The Saussure Effect in Lithuanian

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The so-called “Saussure effect” describes the phenomenon of laryngeal loss in the following environments: *#HRo- and *oRHC-.

The fact that the effect is observed in several Indo-European branches suggests that it took place at the stage of Proto-Indo-European. In this paper, characteristic examples of the phenomenon in Lithuanian are presented, and an attempt is made to provide a consistent morphological explanation of the reason why no traces of the Saussure effect are observed in several seeming counterexamples where its operation is expected.

1 Introduction

The “Saussure effect” is a phenomenon where a laryngeal is lost without any trace in specific environments in the vicinity of the vowel */o/. Although not many examples are found, it is observed in Greek, Anatolian, Italic, Sanskrit, and Armenian. This fact suggests that the Saussure effect took place at the stage of Proto-Indo-European. Recent studies on the Saussure effect include a survey of the examples of this phenomenon in Latin and Italic in Nussbaum (1997), an investigation and a summary of the phenomenon in Greek in Beekes (1969: 74–75, 238–242), as well as in Anatolian in Melchert (1994: 49–51).†

For Balto-Slavic, the main study of this phenomenon is by Rasmussen (1989), who provides examples of the phenomenon from Balto-Slavic in order to explain the unexpected circumflex

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†The phenomenon was originally described in Saussure (1905: 51ff.).
tones of some forms. Unfortunately, however, the evidence for
the Saussure effect in Baltic does not seem to have received
the attention it deserves.

In this paper, I will examine certain examples and
counterexamples of the Saussure effect in Lithuanian, thus
refining the results obtained by Rasmussen (1989). Since as yet
there are no good collections of Proto-Indo-European nominal
roots, the data presented here in regard to the Saussure effect
are largely based on the collection of Proto-Indo-European
verbal roots in LIV. Furthermore, I will attempt to clarify the
relationship between the Saussure effect and each of the
seeming counterexamples. Most of these counterexamples are
assumed to have been affected by legitimate analogical
processes which restored the lost laryngeals.

1.1 The Saussure Effect

The Saussure effect constitutes the loss of a laryngeal in
the environments indicated in (1) below:

   (1) a. *#HRo- > *#Ro-
b. *-oRHC- > *-oRC-

The examples in (2) and (3), which are examined in
Beekes (1969: 74–75, 238–242), show that laryngeals in Greek
were not vocalized in the environments indicated in (1):²

(2) Failure of vocalization of laryngeals in the environment
of *# Ro-:

   a. *h₃loig-o- > λοιγός ‘decimation’: cf. *h₃lig > ὀλίγ- ‘few, small’
   b. *h₃moig-h-o > μοιχός ‘adulterer’: cf. *h₃maiγ₃-h > ὀμεῖχω ‘to urinate’
   c. *h₂nɔr- > νερή ‘to be active’ (Hesychius): cf. *h₂ner- > ἄνηρ ‘man’
   d. *h₂uors- > ὕρων ‘urinate’, ὕρων ‘urine’: cf. *h₂uers- >
      ἄερσαν, ἀέρσην ‘dew’

(3) Failure of vocalization of laryngeals in the environment
of *-oRC:

²(2) and (3) are based on the summaries in Nussbaum (1997: 181–182).
The examples from Latin in (4) below were examined in Nussbaum (1997):

   ‘safe and sound’
   b. *tolHu > *talu > *toll- → meditullium ‘the interior, inland part of a country’: cf. *tlH-tos > *tl-atos > Lat.


   gh1-tó- > (g)matus ‘born’: PIE *CRHC > Lat. CaRaC, e.g., *
   ph2-meh2- > *palama > palma ‘palm’. On the other hand, Schrijver (1991: 193–197) argues that it is unnecessary to set up a phonological rule *CRHC > CaRaC and shows that most examples of the alleged change CaRaC < *CRHC can be explained in different ways. *CRHC is proposed by him as one of the possible sources of Latin CaRaC sequences: palma < *plh2-em; calamitás ‘calamity’ < *kH-em. Therefore, the former change from *
   slh2-uyo- to Lat. salvus can be regarded as possible if we accept the development *CRHC > CaRaC mentioned in Meiser (1998: 108). At the same time, the latter change from *
   slh2-evo- to Lat. salvus is possible. As a result, *CRHC > CaRaC is rejected and an alternative explanation is provided by Schrijver (1991: 193–197). However, since it is essentially irrelevant whether the preform of Lat. salvus is *
   slh2-uvo- or *
   slh2-evo, this problem will not be discussed further here.
látus ‘broad, wide’; *tol(H)u > OPr. talus ‘floor’;  
*tol(H)u- or *telHu- > Skt. tālu  
‘palate’ (< *roof of the mouth’)

c. *kolH-ni > *holni- > collis ‘hill’: cf. *kelH-tei > Lith. kėlti,  
Latv. celt  
‘to lift’  
; without the laryngeal loss, the expected Latin form  
would be X colnis or X culnis < *kolani- < *kolH-ni.

Ved. tuvi-kurmi(n)-  
‘moving strongly’ < *kH[H]-ni, Gk. πλημμυη ‘nave of a  
wheel’ < *kH[H]- or *kH[H]-.

Melchert (1994: 49–51) gives examples from Hittite in  
(5) as evidence of the laryngeal loss.

While the reconstruction of *kolHso- (Nussbaum 1997: 196) is  
phonologically sufficient, it raises a morphological question concerning the  
suffix *-so-. *kolHso- seems to have a morphological boundary between  
*kolH- and *-so, since a root of the shape of *kolH- and a suffix *-so- can be  
recognized on the basis of Gk. πλημμυη ‘to turn (into), to be(ome)’ and Skt.  
cárati ‘to travel, to wander’ (< *kH[H]-/a/), and so on.

However, the reconstruction of the suffix *-so- is problematic, at least  
for an early stage of Proto-Indo-European, since there is no clear evidence for it. Brugmann (1906: 538ff.) showed that the suffix *-so- is an extension of *-a- or *-es- by *-o-, analogous to *-en- and *-on- by *-o-, etc. Furthermore, even though a so-formation shares the same suffix and the same root, the difference in the ablaut of the root usually indicates that a shift of old s-stems to o-stems occurred in the daughter languages, e.g., Skt. raksá- ‘shining’ with zero grade and Olcel. lóss ‘light’ with e-grade suggest an old s-stem. There are a fair number of examples of this kind. Also, Chantraine (1933: 433–436) classifies Greek words with -sow into three groups: (i) loan words, (ii) expressive adjectives and action nouns, each of which can be explained as a root with a desiderative suffix, and (iii) hypocoristics. As a result, he avoids the reconstruction of the suffix for Proto-Indo-European.

Although it is clear that further research regarding this issue is needed, it is beyond the scope of the present paper. The examples of the Saussure effect with the suffix *-so- as identified by previous studies are cited below, with the exception of the forms in *-so- in my own examples.

However, Nussbaum (1997: 196) mentions that the possibility cannot be excluded that collus/collum reflects the following change: *kolHso- > *kolso- > *kolHso- > collus/collum. One of the anonymous referees suggested that the following place-name and its corresponding adjective could be counterexamples to the above-mentioned sound change since the expected assimilation of sonants following syncope does not seem to have occurred in them: Falerii < *Falrior < *Falesioi, (adj.) Falerus < *Falrios < Falesinos. The investigation of these two forms will be reserved for a future time.
(5) a. *h₂wórso-* > *wórso-* > war- ‘mist steam’: cf. *h₂wér- ‘to rain’ > Gk. ἀσφάλτος ‘dew’
b. *h₂worg- ‘turn, twist’ > (reduplicated) *worg- > wawarkima- ‘door - hinge’: cf. *h₂urk- > hurki ‘wheel’
d. *polh₂ueh₂- > palwa(i)- ‘to clap’: cf. Lat. palma ‘palm’ < *ph₂mah₂or or *ph₂hem²; without the laryngeal loss, Hitt. palwa(i)- would be expected.

In addition to the examples listed in (2) – (5) above, there are some examples from other languages, which are provided in Nussbaum (1997: 183), such as the ones in (6) below.

(6) Examples from other languages
a. *solh₂-o- > Skt. sárva- ‘whole, all’: cf. (3d)

As shown above, examples of the Saussure effect are observed in several Indo-European daughter languages. In the next section, I present possible traces of the Saussure effect in Lithuanian.

1.2 Expected traces of the Saussure Effect in Lithuanian

Although laryngeals do not have segmental reflexes in Lithuanian, it is well known that they have reflexes as tonal accents, as in (7) and (8) below.

(7) a. *VRHC > ŽRC [acute intonation (falling tone)]
b. *VRC > VR̃C [circumflex intonation (rising tone)]

(8) a. *gēnḥ₁-to- > žėntas ‘son-in-law’, *bhérH₂ > bėržas ‘birch’
b. *gömЬos > žañosas ‘sharp edge’, *uĺk̚os > vilkas ‘wolf’

Accordingly, the intonation of *-oRHC- sequences, which have also undergone the Saussure effect, is expected to be

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7See footnote for the two competing possible preforms.
8Lithuanian long vowels, diphthongs, and mixed diphthongs (vowel + sonant between consonants) have two kinds of intonations when they are accented:
a. acute intonation (V̂): falling tone
b. circumflex intonation (Ṽ): rising tone
circumflex in Lithuanian: \(^{*}_oRHC_\) > \(^{*}_oRC_\) [via the Saussure effect] > \(-aRC_\) (7b). Based on this, Rasmussen (1989: 181 – 184) gives the forms which seem to have undergone the Saussure effect. \(^9\) Some of these examples, which I consider plausible, are given in (9). \(^10\)

(9) Examples from Lithuanian

a. (PIE \(^*_korH-neh_2_\) > PB-S. \(^*_karna > karnà \) (4) \(^11\) ‘bast’: cf. \(^*_kérH-on-s > kérH-òn \rightarrow kiH-òn \rightarrow \) Lat. *caro ‘meat’

b. (PIE \(^*_sphorH-teh_2_\) > PB-S. \(^*_spartà > spartà \) (4) ‘speed’: cf. Ved. ṁda ṛpha sphaṝś (RV 6.61.14) ‘do not spurn [us]!’ < \(^*_spherH- ‘to kīck’

c. (PIE \(^*_kouH-no-\) > PB-S. ṣaunas > šaūnas, šaunūs (4) ‘brave’ \(^12\)

\(^9\) The purpose of the analysis in Rasmussen (1989) is to utilize the Saussure effect to account for certain forms which exhibit unexpected circumflex tones but which cannot have undergone \(\textit{métatonie douce}\) since they do not appear in the well-known environments necessary for its occurrence.

\(^10\) However, since (9d) and (9e) are affected by the problem already mentioned in footnote 7, they are less plausible in comparison to the other three.

\(^11\) Lithuanian nominals are classified into four “accentual paradigms (AP)” according to the pattern of the stress alternation between the stem and the ending throughout the nominal paradigm. Regarding nouns with a monosyllabic stem, the tone of the stem is connected to the AP to which the noun belongs. AP1 denotes a barytone paradigm with the acute accent on the root, while AP2 is a historically barytone paradigm where the root is non-acute and the stress alternation between the stem and the ending is caused by Saussure’s law and other morphological factors. AP3 comprises mobile paradigms with the acute root, whereas AP4 denotes a mobile paradigm with the non-acute root where further stress alternation has been brought about by Saussure’s law and other morphological factors.

\(^12\) While Rasmussen (1989: 182) considers šaūnas to be related to šáunti ‘to shoot’, which is a descendant of the Proto-Indo-European root \(^*_ke\H- ‘to throw, push to move’ (LIV 330), it could also be related to Skt. śānā ‘lack’, sūvar (perfect form of the root sāv ‘to swell’: Mayrhofer 1986–96: II, 623–624) and Gk. κυόω ‘to bear in the womb’ as suggested in IEW (592–594). The Greek form suggests the existence of \(^*h_1\) in the root for ‘swell’ since it can be interpreted as a reflection of a causative form \(^*_keh₁-é\). However, from those zero grade forms, two kinds of full grade forms, namely \(^*_keh₁-\) (following Mayrhofer 1986–1996: II, 624) and \(^*_kueh₁-\) (after LIV 339), can be reconstructed. It is difficult to judge which of the two forms represents the older shape of the root, and this problem remains open.

In addition, following the analysis of Mayrhofer, the root on which the protoform of šaūnas is based is a set root in the case of both \(^*_kouH- ‘to throw’ \) and \(^*_kouH- ‘to throw’ (or \(^*_kueh₁-\)) ‘to swell’. Therefore, šaūnas is a fine example of the Saussure effect.
d. (PIE *norH-seh₂, -so-) PB-S. *narṣa, -sas > narsā, nařsas (4)
   ‘courage’ : cf. OCS po-nṛṭtū ‘buried’, Lith. nėrū ‘to
dive’ < *neṛH- ‘to dive’
e. (PIE *bölH-so-) PB-S. *bālsas > bašas (4) ‘voice’ : cf.
   Lith. bilti ‘to begin speaking’ < *bolH-tei, OE bellan ‘to
   ring’ < *bolH-e- ‘to sound’

2 Problems with the Lithuanian Examples of the Saussure Effect

Following §1.2, the examples of the Saussure effect in Lithuanian should be forms which have a circumflex accent on
their respective root syllables, and whose preforms are
considered to have contained *-oRHC- sequences. However,
these two criteria are not sufficient for the proper
identification of the effect since there are additional factors
which need to be taken into account. Therefore, I believe that
some forms presented in Rasmussen (1989: 181–184) and cited
below should be excluded from the list of probable examples of
the Saussure effect for reasons which I will discuss in the
following sections.

2.1 Uncertain reconstruction of laryngeals

For some roots, it is difficult to decide whether a root-final
laryngeal can be safely reconstructed. Some researchers
consider the following forms to have been derived from set
roots, while others consider them to have been derived from anit
roots.

2.1.1 *k̂or(H)meh₂ > šarmā (4) ‘frost’

Rasmussen (1989: 181) regards Lith. šarmā as one of the
cognates of OE, OSax. hrim ‘frost’, and reconstructs PIE
*k̂eriH-. He considers that the Germanic forms reflect the
zero-grade form *k̂eriH-, and that their long vowels provide
evidence for the existence of a laryngeal. However, OE,
OSax. hrim is related to *k̂rei- ‘to touch something, contact’
together with Lith. krēnā (4) ‘cream’ by IEW (618), which is
modified as *KreɪH- ‘to touch’ in LIV (368). Yet, two problems
arise from these reconstructions. The first concerns the
question of whether the initial consonant of the target root was
a plain velar or a palatovelar, since these two consonants have
different outcomes in Lithuanian, namely š (< *k̂) and k (< *k).
Another problem is which shape of the root is the original,
*k̂/k̂reiH- or *k/kreiH(i)-, for only zero-grade reflexes are shown

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outside of the Balto-Slavic cognates, making it difficult to determine the original shape of the root.

Furthermore, there are uncertainties regarding Lith. šármas and its related forms. Derksen (1996: 88–89) reconstructs a Proto-Baltic acute root for this form on the ground of the accentual correspondences between Lithuanian [šármas (1/3) ‘hoarfrost, lye’, sarmà (3) ‘id.,’ šárna (1) ‘hoarfrost’] and Latvian forms [sá̂rmas ‘lye’, sârma ‘hoarfrost’, sêrma ‘id.’]. He regards the accentuation of šármas (4) and šarmà (4) as the result of the analogical spread of AP4. He also discusses its cognates with a zero-grade (š̄rmàs (3) ‘grey, dapple grey’, Latv s̄irms ‘grey’), which exhibit the original acute. For these reasons, he thinks the acute accent in the cognates with a *-no- suffix (š̄rmàs (3) ‘wild boar’) and with -v- (š̄r̄nas (3) ‘grey, dapple grey’) show the original acute accent, while šērknas ‘hoarfrost’ and Latv. šērnis ‘hoarfrost’ do not show any trace of the old acute. In contrast to this, Illich-Svitych (1978: 119) reconstucts an ani† form *kernom ‘hoar-frost’ since some of the Slavic cognates, such as Ru. serēn ‘crust over snow’ and Ukr. serēn ‘frozen hard snow’, point to a non-acute root, while he relates Lith. šárma (1) to a sêt root (*kerH-) in PIE. Derksen states that if Illich-Svitych is right, there seem to be two almost identical roots (*ker- and *kerH-) in Balto-Slavic.

Thus, if we postulate that all the forms quoted above are derived from the same root in PIE, it is extremely difficult to determine whether the original root in PIE was an aniṭ or a seṭ root, since some cognates (šármas (1/3), Latv. sārns, šīrmas, Latv. šīrns, etc.) suggest an original acute, or a seṭ root, while others (šērkšnas, Latv. šēršnis, Ru. serēn, Ukr. serēn, Slk. sriei̯) imply a non-acute, or an aniṭ root. For this reason, the problems surrounding the root *ker(H)- should be reserved for a later research.

2.1.2 *moi(H)neh₂, -os > maînas, dial. mainā (4) ‘exchange’

Rasmussen (1989: 199) reconstructs a seṭ root *meiH- on the grounds of Latv. mīt ‘to exchange’ and Ved. máyate ‘to exchange’. The Latvian correspondences to Lith. maînas are maïņa, maîna, and maîna ‘change’, which exhibit acute accentuation. However, the cognates of Lith. maînas include

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15 Būga (1923/1924: 272) thinks that Lith. maînas would have been formed beside *mâina on the analogy of vaînas : vârna, on which the denominative
Ved. *apa-mitya- (< *-mi-) 'charges', which suggests an anit root *mei- in Proto-Indo-European (Mayrhofer 1986–1996: II, 314–315). Scr. mijena 'change (of the moon)' also points to an anit root. Consequently, although the intonation of Latvian forms certainly presents a problem, it is nonetheless clear that the root itself is of the anit type.

2.1.3 *uor(H)tā → vaītāi (2) 'gate'

An anit root *uer- 'to ward off' is reconstructed in LIV (684), while Rasmussen (1989: 183) reconstructs a set root *uerH- beside the anit form (*uer-m). Rasmussen (1989: 82) assumes two more structures for the root, namely *uerHu-m0 and *uruH-m0, where the former produced *ēruma 'cover', whereas the latter gave rise to *uruma 'cover'.

The cognates of this root include Gk. ἀρμα < *uer-u- 'to check (from doing something)' (LIV684), Ved. vṛtā- 'enclosed' < *uṛ-tō, vartār- 'inhibitor' < ṣe-ṛ-t- (e.g. arno-vṛt- 'obstructing the flood') and varū (e.g. varutār- 'defender', vārutha- 'umbrella, protection') (Mayrhofer 1986–1996: II, 512–513). Mayrhofer (1986–1996: II, 513) thinks that varū does not necessarily indicate a se root since Ved. vṛtā-, vartār-, and -vṛt- suggest an anit root, contrary to the assumption of *uerH- proposed in Rasmussen (1989).

As briefly surveyed, there are a number of forms which suggest an anit root *uer- for PIE. For this reason, this form will be excluded from my discussion.

2.1.4 pol(H)uos > paĪvas (4) 'pale'

Rasmussen (1989: 184, 306) reconstructs an unspecified laryngeal for the root *pelH- 'pale'. On the other hand, Nussbaum provides a discussion on the root relevant to Lith. paĪvas. He distinguishes between the two forms (i) PIt. *pollo- (< *pal-u-), identical in formation to Gmc. falwa- 'pale' (OIr. *fallo < *falo, OHG folo) and with Lith. paĪvas, and (ii) PIt. *pollo- 'dark, gray', which is continued by Lat. pullus 'dark, gray'. These two forms mainīti (maine [3p.]) was formed. Thus, he regards the acute intonation as original for the Baltic words meaning 'exchange.' On the other hand, Derksen (1996: 260) proposes an alternative idea that the méiatonie rude in a-stem agent nouns in Baltic was analogical to the derivation of nomina agentis from iterative (or intensive or durative) verbs with the suffix *-a. Later, this type of derivation became productive and a-stems with fixed stress on an acute root were derived from verbal roots even if there were no such verbs. Although maina, maina, and maina 'change' are not agent but abstract nouns, they might be the result of the derivation mentioned above.

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reconstructed forms could be descendants of one and the same stem, although there are difficulties regarding this assumption: “one is that *pal- and *pol- are not easily reconciled (*ph₂e/ol- being excluded by Gk. πελιός ‘gray’ etc. and *polH-/*pH- by e.g. OIr. liath ‘gray’ < *pl-ei- and not *p(H-ei-)” (Nussbaum 1997: 191⁶²); the other is that *pallo- denotes a pale color while *pollo- denotes a dark color. Considering these points, Lith. palvas seems to be semantically and morphologically akin to a group of words which have descended from *pallo- (< *pal-u-) ‘a pale color’ rather than from *pollo- ‘a dark color’. Furthermore, following the view of Nussbaum that the sequence *-ll- in *pallo- is more likely to reflect *-l- than a syncopated *-V-, *pallo- is not likely to show the vocalized root-final laryngeal, and the shape of its ancestral root would be *ph₂e/ol-, without a root-final laryngeal. However, there remains a complicated etymological problem, namely whether there is a proper way to reconstruct one PIE root reconciling *pal- and *pol-, which Lith. palvas should be based on, as well. This is why palvas is omitted from the following discussion.

2.2 Etymological problems

The forms listed in the following sections face etymological problems in the sense that there are competing etymologies, one of which allows the reconstruction of a root-final laryngeal, while the other one does not.

2.2.1 spañas (4) ‘wing’

Rasmussen (1989: 182) regards Lith. spañas as connected with Lith. spirti, Latv. spēt ‘to kick’, which are cognate with Ved. sphurāti ‘to push, to kick away’ [< *spH-é- (LIV 585)]. However, at the same time, there is another possibility, namely *(s)per- ‘to traverse’ [ *(s)por-no- > spañas], which is related to Skt. parrṇā- ‘wing’, OHG farn, and OE fearn ‘fern’ in IEW (850).¹⁴

¹⁴According to IEW (850), the origin of the initial s- in the Lithuanian form could be the verbal root *spH-. I further note that both Illich-Svitych (1965 [1979]: 38) and Southern (1999: 36) mention Lithuanian spañas as a variant with s-mobile, although they set up *(s)pern- for the Proto-Indo-European root. Since “(*s)+ plain voiceless stops” is the “home territory” of s-mobile, as described in Southern (1999: 20–21), the view of Illich-Svitych (1965 [1979]: 38) and Southern (1999: 36) is not implausible.
Both of the possible root etymologies work well with Lith. *spaRNAS*, while the one based on *per-* is preferred in respect to Skt. *parNá* since the root with aspiration, i.e., *spH*erH- (> *sphar-* ‘to kick away’) and the other without, i.e., *per-* (> *par-* ‘to bring through, pass’), are clearly distinguished in Sanskrit. So, if *spH*erH- is adopted as the root etymology of *spaRNAS*, it should not be derived from *(s)per-, which allegedly gave rise to the rest of the forms, namely Skt. *parNá-, OHG *farn* ‘fern’ etc. However, it might be difficult to suppose that *spaRNAS* is not etymologically related to Skt. *parNá-, OHG *farn* ‘fern’ etc., since both their phonological shapes and their meanings are closely related. As further discussion on the etymology of *spaRNAS* is beyond the scope of this paper, this case will be left aside.

2.2.2 taRNAS (2 > 4) ‘servant’

On the one hand, Rasmussen (1989: 183) reconstructs *terHu-* ‘young, delicate’ as the root on which the protoform of Lith. taRNAS is based. He further notes that *terHu- is not necessarily identical to *terHu- ‘to wear away’, but does not explicitly show any evidence for a root-final laryngeal. On the other hand, according to IEW (1070), taRNAS is derived from an adjectival *anit* root *ter- ‘delicate, weak’. It is not certain that a morphological procedure for building a no-formation on the basis of an adjectival root existed at an early stage of Proto-Indo-European. Consequently, this form will be excluded from the source list for the discussion below.

2.3 A form derived from an *s*-stem

The form in question is *tom(H)seH2 > tamsà (4) ‘darkness’, which is derived from Proto-Indo-European *temH- ‘to become dark’. We also have an adjective *tamsùs* ‘dark’ in Lithuanian. According to IEW (1063), there is a Vedic cognate of this word, namely támás- ‘darkness’. Mayrhofer (1986–96: I, 626) reconstructs an *s*-stem paradigm *témH-es/*témH-s- for the protoform of Ved. támás- and Lat. *temere* ‘at random, by chance’ (< ‘* in darkness’ = Ved. támás- [loc.sg.]), which clearly points to an e-grade in the protolanguage, as well as OHG *demar ‘dim’ (< *temHsò-). Thus, these materials suggest an *s*-stem paradigm containing an e-grade. Furthermore, except for a few examples (Gk. δύο ‘a chariot’, Lat. *pondus* ‘a weight’, *foedus* ‘foul, ugly’, OCS *kolo* ‘a chariot’), *s*-stems usually do not have an o-grade in
their roots (Schindler 1975: 265). Therefore, it does not seem likely that the \( o \)-grade in the Lithuanian forms is primary. At the same time, there are examples, including several ones outside Balto-Slavic, of \( u \)-stem adjectives built on \( s \)-stems with an \( o \)-grade, which is completely parallel to \( tamsùs \) (< \( *\text{tomH-s-u-} \)), such as Gk. \( ὀξὺς \) ‘sharp’, whose protoform can be reconstructed as \( *\text{h}_2\text{o}k-s-u- \). This suggests that there might have already existed a morphological process where \( s \)-stems changed the \( e \)-grade of the root vowel to an \( o \)-grade in the protolanguage. However, since the age of this reformation is not certain, this example should also be left aside.

2.4 Forms which Underwent Metatony

2.4.1 Metatony

Metatony refers to the replacement of one intonation with another in Baltic languages, for example, in the case of \( u \)-stem adjectives: \( \text{saldùs} \) (3) [Daukša’s Postilė (1599)\(^{15}\)] (cf. Latv. \( \text{sa lūds} \)) \( \rightarrow \) \( \text{saldùs} \) (4) ‘sweet’, which took place in the relatively recent history of Lithuanian (Stang 1966: 160). Also, some groups of words containing certain morphological suffixes frequently underwent metatony, for example, \( \text{puòdàs} \) (1) ‘pot’ \( \rightarrow \) \( \text{puòdžiùs} \) (2) ‘pottery’ [nominal suffix with \( -ùiù \)], \( \text{svèikas} \) (4) ‘healthy’ \( \rightarrow \) \( \text{svèikintì} \) ‘to greet’ [verbal suffix \( -intì \)]. As shown, metatony obfuscates the original tone. Metatony is classified into two classes in accordance with the resulting intonation. Métatonie rude refers to a change from circumflex to acute intonation, and métatonie douce refers to a change from acute to circumflex intonation. Compared to métatonie rude, métatonie douce is much more frequent, especially in forms with suffixes containing \( *\text{-ìi-} \) (e.g., \( u \)-stems in \( -ius \), \( iu \)-stems, etc.).\(^{16}\)

Thus, it is clear that forms with suffixes containing \( *\text{-ii-} \), such as

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\(^{15}\)The accentuation of the words in Daukša is adopted from Skardzius (1935).

\(^{16}\)According to Stang (1966: 145–147), \( *\text{ius} (> \text{-ius}), *\text{iùos} (> \text{-is [io-stem]}) \) or \( *\text{iùà} \) [or \( *\text{iùd} \)] (\( > \text{ð} \)) shifted the ictus on \( *\text{-iù-} \) to the immediately preceding syllable at an early stage of Proto-Baltic. If the syllable which received the ictus had a long vowel or a diphthong, it received a circumflex intonation. Derksen (1996: 375) concluded that this retraction of stress took place at the East Baltic stage. This view of accent retraction, which brought about métatonie douce, seems to have been accepted as a standard: “...the sequence \( *\text{-ii-} \) in medial stressed position lost its ictus to the preceding syllable. This caused the syllable to change an original acute tone into a circumflex, i.e., the retraction caused métatonie douce on a preceding syllable. This rule has been accepted as a major source of Baltic metatony” (Larsson 2004: 162).
bañnis (2) ‘quarrel’ (PIE *bʰerH- ‘to work on something with a sharp tool’), krañnis (2, 4) ‘dowry’ (PIE *kʰe rij- ‘to exchange’), kalnius (2) ‘mountaineer’ (PIE *kelH- ‘to raise’), etc., should be excluded from the list of proper examples. However, the situation is not so simple with nominals of other stems. Since mélatonie douce in other forms, such as o-stems and a-stems, is not regular, it is necessary to examine whether a circumflex intonation in a particular stem is original or the result of mélatonie douce.

2.4.2 Distinguishing between original and secondary intonation Endzelins (1899: 263ff.) observed a correspondence between Lithuanian accentual paradigms and Latvian intonation patterns in word-initial syllables. The correspondence is as follows:

- Lith. acute (AP1) ~ Latv. sustained tone (V)
  e.g. Lith. vyraš ‘man’ ~ Latv. viirs ‘id.,’ Lith. dúona ‘bread’ ~ Latv. duôna ‘id.,’
- Lith. circumflex (AP2) ~ Latv. falling tone (V)
  e.g. Lith. rankà (rañkà [sg.acc.]) ‘arm’ ~ Latv. rûoka ‘id.,’ Lith. iêšmas ‘spit’ ~ Latv. iêms ‘id.,’
- Lith. acute (AP3) ~ Latv. broken tone (V)
  e.g. Lith. nûogas ‘naked’ ~ Latv. nûogs ‘id.,’ Lith. sîdis ‘heart’ ~ Latv. sîðs ‘id.,’
- Lith. circumflex (AP4) ~ Latv. falling tone (V)
  e.g. Lith. båsas ‘voice’ ‘id.,’ ~ Latv. bålss, Lith. draîgas ‘friend’ ~ Latv. dràugs ‘id.,’

Also, Illich-Svitych (1963 [1979]: 52–53) presents the following argument regarding the chronological relationship between Lithuanian and Latvian accentuations:

The process of accent retraction to the initial syllable in Latvian took place at an early date: it is a proto-Latvian process, (...) the tone contrast of ´ and ´ in initial syllables in Latvian reflects an older distribution of nominals by accent class than does modern Lithuanian (...) Therefore, Lith. ieva ‘bird-cherry’ (< PIE *óiua or *ciuā) occurs in AP1, 2, and 4, while Latv. iêva ‘id.’ preserves the original accentuation, and Lith. jêgà ‘thought, mind, wit’ (< PIE *jêgā) occurs only in the secondary accentuation AP4, while Latv. jêga exhibits the original accentuation (Illich-Svitych 1963 [1979]: 53). The studies by Endzelins (1899) and
Illich-Svitych (1963 [1979]) show the importance of the intonation of Latvian forms which correspond to Lithuanian ones, since it preserves the older accentual patterns. Consequently, the following examples in (10) should be excluded from the possible examples but included in the counterexamples, since the accentuation of the Latvian correspondences points to the original acute.

(10) a. (PIE \*kölH-neh₂-) PB-S. \*čalna > šalnà (4) ‘frost’:
    PIE \*kölH- ‘to be cold’
    cf. Latv. šalna
b. (PIE \*kölH-eh₂-) PB-S. \*kalva > kalvà (4) ‘hill’:
    PIE \*kölH- ‘to be elevated’
    cf. Latv. kalva

(10a) and (10b) will be discussed in §4.

3 Possible Examples of the Saussure Effect

The problems with some of the examples of the Saussure effect provided in Rasmussen (1989) were briefly discussed in the previous section. The following three points have emerged from this discussion:

• Ensure the reconstruction of a root-final laryngeal and the etymology of each root is reliable and clear.
• Ensure the original o-grade can be reconstructed for Proto-Indo-European. (for example, an o-grade of a reflex derived from an old s-stem should be excluded since the age of its formation is not certain as already discussed in §2.3).
• Ensure the intonation of the form in question is the original one.

Taking these points into consideration, I present some possible examples in this section in addition to those listed in (9) after Rasmussen (1989). Most of them have environments which allow for the shape of the form to be derived on the basis of either the Saussure effect or another rule for laryngeal loss with equal possibility. As we will see in the following sections, the rule \*CH.CC > \*C.CC discussed in Hackstein (2002) could share the same environment as that which triggered the Saussure effect if the sequence occurred in the environment \*oRH.CC (where the context of the Saussure effect \*-oRH.C- is
followed by another consonant). Also, Pinault's law [ *H > Ø in internal syllables before yod (Pinault 1982: 268–269) ] is a rule that could share the environment with the Saussure effect when it operated on the sequence *-oRHI- (where the consonant following the laryngeal is a yod in the sequence of the Saussure effect). For this reason, the possible examples listed below fall short of being certain. The intonation of the Latvian forms is based on Mülenbachs (1923–32) and Endzelins (1934–46), whereas the accentual paradigms of the Lithuanian forms are based on LKZ.

3.1 gaúð (4) ‘sonorous’

\[ gaúð (4) \text{‘sonorous’} : *g\hat{u}h_{r} \]
\[ \text{‘to call’ (cf. LJV 189)} \rightarrow *gouh_{r}d^{h}_{1}h_{r} > *gou-d^{h}_{1}h_{r} > gaúð \]

The cognates of Lith. gaúð include Gk. γοάω ‘I wail’ and OHG kúma. The long vowel in kúma (\(< *guh_{2}-m-o\)) indicates the existence of a root-final laryngeal, and γοάω (\(< *gouh_{r}-\hat{e}i-e\)) is suggestive of a root-final \(*h_{2}\). The accentuation of the corresponding Latvian form gàuds ‘miserable’ shows that the circumflex intonation of Lith. gaúð is the original intonation rather than a secondary intonation derived by métatonie douce. Here, it is necessary to assume that the laryngeal in *gouh_{r}-d^{h}_{1}i-o- disappeared at the Proto-East-Baltic stage at the latest.

However, there still remains the problem with the o-grade in gaúð, since u-stem adjectives are known to be of the proterokinetic type (Pinault 2003: 162ff.), where o-grade roots do not appear. In order to explain this o-grade in gaúð, a verbal form related to gaúð, namely Lith. gaúdziū, gaústi ‘to resound’, can be taken into consideration. The present paradigm of the verb can be interpreted as being built on the stem *gouh_{r}d^{h}_{1}h_{r}-io-, which is extended by two suffixes, i.e., *d^{h}_{1}(e)h_{r}\text{17} and *ie/o-, just as in Ved. yú-\hat{d}-ya-te ‘(he) fights’ and Lith. sker-\ddot{d}ziū ‘I slaughter’ (Brugmann 1892: 1103). Since *d^{h}_{1}(e)h_{r}, can be added to a root of any grade, as in the case of Lat. verbum (\(< *\hat{u}erh_{1}-d^{h}_{1}h_{r}-o\) ‘word’, Lith. vaïdas (\(< *\hat{u}orh_{1}-d^{h}_{1}h_{r}-o\) ‘name’ and Goth. waurd (\(< *urh_{1}-d^{h}_{1}h_{r}-o\) ‘word’, the o-grade of *gouh_{r}d^{h}_{1}h_{r}- is morphologically compatible. Also, as the suffix *ie/o- was added directly to nominal stems to

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17 Following Brugmann (1892: 1045ff.; 1906: 467), the *d^{h}_{1}- element could be a suffix *d^{h}(e)h_{r}, which originated from a verbal root *d^{h}eh_{r} ‘to put, do’.

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derive denominative verbs, as in Gk. ὠνόματι (.downcase*h₁nh₃mp-ie/o-to name), *gouh₂-dʰh₁- can be interpreted as a nominal stem. In Lithuanian, u-stem adjectives are productive (Skardžius 1943: 55ff.) and can be secondarily formed on the basis of o-stem nouns, for example, godūs ‘covetous’ : gōdas ‘covetousness’ ; draugūs ‘friendly’: draugas ‘friend’. This suggests that the adjective might have been formed on the basis of a nominal stem *gouh₂-dʰh₁-o-, although it is not attested as a noun. Consequently, *gouh₂-dʰh₁-, the protoform on which gaudūs is based, can be interpreted as satisfying the condition of both environments of the Saussure effect (.*oRH.C > *oR.C) and *CH.CC > *C.CC. Accordingly, there are two possible causes for the laryngeal loss. Since it is difficult to set up a relative chronology for these two rules, the possibility cannot be excluded that *gouh₂-dʰh₁- might have undergone the rule *CH.CC > *C.CC. For this reason, it should be regarded as a possible example.

3.2 garbē (4) ‘honor’

garbē (4) ‘honor’ : *gerH-‘to express one’s approval’ (cf. LIV 210–211) → *gorH-bh (h₂)- > *gor-bh(h₂)- > garbē

The root-final laryngeal is reconstructed on the basis of Ved. gūrtā- ‘blessed’, Lat. grātus ‘id.’ < *gʷr₁H-tó-. Although there is no information regarding the accent in Latvian, there is accentual information in Daukša’s ‘Postil where most of the instances appear with AP4. Following this, Derksen (1996: 208) reconstructs another form *gwer-bh- for garbē (4) in addition to *gwerH- (> Lith. gīrti, Latv. dzīt ‘to praise’ and Ved. gūrti- ‘praise’). However, assuming the Saussure effect, the reconstruction of a separate root is not necessary. In fact, if the

18 Although the Proto-Indo-European paradigm of ‘name’ has been disputed, here I follow the suggestion presented in Kim (2002: 29) that Gk. ὠνόματι is derived from the generalized weak stem of a proterokinetic paradigm *h₁nh₃mp-ëh₁h₃m-ëh₁h₃m-ën remade from the original acrostic paradigm *h₁nh₃mp-ëh₁h₃m-ëh₁h₃m-ën because of phonetic resemblance to nominā actionis in *-mp-ëh₁h₃m-ën.

19 According to Brugmann (1906: 386), *bho- possibly belongs to Skt. bhāti ‘to shine’, whereupon Ved. bhā- ‘bull’, which is now reconstructed as bʰēh₂-(LIV 68–9) on the basis of Gk. φώτων λάμπωντα (Hesychius) ‘aglow’, etc. Later, Besemberger (1973: 131) suggested that this suffix belongs to a PIE root *bhā- (bʰéh₂ ‘to be’). However, Hyllstead (2008) presents a counterargument which is discussed in the following part of this section.
Saussure effect is not considered, then it is necessary to propose two almost identical roots, namely *gerH- and *ger-, with the same meaning.

On the other hand, the etymology of the suffix *bʰo-/-eh₂- should be taken into account here in order to examine the plausibility of *gárbe₂ as an example of the Saussure effect. The suffix *bʰo- was first identified with a PIE root *bʰeh₂- ‘to shine’ in Brugmann (1906: 386), and has been widely accepted since then. This suffix occurs in a considerable number of abstract nouns and adjectives without any connection to colors or animals. Hyllested (2008) considers the original function of this suffix to be to form verbal nouns. Furthermore, he expresses doubt over the traditional identification of the suffix with the root *bʰeh₂- ‘to shine’ inasmuch as the phonetic similarity between the suffix and the root is limited to a single, very frequent consonant and the modifying effect of *bʰo- should lie in the modifying nature of derivation itself. What follows is that the suffix *bʰo- might not necessarily be connected to the PIE root *bʰeh₂-.

However, if the possibility of the suffix *bʰo- going back to the root *bʰeh₂- cannot completely be denied, the laryngeal loss could be caused by the sound change *CH.CC > *C.CC, making this form short of being certain.

3.3 tárpas (1) ‘hole’

tárpas (1) ‘hole’ : *terh₁- ‘to bore, drill, rub’ (cf. LIV 632–633) → *torh₁-p- > *tor-p- > tárpas tárpas

Evidence for the root-final laryngeal includes the Greek form τερέτρων ‘gimlet’ < *terh₁-tro-. The accentual correspondence between Latv. tārps ‘worm (as a creature boring a hole)’ and dial. Lith. tarpas (4/2) ‘hole’ suggests that the acute intonation in tárpas must be secondary, where originally it must have had a circumflex intonation. Therefore, it is possible that this form is the result of the Saussure effect.

3.4 kraņjas(4) ‘blood’

kraņjas (4) ‘blood’ : *kreuh₂- ‘clot, bloody flesh’ → *krouh₂-jo- > *krou-jo > kraņjas

An important piece of evidence for the specified root-final laryngeal is provided by Gk. κρέας ‘flesh’ < *kreuh₂-s-. According to Fraenkel (1962–65: I, 290), the Latvian word corresponding to Lith. krajas is *kraujis ‘blood’. However, it disappeared for two
reasons. One point is that this form constituted a homonym with Latv. krāujš ‘steep, steep edge of shore’. As a result, *kraujš for ‘blood’ might have been replaced with another item. The second reason is that the “other item” which replaced *kraujš actually existed. This item is Latv. asins, which is a cognate of Skt. āṣr, Hitt. ešbar, and Gk. ἐχαρ, ἐχαρ (Hesychius) ‘blood’. asins would have accelerated the shift from *kraujš to asins for ‘blood’. Therefore, the accentuation of Latv. krāujš could provide circumstantial evidence which suggests that the circumflex accent of the Lithuanian form is original.

The intonation of the Lithuanian form reflecting an ani root is explainable in terms of both the Saussure effect and Pinault’s law since *kroh₂-i-o- meets the structural description of both of these rules. Interestingly, Ved. kravý- (< *kreūio- < *kreuh₂-i-o-), which is an e-grade cognate of Lith. kraūjas, does not show a reflex of the laryngeal either, which is best explained by Pinault’s law. Nevertheless, it might be interesting to mention kraūjas since the environment meets both of the two rules regarding laryngeal loss.

3.5 kařdas (4) ‘echo’

kařdas (4) ‘echo’ (cf. LIV 353) : *kerH- ‘to admire’ → *korH-d(h)- > *kor-d(h) > kařdas

The root-final laryngeal is reconstructed on the basis of Ved. kṛti- ‘fame’ < *kṛH-ti-, ON hrōdr ‘fame’ < *kroH-tro-. Unfortunately, there is no corresponding form in Latvian, which is why this example falls short of being certain. However, since there is no evidence for métatonie douce in Lith. kařdas, the circumflex intonation of this form could be the result of the Saussure effect.

4 Potential Counterexamples and Their Analysis

In this section, I present some seeming counterexamples of the Saussure effect and explain why these examples do not show any reflexes of the Saussure effect in environments where it is expected to occur. There is no clear distinction in phonological environment between the examples which show the Saussure effect and the ones which do not. This has led me

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20 A more detailed discussion can be found in Endzelins (1921) Filologu briedribas raksti. However, since I was unable to obtain a copy of this work, the discussion here is based on the citations in Fraenkel (1962–65: I, 290).
to think that it is more feasible to seek a morphological explanation than to set up a new criterion for the Saussure effect, since many of the examples which do not show the Saussure effect are derived from to- or no-formations with an o-grade, as shown below.

I also discuss the fate of the original forms and their paradigms in Proto-Indo-European from which the forms in §4 descended. There are two main possibilities for the original type of the paradigms of the counterexamples, one of which is the thematic type, and the other is the athematic type. In the following sections, both cases will be discussed in this order.

4.1 Forms derived from thematic stems

First, I will provide an explanation for each thematic counterexample. Interestingly, cognate forms that escaped the operation of the Saussure effect are found for each of them. The cognate form is either a verb or, less often, a noun. The discussions below include those cognate forms. Since there is an etymological problem in general with sets of words with different vowel grades which share the same root, as in the case of *su€p-no-/*suop-no-/*suip-no- ‘sleep’, *u€ś-no-/*uos-no- (/ *ues-no- 21) ‘purchase’, and *u€g-no-/*uog-no-/*ug-no- ‘wagon’, the explanations given here are provisional.

4.1.1 káltas (1) ‘chisel’: kálti ‘to forge’

káltas (1) ‘chisel’ : *kelh2- ‘to beat, hit’ (cf. LIV 350)
*kolh2-to- > káltas

Possible support for the specified root-final laryngeal includes the Greek form: κλᾰί- ‘break’ < *kľh2-. There is a Latvian form corresponding to Lith. káltas, namely kaľtas ‘chisel’. The sustained tone in the Latvian form suggests that the acute accent in káltas (1) must be the original tone. No trace of the Saussure effect is found in this form.

Apparently, káltas is a to-formation with an o-grade built on a verbal root *kelh2-. 22 Therefore, it is helpful to look into the

21 Ved. vasná- m. ‘purchase price’, n. ‘fee, pay’ could be from the e-grade or the o-grade.
22 Since to-formations with an o-grade, for example, Gk. vóστος ‘return’, χόφτος ‘enclosure’, Lat. hortus ‘garden’, are known as abstract nouns, or at least requiring this function as nouns (Brugmann 1906: 420, Risch 1937: 22, Schweizer 1953: I, 501), the instrumental meaning of káltas calls for a semantic explanation.

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verbal paradigm derived from the root *kelh₂. Jasanoff (2003) has proposed a new type of present verbal paradigm in Proto-Indo-European, the so-called "molō-type", which allegedly had the o-grade in strong forms and the e-grade in weak forms as well as perfect-like endings. Verbs in daughter languages which have present forms either with persistent e-grade or with persistent o-grade belong to this type; for example, *molh₂/*melh₂ 'to grind' [Hitt. mall(a)i-, Lith. málti, Goth. malan < *molh₂ in contrast to OIr. melid, OCS meljo < *melh₂ (Jasanoff 2003: 64)]. Furthermore, Jasanoff (2003: 76) argues that the verbs which can be ascribed to the molō-presents show 'evidence for an o-grade present in more than one language, but no unambiguous reflex of the e-grade weak stem.' Following this assumption, *kelh₂ is included in this type on the basis of Lith. kalù, kálti and OCS koljo, klati. The following paradigm can be reconstructed for *kelh₂; cf. Jasanoff (2003: 71ff).

1sg. *kólh₂-ḥ₂e 1pl. *kélh₂-meH (?)
2 *kólh₂-th₂e 2 *kélh₂-(H)e (?)
3 *kólh₂-e 3 *kélh₂-(s)

In the 1st person singular, *kólh₂-ḥ₂e is phonologically in one of the two environments of the Saussure effect. Consequently, the root-final laryngeal might have been lost due to the Saussure effect. Likewise, 2sg. *kólh₂-th₂e might have lost the root-final laryngeal as a result of the Saussure effect.²⁴

²³ These question marks are given by Jasanoff (2003: 32) due to the fact that the situation with the endings in the plural is less clear.
²⁴ Although it might seem conceivable that the laryngeal was lost due to another sound law *CH.CC > *C.CC, the accent in this case falls on the preceding vowel. Since this sound law operated when the accent was on the following vowel (Hackstein 2002: 2), its operation in this environment would have been impossible.
Since the 3rd person singular form and the plural forms are not in the environment of any rules for laryngeal loss, they would not have lost their root-final laryngeals theoretically.

strong forms: (1, 2sg.) *kolh₂-C- > *kol-C-
(3sg.) *kolh₂-e > *kolh₂-e [vacuous operation]
weak forms: *kelh₂-C- > *kelh₂-C- [vacuous operation]

Thus, in this case the paradigm would have comprised both stems, one with a root-final laryngeal (*kólh₂/ *kélh₂) and the other without a root-final laryngeal (*kól). Then, a theoretically possible morphological interaction between them might have occurred, producing the following results:

phonological results: (i) *kol, (ii) *kelh₂, (iii) *kolh₂(e)
analogical results: (iv) *kolh₂(C), (v) *kel-

It is not inconceivable that one of the above forms was subsequently generalized in each of the daughter languages. Thus, Lithuanian generalized the stem *kólh₂ as kálti, on the basis of which *kólh₂-to- would have been formed. As Russ. kolóto ‘to break, crush’ also points to a Proto-Slavic acute accent, the generalization of *kolh₂ must have occurred at an early stage which involved both Baltic and Slavic. This is why káltas does not seem to show any trace of the Saussure effect. Therefore, káltas, which can receive a morphological account, is not a counterexample of the phenomenon.

4.1.2 šáltas (3) and šalnà (4): šálti ‘to be cold’

šalnà (4) ‘chill of early morning, hoarfrost’: *kelH- ‘to become cold’ (cf. LIV 323) → *kolH-n- > *šalnà (3) → šalnà (4) šáltas (3) ‘cold’: *kelH- ‘to become cold’ → *kolH-to- > šáltas

These two forms are cognates, and therefore they are treated together here. A laryngeal is reconstructed on the ground of the accents of the Baltic cognates, for example, Latv. salˆnà ‘frost’, salˆt ‘to be frozen’, Lith. šálti ‘to be cold’, etc., and Skt. śíśira- ‘early spring, cold season of the year’ < *śi-kH-o-. The broken tone of Latv. salnà corresponds to Lithuanian AP 3. This suggests that the accentuation of Lith. šalnà (4) is not primary but secondary, and that this form has undergone métatonie douce, thereby not showing the expected trace of the Saussure effect. Lith. šáltas is a cognate of šalnà above, and its
corresponding form in Latvian is saľts ‘cold’. The broken tone of this Latvian cognate suggests that the accentuation of šáltas (3) is not the result of métatonie rude but is rather the original accent. No trace of the Saussure effect is found here either.

As shown above, šáltas and šalnā do not show any trace of the Saussure effect, even though their preform had an o-grade. In order to see how these forms are related to the Saussure effect in their prehistory, it would be informative to look into the problem surrounding the root *kélH-, which is mentioned in Derksen (1996: 84). The problem concerns the fact that some reflexes of *kélH- mean ‘warm’, such as Lat. calère ‘to be warm’ (< *kélH-eh₁-), OIcel. hlær, OHG lāo ‘tepid’ (< *kēl₁-o-), etc., while others mean ‘cold’, as in the case of Lith. šáltas. For this reason, Schrijver (1991: 206–207) suggests that there was an ani† variant of *kélH-, whereas LIV (323) reconstructs *kélH- ‘to become cold’ and *kél- ‘to become warm’. The case can be summarized as follows:25

<table>
<thead>
<tr>
<th>reflexes of sel root</th>
<th>ani root</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lith. šálti ‘to be cold’</td>
<td>šáltas ‘cold’</td>
</tr>
<tr>
<td>Latv. sal ‘id.’</td>
<td>salts ‘id.’</td>
</tr>
<tr>
<td>Skt. śisira- ‘early spring’</td>
<td>calère ‘to be warm’</td>
</tr>
<tr>
<td>Lat. cal ‘id.’</td>
<td>OIcel. hlær, OHG lāo ‘tepid’ (&lt; *kēl₁-o-)</td>
</tr>
<tr>
<td>Wel.</td>
<td></td>
</tr>
<tr>
<td>Gmc.</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows a contrast between Baltic forms in o-grade for ‘cold’ and forms in zero-grade for ‘warm’. On the

25 Although Lith. sīlti ‘to become warm’ and Latv. sīlt ‘id.’ certainly belong here, these two verbs are excluded from the following table. Since both verbs occur with a sta-present, which often induces the acute intonation (métatonie rude, see Buiga 1923/1924: 257; Derksen 1996: 84), a speculation regarding their original intonations can be made on the basis of the intonations of their respective adjectives (Lith. šalnā and Latv. sīltas), although by themselves they do not constitute evidence for the existence of a root-final laryngeal.

26 However, the homonymic root *kél- ‘to bury, hide, cover’ draws attention, which is reconstructed for Proto-Indo-European on the basis of OE helan ‘to bury’ (LIV322). OIr. celid, -celi ‘to hide’ (Schumacher 2004: 394). Taking the homonym into consideration, Wel. ehd can be derived from *kél₁-o- ‘*covered (space) > warm’, hence the question mark in this table.
other hand, the fact that the forms for ‘warm’ (Lat. calère, OIcel. hlær, OHG lão, Lith. šiltas, Latv. silts, Wel. clyd) comprise both anīt and set forms suggests that at an early stage of Proto-Indo-European there was a confusion between anīt and set forms. A possible reason for this might be that the verbal paradigm based on *kēlH- had both the o-grade and the e-grade. In this case, the forms with the o-grade would have undergone the Saussure effect, while the forms with the e-grade would have retained the laryngeal. This, in turn, would have produced anīt and set variants within a single paradigm. This speculation may allow one to assume a molō-type present paradigm for *kēlH- with o/e ablaut. If the verb *kēlH- belonged to the molō-type, the laryngeal of the o-grade forms, once lost by means of the Saussure effect, would have been restored under the morphological influence of the e-grade set variant *kēlH-. Thus, Lith. šaltas and the preform of šalnā [*šalnā (3)] can be regarded as the descendants of the restored set root *kāH-.

The view shown above suggests that the root for ‘warm’ originally may have been a set root kēlH-, which is identical with the root for ‘cold.’ What follows this is that kēlH- may have been a common root for ‘cold’ and ‘hot’, and it must have undergone a semantic change from ‘cold’ to ‘warm’ in some languages, for example, Lat. calère and OIcel. hlær, or from ‘warm’ to ‘cold’ in Baltic languages. Although this kind of semantic change in opposite directions is not very common, an instance can nevertheless be pointed out. While some reflexes of the root meq-h2- mean ‘great’ (Mayrhofer 1986–1996: II, 338) as in Gk. μεγά-, Ved. māhi-, the Baltic reflexes mean ‘small’ [for further details about their etymology, see Fraenkel (1962–65: I, 422–423) and Mühlenbachs (1923–32: II, 574)], just as in the case of Lith. mazas and Latv. mazs.27

This still raises semantic problems with regard to whether the original meaning of *kēlH- was ‘cold’ or ‘warm’, and of how the original meaning changed into the opposite one. Some cognates which mean seasons, or which are linked to the

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27 One of the anonymous referees suggested that the opposite meaning of the Baltic forms can be explained if it is supposed that the root *meq(-h2-)- meant ‘to grow’ (cf. OIr. mogaid ‘to grow’), and that the Baltic forms underwent a semantic change from ‘still in growth’ to ‘not big enough, small’, while the cognates in other branches underwent a semantic change from ‘to grow’ to ‘grown fully, big.’ The following discussion in this section is also indebted to the insightful comments of the referee.
change of seasons, can provide clues for solving this problem. Some of the descendants of *kélH- have meanings linked to seasons, viz. sūšīra- ‘early spring’, and Olcel. klána ‘to thaw’ [<PGmc. *klæwanājanan ← *xléwaiz (Orel 2003: 176)]. Olcel. klána can be linked to seasons, for ‘thaw’ is an event taking place in early spring, when the weather gradually becomes milder. Thus, both the Vedic and the Old Icelandic words indicate the season of the year when the weather becomes milder, although it is still rather cold. These items could lead one to establish the original meaning ‘to be(come) mild’ for the root *kélH-. Although it seems the germanic forms kept the meaning ‘mild,’ this original meaning might have contributed to the development of the meaning from ‘to become mild’ into ‘warm’ in Lith. šiltas, Latv. sīls, Lat. calère, while it developed from ‘to be(come) mild’ into ‘cold’ via ‘not warm enough’ in the rest of the forms. This is my present understanding of this semantic problem, although further discussion is necessary.

4.1.3 kálnas (3) ‘mountain’ : kēlti ‘to raise’

A root-final laryngeal is reconstructed since the intonations of some descendants of the root, namely Lith. kēlti and Latv. cel’t ‘to lift’, suggest its existence. Since no decisive evidence points to a specific laryngeal, the coloring of the laryngeal in this case remains unknown.28

The Latvian form kālns ‘mountain’, which corresponds to Lith. kálnas, has a broken tone on the root vowel which corresponds to Lithuanian AP3. Hence, the acute accent on kálnas (3) must be primary, and it does not show the result of the Saussure effect.

At least two possibilities can be proposed for the morphological background of kálnas. First, it can be interpreted as a thematized n-stem. Neri (2003: 273) proposed an amphikinetic n-stem paradigm *kélh3-ô(n)/*klh3-n-ôs/ *klh3-ôn ± i

In this section, I provisionally follow the reconstruction of the unspecified laryngeal in LIV while I admit that the root-final laryngeal is most likely *h3, as the Greek form sólōwós ‘hill’ suggests. LIV (349) mentions that this is not decisive since vowel assimilation has often taken place in Greek, which indicates that the specification of the laryngeal needs further discussion. However, since it is not essentially relevant which kind of laryngeal could be reconstructed for this root, this problem will not be discussed further here.
on the basis of Gk. κολάωνη, whereby two steps would be needed to derive *kolh₁-no: *k|h₃-n- *k|h₃-n-o- [via thematization] and *k|h₃-n-o- *kolh₁-n-o- [with change of the grade of the root vowel]. Since there are no identical formations of *kolh₃-n-o- outside the Baltic languages, these processes must have taken place in the inner history of the Baltic branch. Therefore, it is not likely that *kolh₃-n-o- existed in the early stages of Proto-Indo-European, when the Saussure effect was still operating. Thus, this form is likely to be irrelevant to the present discussion. Furthermore, the ad hoc change of the grade of the root vowel assumed here presents a problem.

Second, *kolH-no- can also be interpreted as a no formation with an o-grade, as Skardžiūnas (1943: 217) notes. Assuming this, the acute intonation of kālnas can be explained by considering the influence of the verb kělti, as suggested in Nussbaum (1997: 196). If this view is accepted, then the change must have taken place at an early stage, when it was still possible for speakers to combine the verbal paradigm with the nominal paradigm. Thus, this scenario is possible, although not certain since there might be another source of the morphological influence on *kolH-no-, as will be mentioned below.

It is noteworthy that there is a debate regarding the set of words *suęp-no-/*suęp-no-/*sup-no- ‘dream’, etc. Although little is known about this, it is possible that if *kelH-no- or *kH₁-no- existed, it might have influenced *kolH-no-. However, since no direct descendants of such forms are found, this possibility lacks convincing support.

The discussion above shows that so far the second view (*kolH-no-) is more likely to be true than the first one (*kolH₁-n-o-). However, even in the case of the second view, the prehistory of the form needs to be reexamined since the problem with the thematic formation still remains, as briefly mentioned above.

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29 There might have been a descendant of *kH₁-no- in Greek. Vine (2006: 510139) suggests the possibility that Gk. κολάων ‘hill’, as well as κολωνός ‘hill’ and κλαμμα- ‘pile of stones’, might have originally represented a contamination involving thematic stems, in other words, *k|h₃-nó- / *k|h₃-mó- and *kol[h]₁-no-. Vine (p. c.) further notes that it can also be interpreted as a result of the morphological interaction between *k₃αω-νό- (< *k₃h₃-nó- ) and κόλαω (< *k₃λων < *k₃ēl₁νόν). In both cases, there might have existed a descendant of *k₃h₁-no- in the prehistory of Greek.
4.2 Forms derived from acrostatic paradigms

In this section, I will discuss a possible scenario in which a seeming counterexample of the Saussure effect could be derived from an athematic paradigm, although, in fact, most of the counterexamples mentioned in § seem to have been derived from thematic formations. Such a scenario can be invoked as a parallel to the case which will be discussed in the next section.

If a counterexample of the phenomenon can be derived from an athematic paradigm, the ablaut type of the paradigm would most likely be acrostatic with o/e ablaut since the counterexamples of the Saussure effect naturally have the o-grade. In an acrostatic paradigm with o/e ablaut, the strong forms, which had o-grade roots, would have undergone the Saussure effect, while the weak forms with e-grade would have been exempt from it.

\[
\begin{align*}
\text{strong cases:} & \quad \overset{\text{eRH}}{\text{CoRH-G}} > \overset{o}{\text{CoR-G}} \\
\text{weak cases:} & \quad \overset{\text{eRH}}{\text{GRH-G}} > \overset{o}{\text{GRH-G}} \ [\text{vacuous operation}] 
\end{align*}
\]

As a result, the paradigm would have had both anī̊t and set variants, which would have subsequently interacted with each other, and the theoretically possible forms would be as follows:

phonological:  
(i) $\overset{o}{\text{CoR-G}} \rightarrow \text{Lith. CaR-C}$,  
(ii) $\overset{e}{\text{GRH-G}} \rightarrow \text{Lith. GR-C}$

analogical:  
(iii) $\overset{o}{\text{CoRH-G}} \rightarrow \text{Lith. CaR-C}$,  
(iv) $\overset{e}{\text{GR-C}} \rightarrow \text{Lith. GR-C}$

Eventually, one of these forms must have been generalized in the paradigm. In the case where the o-grade variant with the restored laryngeal is generalized, then a seeming counterexample is found. Note that it is necessary to assume a consequent thematization when the attested form has a thematic vowel.

4.3 An analysis of kalvā (4) ‘hill’

kalvā (4) ‘hill’ : $\overset{eH}{\text{kelH-}}$ ‘to soar’ (cf. LIV 349)  
*kolH- $\rightarrow$ *kalva (1 (or 3?))  
kalvā (4)

This form is derived from the same root as Lat. collis in (4c) and kālnas in § 4.1.3 above. Lith. kalvā belongs to AP4 and has a circumflex accent on its root vowel (as in kālyg [acc. sg.]), which seems to indicate that it has undergone a laryngeal loss in the environment $\overset{o}{\text{RHC-}}$ through the Saussure effect. However, the accentuation of the cognate Latvian form kalva.
points to an original acute intonation. This suggests that the original accentuation of kalvā must have been acute, and that it has undergone métatonie douce in the prehistory of Lithuanian rather than the Saussure effect at the Proto-Indo-European stage. This possibility makes it plausible to regard kalvā as a counterexample of the Saussure effect.

There is a discussion regarding the etymology of the Germanic forms related to *kelH- in Neri (2003: 273–275). He reconstructs a neuter acrostatic paradigm *kölH-u/*kélH-u for Proto-Indo-European on the basis of Proto-Gmc. *χalluz. Considering this reconstruction, Lith. kalvā can also be related to the acrostatic paradigm since its protoform *kolH-u contained a *-u-, which was a conditioned allophone of *-u- in certain environments. Acrostatic u-stems reconstructed in the protolanguage are well known as a neuter category. Therefore, the feminine Lith. kalvā must have been derived secondarily by adding the feminine suffix *-eh2, while the neuter gender would have turned into masculine in Goth. hallus ‘rock’. Thus, Lith. kalvā might have been derived from this paradigm via (thematization and) feminization: *kolH-u (→ *kolH-o) →*kolH-eh2. A morphological parallel can be found in *dóru-/*déru- *deru-eh2 (→ Lith. dervā ‘resin’); *deru-o (→ OCS drēo, Scr. drēo ‘wood’), *h₂óiu-/*h₂ěiu → *h₂óiu-eh2/*h₂ěiu-eh2 (→ OHG ēwa ‘age, eternity’); *h₂óiu-o/*h₂ěiu-o (→ Goth. aiws ‘id.’). A possible factor contributing to the formation of the feminine form can be a functional thematization. If the preform underwent a functional thematization, which created adjectival derivatives, then it certainly must have undergone feminization at the same time, for adjectives usually have feminine forms as well. Thus, the feminine form of the adjectival derivative should be the preform of kalvā.30 Since the

30 The case of Gk. ὅλος/οἶλος ‘whole’ [cf. (3d), also Lat. salbus ‘safe and sound’ (4a), Skt. sārva- ‘whole’ (6a)] might be a morphological parallel since Gk. ὅλος/οἶλος and Skt. sārva can be explained as a functionally thematized neuter u-stem [*sol(H)-u- ← *solH-u-], and Lat. salbus, as well as Lat. salūs ‘hail’, suggests an original u-stem paradigm [*sļH-yo- ← *sļH-yo- ← *sļH-yo]. Schrijver (1991: 196) notes that Lat. salūs is derived from a lost verbal stem *salve/o, which was probably based on a u-stem *sļu- ← *sļH-yo. Considering this, an original u-stem paradigm *sļH-u ← *sļH-yo can be reconstructed for Proto-Indo-European, from which *sļH-yo (→ Gk. ὅλος/οἶλος, Skt. sārva), *sļH-yo and *sļH-yo (→ Lat. salūs, salbus) were derived. For the derivational process of *sļH-yo ← *sļH-yo, a change of acrostatic ablaut to that of R (o) / R

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process of functional thematization is rather old, and might have originated already at the Proto-Indo-European stage, the preform of kalvă might have undergone the Saussure effect as well. However, the Baltic items point to an original acute intonation, which means that the form prior to the Proto-Baltic stage would have had a long vowel in its root as a result of compensatory lengthening following the loss of the laryngeal. This discrepancy can be explained if the schema presented in the previous section is taken into account. As the original paradigm of *kolH-u-/*kelH-u- had both o-grade and e-grade forms, there could have been a competition between two thematized forms, namely *kolH-u- and *kelH-u-.

thematized o-grade form: *kolH-u- > *kol-u-

thematized e-grade form: *kelH-u- > *kelH-u- [vacuous operation]

As mentioned previously, a morphological interaction between set and ani† variants might have restored the lost laryngeal in the o-grade form, where the Saussure effect operated regularly. This would explain why the Baltic forms point to an original acute intonation. 31

5 Conclusion

While the investigation presented in this paper cannot be considered exhaustive, § and § show that there are at least a few examples and counterexamples of the Saussure effect in Lithuanian. However, as there are no clear phonological differences between the environments of the examples and the counterexamples, we cannot set up a new criterion for the operation of the Saussure effect.

(Ø) [for example, Ved. (*dōru >) dāru / (*dēr-u- *dr-ēu-s >) drōh ‘wood’] can be recalled.

31 The suffix *(e)h2 can be regarded as a collective suffix as well. This assumption provides a semantic explanation of the original meaning of *kol[H]-yeh₂ (*a pile of rocks’), which later came to mean ‘a hill’. As the collective suffix is observed in several branches [cf. Hitt. alpa ‘cloud’, alpē ‘clouds’, alpa ‘group of clouds’; Gk. µυροί ‘thigh’, µυροὶ ‘thigh-pieces’, µύρα ‘group of thigh-pieces’; Lat. locus ‘place’, plural locē and collective loca], the collective formation is regarded as old. Consequently, at the stage of Proto-Indo-European, the paradigm of *kolH-u-/*kelH-u- could have had variants, namely *kolH-u- (> *koly-) for collective forms (*kolH-u-yeh₂ etc.) and *kelH-u- for oblique forms, for only strong cases had collective forms. The explanation involving the restoration of the laryngeal in *kol[H]-yeh₂ as provided above can also be applied in this case.

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Nevertheless, for most of the counterexamples, it is possible to provide morphological explanations as to why they do not show any traces of the Saussure effect in Lithuanian. In most cases, morphological factors can be assumed to have triggered the restoration of the lost laryngeal.

These explanations suggest the possibility that although originally the Saussure effect itself was a regular sound change, the traces of its operation became unrecognizable in many cases due to the various morphological changes that occurred between the early stages of Proto-Indo-European and Lithuanian. This can be considered quite natural if the long span of time between the early Proto-Indo-European stage and the period of the earliest Lithuanian attestation (16C AD) is taken into account.

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