would this work if we are to assume that Notker's coronal stop which violated the *Anlautgesetz* contrasted with the alternating one in terms of FORTIS/LENIS? One would then have to argue that the neutralisation resulting from the Defricativisation was 'saved' by introducing a brand new contrast with a FORTIS/LENIS distinction. The system would look as in (27).

(27) Hypothesis: Notker' system by adding a FORTIS/LENIS contrast

a. after Consonant Shift			b. after Defricativisation		
-pp	-tt	-kk	-pp	tt	-kk
p	t	k	p	t	k
	þ			t	
			> ADD CONTRAST		
			c. add LENIS to all stops other than the 'old' coronal stop		
			-pp	tt	-kk
			b	t	g
				d	

Note that the system in (27) implies that Notker contrasted the singleton coronal stops in initial, medial and final positions and that the others had no such contrast in any position. Second, this system would predict that the geminate consonants were quite distinct from the singleton consonants. Indeed, the coronal stops had now a contrast in QUANTITY as well as in FORTIS/LENIS. The system we support in (26) suggests that there should be no difference in Notker between original Germanic *d and original Germanic *dd. In our

terms, the original *dd would have stopped contrasting in voice with original *tt after the Consonant Shift and would simply be /tt/ as we portrayed in (26). And original *d in our hypothesis also becomes a geminate (in all positions[19] – the new contrast shows up only word initially). This neutralisation should be, and indeed is, reflected in Thurgovian where we always find a geminate /tt/. In contrast, the hypothesis sketched in (27) suggests that there should be a QUANTITY as well as FORTIS/LENIS distinction maintained in Notker from Germanic *d and *dd. Examining the *Martianus Capella* we found examples given in (28) from original *d, *dd (or from PGmc *dj > WGmc *dd) and *þ for comparison. We also give the Thurgovian counterparts to see how they have developed.

(28) Germanic *þ, *d and *dd in medial position in Notker

	Notker	PGmc	OE	Thurgovian	
*þ	< bruôder >	*brôþar	bróðor	[pʀyə̯təʀ]	/t/
*dd	< mitti >	*midjo	middel	[mitti]	/tt/
	< -betti >	*badjo-	bedd	[pett]	
*d	< uuéter >	*wedro-m	weder	[vɛttəʀ]	/tt/
	< mûoter >	*môdar-	módor	[mu̯ə̯ttəʀ]	
	< brûote- >	*brûdi-z	brýd	[pʀuːtt]	
	< lûtta >	*hlûda	hlûd	[luːtt]	

WGmc *d or *dd must have been treated as the same sound by Notker[20] which is why in Thurgovian we now find a /tt/. Notker himself did not make a three-way distinction. Notice that he used both < tt > as well as < t > for the sound which had come from *d.

[19] Another piece of corroborative evidence comes from the shortening of original long vowels before what used to be WGmc *d: cf. OE *módor* 'mother', *slīdan* 'slide' standard German *Mutter*, *schlittern*. There was also lack of open syllable lengthening before such consonants; see Lahiri & Dresher (1999: 687).

[20] Valentin (1962: 348) comments that reflexes of WGmc *þþ also go along with WGmc *dd and gives the three examples mitti, bette, and fettach 'wing; feather'. Martin Durrell also pointed out that reflexes of WGmc *þþ would provide further corroboration of our account. Unfortunately, such examples are hard to find in Notker. However, we do find a few Thurgovian correpondences to other Germanic dialects, as in OE *moþþe* / Thurgovian [mɔttə] 'moth', OE *smiþþe* / Thurgovian [ʃmittə] 'smithy', etc.

In sum, in pre-OHG there was no voicing contrast after the Consonant Shift. Word medially, however, the stops contrasted in QUANTITY. Due to the change of the interdental fricative to a stop, the coronal stops faced a neutralisation, which we claim, in Notker's dialect was saved by extending the QUANTITY contrast to the old coronal stop. In actual fact, the only 'new' change was the extension of the QUANTITY contrast to word initial position for coronal stops. This not only explains Notker's violations of the *Anlautgesetz* for those consonants which were derived from original Germanic *d but also a neutralisation of the original quantity in medial position. This cannot be explained if we assume that Notker had developed a FORTIS/LENIS contrast only for coronal stops. Our hypothesis also predicts that in future generations Alemannic speakers who were borrowing from languages with a voicing or a FORTIS/LENIS contrast, could use the QUANTITY contrast to maintain any distinction they wanted. If a FORTIS/LENIS contrast had already been introduced, then surely if the speakers were borrowing words with such contrasts, it would be this feature which would be used. We show in the next section that this is not so.

2.3. Loans and extending contrasts

The way loans were adapted into the Alemannic phonological system presents additional evidence against VOICE or FORTIS/LENIS being a contrastive feature at Notker's OHG dialect. Modern dialects like Thurgovian continue to have Notker's QUANTITY system. What is at stake here is the extension of the QUANTITY contrast in word initial position, which existed only for coronals in Notker. As we mentioned briefly in §1, the QUANTITY contrast in labials and dorsals developed as a result of loans. We want to establish that in an attempt to incorporate loans with a voicing or FORTIS/LENIS distinction in the donor language, Alemannic dialects extended the contrast they already had for coronals to other places of articulation. Indeed, a corollary to this observation is that the Standard German contrast in voicing or FORTIS/LENIS in stops was perhaps also reinforced as a consequence of loans.

We gave examples of initial singleton/geminate contrast in Thurgovian in (5). We give more examples below, adding standard German and English as comparisons. The point to note is that for labials and dorsals, **all** geminate initial stops are borrowed; singletons may or may not be borrowed.

(29) Initial QUANTITY contrasts in Thurgovian

a. Initial geminates – loans

Thurgovian	[ppaːʀ]	[ttuʀttə]	[kkomfi]
German	Paar	Torte	Konfitüre
English	pair	tart	confiture
French	paire	tourte	confiture

b. Initial singletons – loans

Thurgovian	[poːtt]	[paʀt]	[tattlə]	[kalopp]	[keːn]
German	Boot	Barde	Dattel	Galopp	Gen
English	boat	bard	date	gallop	gene
	MLG boot	OCel bardo	OF date	F galoper	Greek γεν

c. Initial geminates – Germanic, only coronals

Thurgovian	[ttuə]	[ttɔxtəʀ]	[ttaːk]
German	tun	Tochter	Tag
English	do	daughter	day

d. Initial singletons – Germanic, all places of articulation

Thurgovian	[pett]	[puə͡x]	[tiŋ]	[tiə͡p]	[kɔtt]	[kaʃt]
German	Bett	Buch	Ding	Dieb	Gott	Gast
English	bed	book	thing	thief	god	guest

Compare (29a) and (29c). The initial geminates for labials and dorsals are invariably from loans. And as we confirmed, Notker had no such initial QUANTITY contrast, but only an allophonic alternation reflected in his *Anlautgesetz*. The initial geminates for coronals can have two sources: from Germanic *d (29c), or from borrowing (29a). In contrast, initial singletons may all have either a Germanic source (29d) or come from loans (29b).

How much of an effect did the loans have on the phonological system of the language? We graphically trace the systems from Notker to modern Thurgovian.

(30) Stops in initial position

a. Notker's system			b. Incorporating loans through generations > Thurgovian system		
p	t	k	p	t	k
[pp]	tt	[kk]	pp	tt	kk

What would be the situation if we assumed that Notker's system did not contain a word initial QUANTITY contrast, but a FORTIS/LENIS contrast? What would we predict about loans? We think the system would have been much more complex. If Notker had a QUANTITY contrast in medial position and a FORTIS/LENIS contrast in all positions for coronals (as depicted in (27)), we would expect that loans are incorporated differently depending on place of articulation. For instance, given a FORTIS/LENIS contrast in their own language for coronals, Alemannic speakers could easily adapt words with voiced and voiceless coronals, and extend the same feature to initial labials and dorsals, giving a three-way contrast. This hypothetical system is given in (31).

(31) Hypothetical Thurgovian system adapting loans based on coronal FORTIS/LENIS distinction in Notker

Notker [earlier 27c]			Thurgovian		
-pp	-tt	-kk	-pp	-tt	-kk
p	t	k	p	t	k
	d		b	d	g

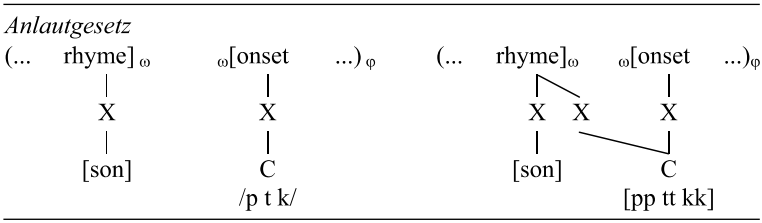
But, note that given a phonological inventory like Notker's in (31), the native speaker has never developed a contrast in consonantal quantity in word initial position. Hence, it remains a mystery (a) why Modern Thurgovian initial dorsal and labial geminates are all from loans, and (b) why coronal initial geminates may either be

descended straight from Notker or could be borrowed. Our hypothesis about Notker already having had a contrast in initial position for coronals and never a voicing contrast fits the synchronic (Notker and Modern Thurgovian) and the diachronic facts. Thus, the consonantal QUANTITY contrast, which existed in word initial position only for coronals, was extended by later generations to other places of articulation to incorporate loans from languages which had a voicing contrast. No new contrast was introduced.

2.4. Notker's Anlautgesetz and Thurgovian alternations

We have argued earlier (cf. (13)) that in Notker's *Anlautgesetz*, a prosodic position is created when the previous word ends in a sonorant sound, thus giving rise to allophonic geminates from underlying singletons. A very similar alternation is observable in Thurgovian today. We repeat the phrasal rule given earlier in (13) for ease of comparison.

(32) Notker's initial geminates [earlier 13]



Sonorant as opposed to obstruent context also plays an important role in the current system of Thurgovian. While a sonorant context allows the maintenance of the singleton/geminate contrast (33a), an obstruent context neutralises it (33b).

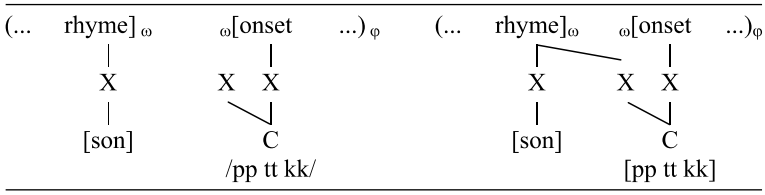
(33) singleton/geminate contrast maintenance and neutralisation

a. /pp/ – /p/	[t͡svai ppaːʀ]	'two pairs'	[k͡xai paːʀ]	'no bar'
b. /pp/ – /p/	[fyːf paːʀ]	'five pairs'	[fyːf̃ paːʀə]	'five bars'

In Modern Thurgovian, a sonorant context makes the realisation of a word initial – underlying – geminate possible through the

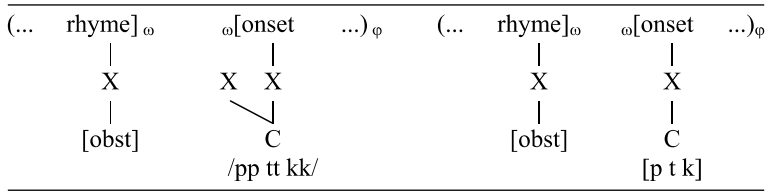
syllabification and licensing of the extra timing position in the last syllable of the preceding word, as illustrated in (34).

(34) Licensing of phrase-medial initial geminates in Thurgovian



An obstruent context (or a phrase boundary), on the other hand, cannot accommodate syllabification across a word boundary: the extra timing position remains unlicensed and as a consequence is stray-erased (34). The result is a neutralisation of the contrast in obstruent context.[21]

(35) Stray Erasure of phrase-medial initial geminates in Thurgovian resulting in contrast neutralisation



Thus, Notker's *Anlautgesetz* reflects the creation of a prosodic position with the underlying singletons. This led to allophonic alternation for the labials and dorsals since there were no initial geminates in these places of articulation. The extra prosodic slot of the Thurgovian underlying initial geminates (in all places of articulation) is licensed in precisely the same sonorant context in which Notker's derived geminates surface. The Thurgovian geminates undergo degemination in obstruent contexts, where Notker's singletons also show up. Perhaps Notker's underlying /tt/ also underwent

[21]Details of the synchronic alternations in Thurgovian are given in Kraehenmann (2001, 2003).

degemination in the same context, but the writing system does not reflect that. Words which we assume had underlying /tt/ in Notker, now show this pattern in Thurgovian.

(36) Notker's /tt/ in modern Thurgovian

Notker <túra>					
<tô hûota	ianus tero	túron> (Nc05506)			
then guard PAST *3P.SG.*	*Janus these*	*doors* DAT PL. FEM			
Thurgovian /ttyʀə/					
[toː hɛt	tə	ianus	tiə	ttyʀə	khyəttətt]
then has	*the*	*Janus*	*these*	*doors*	*guard* PAST PART

'Then Janus guarded these doors'

Notker does distinguish the different status of the geminates by writing the underlying initial geminate with a <t> and the derived geminate with a <d>.

With our analysis of the initial stops, we make certain predictions for the phonological contrast of Notker's final stops. The picture is, thus, not yet complete. We now turn to the final consonants.

3. Notker's final consonants

Recall that Notker's final labials and dorsals are always written with <b> and <g>. Only for the coronals both <d> and <t> occur. We repeat the table in (2) below which gives the distribution of the stops.

(37) Distribution of stops in Notker's *Martianus Capella* manuscript

Letters	<p>	<b>	<k / c>	<g>	<t>	<d>
Initial	122	390	251	1015	1415	2515
Final	0	65	0	205	2210	125

If the final stops follow the same pattern as the initial stops, we expect the correspondences from WGmc to Notker. Since there is no ***Aus****lautgesetz* to complement the ***An****lautgesetz*, we expect no alternation in spelling in final position. Of course 'final' means the final consonant in Notker and not in WGmc. However, other than

some crucial alternations due to Verner's Law which we will discuss as we go along, no other difference between WGmc voiced medial and final consonants would be pertinent.

(38) Our expectations of the development of Notker's final stops (without alternation)

WGmc Source		Notker's spelling		Thurgovian
*b	>	< b >	>	/p/
*g	>	< g >	>	/k/
*þ	>	< d >	>	/t/
*d	>	< t >	>	/tt/

Let us first consider Notker's final < b d g > in the *Martianus Capella* manuscript.

(39) Final labials and dorsals in Notker

Notker's spelling	words	occurrences	Gmc source	Thurgovian
< b >	14	65	*b	/p/
	2	2	*f	/p/
< g >	13	132	*g	/k/
	8	63	*ng	/ŋ/
	1	1	*kk	/k͡x/
	1	2	*h	/k/
< d >	13	112	*þ	/t/
	1	13	*ð	/d/

Notker had no loans in words with final labials, and the Germanic source was mostly *b. In all, there were 33 < g > final words of which 5 words had uncertain etymology and one was a loan (< disg >, Latin *discus*). The suffix < ig >, < eg > also predominated (56 occurrences < Gmc *ig). Ignoring these, we are left with 22 words of which one is from *h (< sluuog > from *slah-), one from *kk (< blíg >). The other 20 come from *g or *ng and are either a singleton /k/ or a nasal in Thurgovian. As for final < d > s in the *Capella* manuscript, there were 14 words in

all. Most of them can be traced back to WGmc *þ, except for two which could have been *ð (-rôd, sîd). Thus our expectations of Notker's final <b>, <g> and <d> are met both with respect to the Germanic source as well as the Thurgovian correspondences.

Now we turn to Notker's <t>s. For the non-alternating initial <t>s we have been claiming that they were phonologically /tt/. Our prediction here is that Notker's final <t>s would be traced back to WGmc *d. However, the data are rather more intriguing, as can be seen in (40).

(40) Final <t>s in Notker

Notker's spelling	words	occurrences	Gmc source	Thurgovian
<t>	26	329	*d, *nd	/tt/ /nt/
	26	823	*[obst]t	/[obst]t/
	8	1058	*þ	/t/, /tt/

Our expectation is not met in two ways. First, up until now nothing has suggested that WGmc *þ should lead to a <t> spelling in Notker. Second, all of Notker's initial <t>s from *þ have generally a singleton correspondent in Thurgovian, and this is clearly not the case here. Breaking down the words into finer categories we obtain the somewhat more systematic picture in (41), but the findings remain unexpected.

(41) Details of final <t>s in Notker

Notker's spelling	words	occurrences	Gmc source	Thurgovian
<t>	26	329	*d, *nd	/tt/ /nt/
	26	823	*[obst]t	/[obst]t/
<-(e)nt>	3P.PL. + 2w	320 + 25	*nþ	/t/
<-(e)t>	3P.SG. + 4w	682 + 66	*þ	/tt/

Thus, we get not only the predicted correspondences as spelt out in (38) but also the unpredicted ones in (42).

(42) Notker's final stops and their correspondences

WGmc Source		Notker's spelling		Thurgovian
*b	>	<b>	>	/p/
*g	>	<g>	>	/k/
*þ	>	<d>	>	/t/
*d	>	<t>	>	/tt/

To understand the asymmetries in (41) and (42), we need to consider the 3P.SG. and the 3P.PL. suffixes and the underlying phonological system of Notker in more detail.

3.1. The interdental fricative and Notker's final <t>

There are two issues with these morphemes.

(43) The third person singular and plural morphemes

a. Why did Gmc 3P.SG. IND. *þ > Notker <t>, expected <d>?
   Why did Gmc 3P.PL. IND. *enþ > Notker <ent>, expected <end>?

b. Why the asymmetry between in 3P.SG./PL. IND. in Thurgovian?
   Notker 3P.SG. IND. <t> (682) expected Thurgovian [tt], attested [tt]
   Notker 3P.PL. IND. <ent> (329) expected Thurgovian [ətt], attested [ət]

The question we need to ask is what contrast was Notker trying to capture? Recall that unlike the Gmc. 3P.SG. IND. *þ, other morpheme final *þs are written in Notker with a <d>. Compare, for instance, PGmc *dauþ- written in Notker as <tod>. If we go back to the Indo-European source of the 3P.SG. IND. suffix we find the Germanic correspondences given in (44).

(44) Development of 3P.SG. IND.

IE 3P.SG. *e-ti	
Gothic	-iþ
Old English	-eþ
OHG	-it
cf. Sanskrit	bhávati
	tudáti

As Prokosch (1939: 210) points out OHG standardised the suffix where the root bore the main accent. This means that the coronal consonant was subject to Verner's Law and hence would have been *ð in Gmc.[22] And as we have seen above, a few of Notker's <d> which also came from the voiced interdental fricative is at present a geminate /tt/ in modern Thurgovian (39). Thus, the development of the Gmc 3P.SG. IND. *-ð was entirely regular.

(45) Development of Gmc 3P.SG. IND. *-ð

Gmc *-ð	Notker <t> /tt/	Thurgovian /tt/

Note that both Notker's spelling as well as the synchronic attestation implies that Notker must have treated *d and *-ð as the same sound namely /tt/ and written it predictably as <t>. If this is indeed the case, then we should find the same sort of correspondences in the strong verbs where the Verner's Law alternations word medially between voiceless and voiced fricatives are better understood in the PAST 1P.SG. IND. as against the PAST 3P.SG. IND. and the PAST PARTICIPLE. We give below representative OHG verbs from Prokosch (1939: 64–65) illustrating the difference and then examples from Notker. The complete sentences are given in (47).

(46) Coronal fricative alternations in the strong verbs

	*VÍþV		*VðÍ		
	INF	3P.SG.IND.	3P.PL.IND.	PAST PART.	
OHG	lîdan	leid	litun	gilitan	'go'
	snîdan	sneid	snitun	gisnitan	'cut'
	quedan	quad		giquetan	'speak'
Notker	<erlîden>			<erliten->	'suffer'
Thurgovian	[ərliːtə]			[ərlittə]	

[22] Verner's Law: Gmc voiceless fricatives remained voiceless if the preceding syllable was accented; if the preceding syllable was not stressed then they became voiced in voiced surroundings.

(47) Notker's examples

<erlîden> ~ <erlîteniuíoh>
<ten hôch flúg erlîden ne trû uueta> (Nc03909)
suffer-INF
<ióh erlîteniu> (Nc12801)
suffer-PART-NOM/ACC PL. NEUTER

Thus, Notker had a difference between original Gmc *þ and *ð and they show up in the writing system as <d> and <t> respectively. Since this alternation is never present word initially, it did not play a role in the *Anlautgesetz*. Before we consider Notker's entire system of contrasts in final position, we need to consider the 3P.PL. IND. <ent> as well.

If indeed the original source was Gmc. 3P.PL. IND. *enþ,[23] then Notker should have had † <end>. Perhaps then one may conjecture that the plural like the singular was subject to Verner's Law? But here we have an asymmetry with the Thurgovian correspondences as shown in (41). Notker's <t> always ended up as Thurgovian /tt/ except in this case. In addition, if the source was *ð, then like the 3P.SG. IND. we should definitely expect Thurgovian /tt/ and not /t/. To explain the course of the development, we would then predict that Notker's 3P.SG. IND. should have been written with a <d> indicating a singleton. But Notker had a clear distinction between final <t> and <d> which lead to Thurgovian /tt/ and /t/ respectively, so how do we explain this anomaly. We see such an alternation if we compare Notker's <lt> and <ld> final words.

(48) Contrast between Notker's final <lt> and <ld>

Notker	<lt>	PGmc	*ld	Thurgovian	/ltt/
	<geuuált>	*wald-a		/kkvaltt/	'force'
Notker	<ld>	PGmc	*lþ	Thurgovian	/lt/
	<góld>	*gulþa-		/kolt/	'gold'

[23] A reviewer has pointed out that the Thurgovian plural marker could have come from the 2P.PL. Gmc* eþ rather than the 3P.PL Gmc *enþ. However, Notker himself had only one form for both 2P. and 3P.PL. which was <ent>, which suggests that for him, at least, the original 2P.PL. was lost. Consequently, it is unlikely that the origin of the modern Thurgovian form would be the 2P.PL. Indeed, our hypothesis that the source was the 3P.PL. is substantiated by the analysis.

The reason for the apparent asymmetry in the correspondence in the 3P.PL. IND. <ent> which became Thurgovian /t/ lies in the fact that Notker had no contrast between final /nd/ and /nt/. Medially, however, we find a few contrasts as in <uuinde> 'wind, DAT. SG.' (< PGmc. *wenda) vs. <uuinter> 'winter' (<PGmc *wentrus). And word finally Notker always wrote the former with <nt>, viz. <uuint> (also cf. <hánt> 'hand', <lánt> 'land').[24] The Thurgovian correspondences are predictably /vint/ and /vinttər/ respectively. Thus, Notker reflected the medial contrast in his spelling, but although the phonetic distinction was there, there was no phonological contrast, and Notker chose to write all final <nasal+coronal stop> clusters as <nt> regardless of their actual pronunciation which according to our analysis would be a singleton /t/. The striking thing is that the diachronic development into modern Thurgovian still shows what the original phonetic form must have been. And this is why we suddenly find an asymmetric correspondence between Notker's extremely regular spelling system and the modern Thurgovian sound system which maintains the singleton. The development of Gmc *nd would have been as follows.

(49) Notker's final <nt>

Gmc	ONLY *nd (no *nþ)[25]	
Notker	<nt>	(no contrast with <nd>)
Thurgovian	/-t/	(no contrast hence analysed as a singleton)

Lack of contrast led Notker to write <nt> for a non-geminate; else the Thurgovians would have attested the form as a geminate. Of course, the Thurgovian 3P.PL. IND. /-t/ has no nasal, and could have had a different source.[26] But the phonological system does not belie the source being *enþ.

[24] Penzl (1971: 104) states that Notker wrote the final /t/ changed to /d/ medially which showed a phonetic similarity between the two sounds.

[25] The only exception is Notker's <munt> from PGmc *munþa. It could be the case that this was Gmc *ð.

[26] It could have been from the 2P.PL.– but the problem remains. For Thurgovian /t/ to be explained, the original source needed to be *d – and it never was. Our account has an explanation for this fact.

One last point concerns Notker's merging of original *ð and *d. If Defricativisation (23) was a general process, we would have expected *ð and *þ to merge and become a stop. In all probability however, the voiced interdental fricative merged in most of the Germanic languages with *d earlier. As a result, Defricativisation only affected original *þ and Notker had only two coronal consonants to deal with. Notker's final stops and their correspondences are given in (50).

(50) Notker's final stops

WGmc	Notker's spelling & phonology		Thurgovian
*b	<b>	/p/	/p/
*g	<g>	/k/	/k/
*þ	<d>	/t/	/t/
*d, *ð	<t>	/tt/	/tt/

3.2. Notker's choice of letters, context of the Anlautgesetz and lack of Auslautverhärtung

Our claim has been consistently that Notker did not have a FORTIS/LENIS contrast but rather a QUANTITY contrast. Here we consider two further phonetic discrepancies with his writing system if indeed he was trying to represent a FORTIS/LENIS distinction.

Recall that in (2) we note that in word final position Notker **never** used the voiceless letters <p> and <k> — he only uses <b> and <g>. If his *Anlautgesetz* was one of FORTIS/LENIS alternation, and he was using the Latin letters to reflect it, then he ought to have represented *Auslautverhärtung* which came into the language presumably in the 9th century (Braune & Eggers 1987) with FORTIS letters as in standard German. According to Kohler (1984) for instance, who claims that standard German has a FORTIS/LENIS contrast, word final position facilitates FORTIS articulation. This is in direct contradiction to Notker's spelling, since he

always uses the LENIS letters. One could, of course, argue that there was no such rule as *Auslautverhärtung* in Notker's grammar and hence his final consonants were always LENIS. But, this is somewhat unlikely given that all German dialects with a FORTIS/LENIS distinction show *Auslautverhärtung* with FORTIS obstruents word finally.

The alternative option, which we prefer, is that Notker had no FORTIS/LENIS contrast and hence no question of anything like *Auslautverhärtung*, and always used 'voiced' letters for labials, velars and coronals word finally when they were singleton, but <t> for the geminate. The latter is, arguably, a more coherent explanation.

There is one further point against the FORTIS/LENIS assumption. If the voiced letters <b d g> were meant to be LENIS and the voiceless letters <p t k> were FORTIS, then the context of the *Anlautgesetz* is rather strange. Recall, that Notker used the letters <b d g> word initially when the preceding word ended in sonorant. This could be viewed as an assimilation to sonority or voicing — a type of *Lenisierung*. But he used <p t k> when the word ended in an obstruent, which include the LENIS obstruents <b d g>, FORTIS <t> and fricatives and affricates. Here, the FORTIS feature cannot be the trigger for the *Anlautgesetz*.[27]

A final argument against the FORTIS/LENIS distinction is based on Notker's medial contrasts like <lt> and <ld>. Under the FORTIS/LENIS hypothesis, the sonorancy of the medial <l> plays no role word medially. In our view, the sonorant <l> in the rhyme allows both the underlying singleton and a geminate to follow. This is **exactly** the same pattern one finds across words.

As we have said before, if one looks at the system as a whole, all the pieces fall into place.

[27] Citing Kohler (1984), Page (1999: 304–5) claims that the sonorants "facilitate" the production of LENIS consonants and obstruents "facilitate" the production of FORTIS consonants, even though the obstruents themselves include the LENIS consonants. Page claims that "whether or not *b*, *d*, *g* in Notker's manuscripts represent voiced lenes or voiceless lenes is immaterial to understanding the alternation". He proposes that the initial consonants were underspecified and presumably they get the lenis feature in the sonorant context. The non-alternating *t* is specified as FORTIS. This does not solve the problems of how such a system came about as we mentioned earlier when discussing Penzl, and it is also unclear what the analysis of the final consonants would be.

4. Conclusion

From the Alemannic dialect of Notker der Deutsche to the modern Alemannic dialect of Thurgovian, the system of QUANTITY contrasts in stops has undergone very little change. Notker had a QUANTITY contrast for the stops in all places of articulation word medially. Word initially and finally the contrast only existed for the coronal stops. This contrast arose for two reasons. The High German Consonant Shift removed the original contrast in voicing by changing all the voiceless stops to fricatives or affricates. Thus, speakers of later dialects like Notker could have had no access to any such contrastive feature. Lost contrasts do not exist in the synchronic phonological system. A further process of Defricativisation of the pre-OHG *þ would have led to a neutralisation of the original coronal sounds: dental stop and the interdental fricative. In Notker's dialect, the existing medial QUANTITY distinction was extended to the initial and final positions to maintain the old contrast: the original pre-OHG stop *t became a geminate /tt/ while the original fricative *þ became a stop /t/ and participated in alternations with the labial/p/ and dorsal /k/ (cf. (24b)). Thus, in Notker's *Anlautgesetz*, where /p k/ allophonically became [pp kk] across word boundaries within a phrase if the preceding word ended in a sonorant (13), the /t/ (from *þ) also underwent a similar gemination and became /tt/. To graphically contrast the underlying geminate (/tt/ < *d) with the derived geminate (< *þ) in word initial position, Notker wrote the former with the letter <t> (which did not alternate) and the latter with <d> alternating with <t>. There was no alternation in word final position and Notker here used the letters <b d g> for the singletons and continued to use <t> for the underlying geminate.

Thus, the only real change in Notker's phonological system from pre-OHG was the **extension** of the QUANTITY contrast in word initial and final position for the coronal stops. And the reason for this change, we claim, is to maintain an original stop/fricative contrast which was neutralised.

A further extension of the QUANTITY contrast in word initial position occurs due to the adaptation of loans. In an attempt to maintain the original voicing contrast of the donor language(s),

loans with voiceless consonants were borrowed as geminates for all places of articulation, thus extending the QUANTITY contrast everywhere. Consequently, the Modern Thurgovian phonological system has a QUANTITY contrast in all places of articulation and in all positions in a word. Interestingly, Modern Thurgovian also has word initial singleton/geminate alternation which is identical in context to that of Notker: singletons after obstruents, geminates after sonorants. The only difference is that for Modern Thurgovian it is not the singletons which add a prosodic position across word boundaries, but the geminates which lose a prosodic slot when the preceding rhyme contains an obstruent (Kraehenmann 2001, 2003).

We argue extensively against a FORTIS/LENIS contrast in Notker (§2). If we assume that after the OHG Consonant Shift (cf. Penzl 1971), a FORTIS/LENIS contrast developed by first making all the LENIS pre-OHG *b *d *g FORTIS p t k and then changing the *þ to d, the mystery remains why in Notker the original LENIS *d stands out on its own. Penzl's observation that there was no 'opposition' in voicing after the Consonant Shift is entirely correct. But this also means that there was no real contrast in voicing within the pre-OHG system and hence no *b *d *g which could have changed to *þ *t *k (§2.2.2; see also Dresher 2003 for a detailed account of contrast in phonological systems). These symbols are meaningless in terms of a VOICE contrast or even a FORTIS/LENIS contrast — there is no laryngeal contrast, but only one set of stops. Thus, no such change occurs. The only change is the Defricativisation of *þ. Individual piecemeal changes are not necessary.

The analysis of medial sonorant plus coronal obstruents also follow straightforwardly. Notker's <ld> and <lt> clusters word medially pattern exactly as across word boundaries — /l/ permits both singleton and geminate coronals. And again, the correspondence with Modern Thurgovian is direct — <ld> words are now with a singleton /lt/, while <lt> words have a geminate /ltt/ (see §3.1).

Our analysis of Notker's system as one which has a QUANTITY contrast corresponds perfectly with the modern Thurgovian development. Wherever Notker had an alternating <p> ~ <b>, <k/c> ~ <g>, <t> ~ <d>, Thurgovian has a singleton. And Notker's non-alternating <t> corresponds system-

atically with Thurgovian geminate /tt/. Thus, through the generations the change in the entire system has been minimal, which is what we expect since there was no particular opacity which could have led to a potential reanalysis of the grammar.

Many other odd individual changes fall into place. For instance, under our hypothesis that Notker's contrast was singleton versus geminate, the mystery why his medial <t> from WGmc *d, and <tt> from WGmc *dd should both lead to Thurgovian /tt/ is explained. For Notker, the medial <t> and <tt> had to be the same sound, viz. a geminate, which survives as such in the modern language. A further consequence is the development of *þ and *ð in word medial position. We claim that the *ð as a result of Verner's Law must have merged quite earlier with the original pre-OHG *d. As a result, the Verner's Law alternation in the ablaut verbs show up as <d> ~ <t> in Notker and they are maintained in modern Thurgovian as /t/ vs. /tt/. Note that this alternation is not a postlexical phrasal alternation like the *Anlautgesetz* where Notker's <d> was a geminate and the <t> a singleton. These are underlyingly /t/ and /tt/ corresponding to <d> and <t>.

The modern Thurgovian system with word initial singleton/geminate contrasts is quite a marked system. It is also fairly unexpected given that the system seems to have developed due to loans. Introducing new contrasts due to loans, which is part of the adult system, is indeed surprising since the grammar should be quite resistant to such dramatic changes. However, when we consider the phonological system as a whole, this is not such a unusual change. The older Alemannic system of Notker had already laid the foundation for this system. Notker already had a word-initial contrast in coronals; the later generations extended the QUANTITY contrast to other places of articulation. No new contrast was added.

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APPENDIX

Extracts from *De nuptiis Philologiae et Mercurii Codex Sangallensis 872*, by Martianus Capella, translated by Notker der Deutsche, 11th century.

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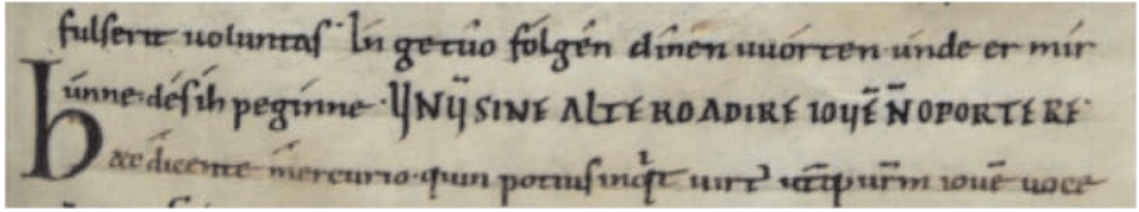
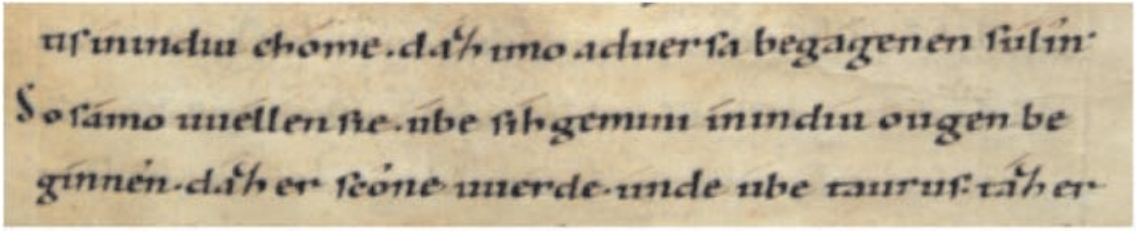
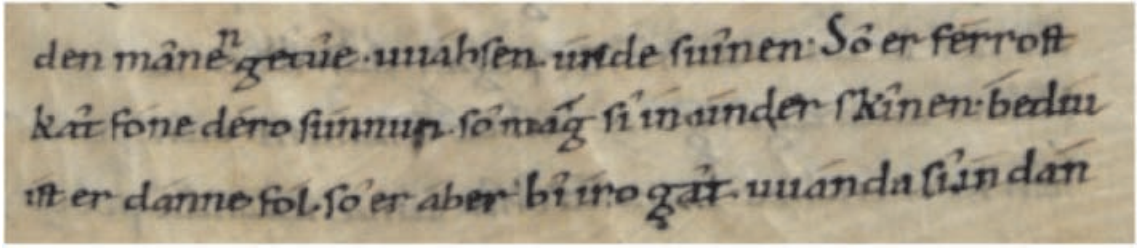
...Ín getûo fólgên dînen uuórten• únde er mír únne• dés íh **p**egínne... (Nc 03519)



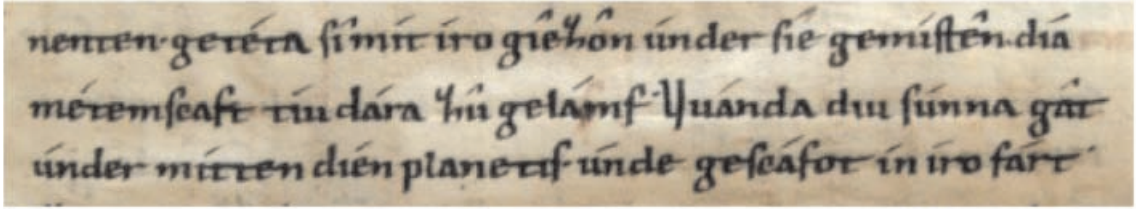
...úbe síh gemini ínin díu ouge**n** **b**egínnên. dáz er scône uuérde... (Nc 09720)



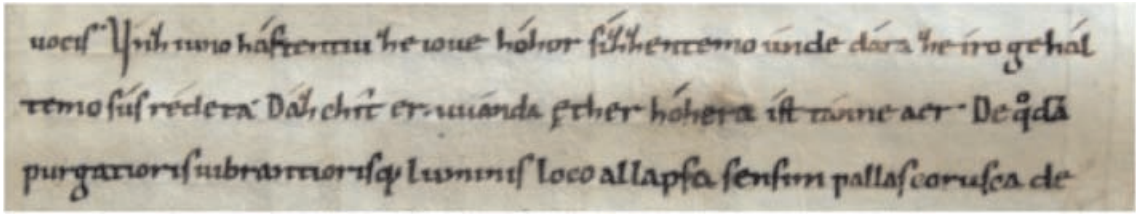
...Sô er férros**t** **k**ât fóne déro súnnun... (Nc 10721)



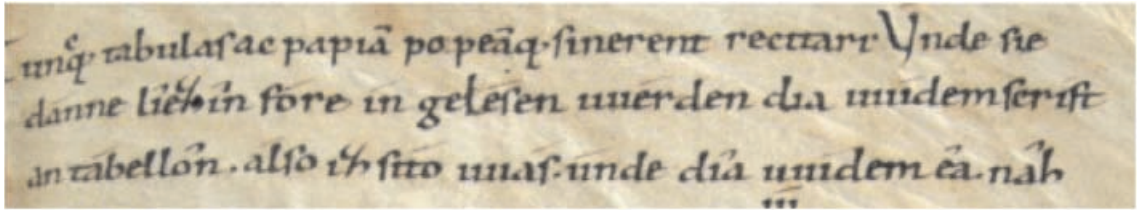
...Uuánda diu súnn**a** **g**ât únder mítten dién planetis... (Nc 02311)



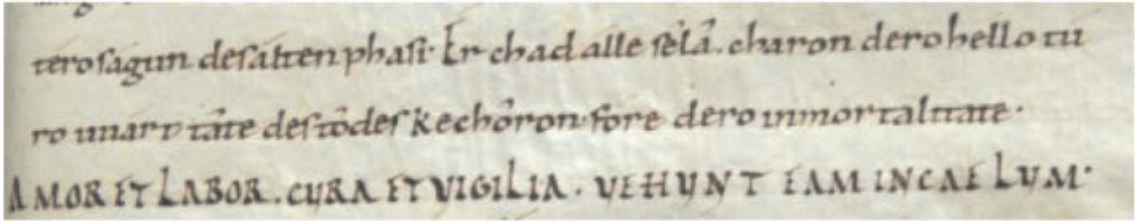
...uuánda ęther hóhera íst tánne aer... (Nc 04712)



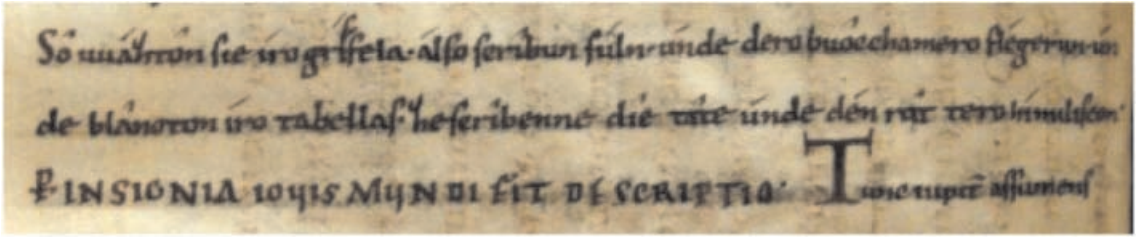
...Únde sie dánne lîezîn fóre ín gelésen uuérden dia uuídemscrîft an tábellôn... (Nc 16902)



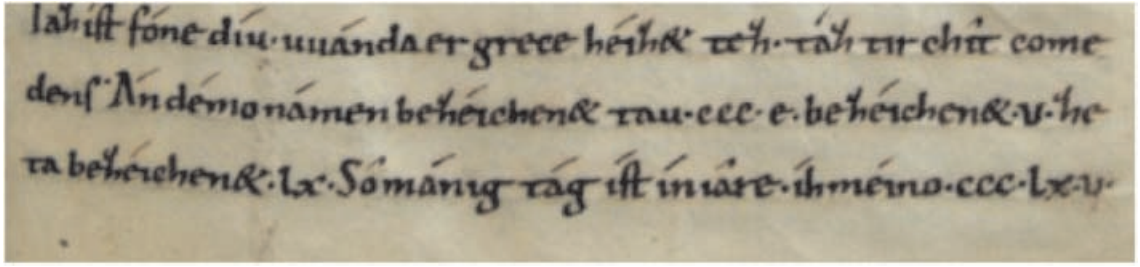
...charon dero héllo túro uuár**t** **t**âte des tôdes kechôron... (Nc 13110)



...ze scrîbenne dî**e** **t**âte únde dén rât tero hímiliscon... (Nc 05608)



...Sô mánig tág íst ín iâre... (Nc 06122)



...Sô uuárd táz ter tág pegónda décchen die stérnen... (Nc 10421)