

Brugmann's Law and the role of perception in sound change

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Abstract

In this paper I argue that Brugmann's Law is a phonological change based on hypocorrection. The initial state before the change was a vowel system with a tense **o*. Due to erroneous parsing in lexicon acquisition, L_1 -learners came to classify the greater duration of the tense vowel relative to the other non-tense non-high vowels as part of its phonological specification. As length was phonemic in PIir, tense **o* therefore could be reanalyzed as **ō*. The change as well as the initial system are put into a broader typological perspective.

1 Introduction

Historical linguists devise sound laws to relate different states in the history of languages or language families to one another. The foremost aim of this enterprise is to derive a later state of the phonological system from a preceding state in a manner as strict and regular as possible. However, the relation between two different states correlates to historical developments. Sound laws, therefore, are not just abstract algebraic formulas. Rather, they are formulaic summaries of a historical narrative. This narrative comprises two processes. On the one hand, there is the spread of a certain change throughout the lexical items of a given language and through the speech community, once it is on its way. This – sociolinguistic – topic has been studied extensively by Labov and others.¹ In the realm of prehistoric change it cannot be pursued, as we know next to nothing about the social conditions prevalent at the time of the alleged change. On the other hand, there are the – purely linguistic – factors that set a change off in the first place. This issue has been dealt with in recent years by Ohala (1989) and Blevins (2004), or, in a less reductionist way, by Boersma (2003) and Hamann (2009) among others. For an overview see Bermúdez-Otero (2006). Naturally, this part of the story can never be told appropriately, as the first deviation from former standards starting a sound change cannot possibly be observed, even when change in progress is studied. However, the factors leading to sound change are mostly phonetic in nature. And as the phonetic conditions triggering sound change have stayed the same for several millennia (the articulatory and perceptual means of humans have not changed in the last 80.000 years), we are in a position to assess the plausibility of a particular

¹See e.g. Labov (2001).

sound change by matching it with phonetically possible and probable deviations in language acquisition and adult speech, even if the change took place in pre-historic times. This part of the narrative, then, can be told, and indeed it ought to be, since prehistoric sound laws are necessarily hypothetical by nature: Even the most undisputed sound law has a probability smaller than 1. The ability to propose a realistic phonetic scenario for a sound law therefore strengthens this probability. If, however, no possible scenario is available, the law is weakened and we might be well-advised to look for alternative explanations of the facts.

2 Brugmann's Law

A case in point is Brugmann's Law (henceforth BL). As is well known, the law has been disputed right from the beginning, and details of its history can be found in Volkart (1994). BL is typically formulated as

$$(1) \text{ PIE } *o > \text{PIIr. } *ā / ______]_{\sigma} \text{CV}$$

or more precisely as

$$(2) \text{PIIr. } *o > \text{PIIr. } *ō / ______]_{\sigma} \text{CV (before } *o, \bar{o} > *a, \bar{a} \text{ and before } *H > \emptyset)$$

See Hajnal (1994), Volkart (1994), and Lubotsky (1997). Probably the law is restricted to ablauting $*o$, as was already proposed by Brugmann (1897:153-4). For a recent version of this restriction see Lubotsky (1990), but cf. also Hajnal (1994:196,fn.8).

A possible refinement of BL which has many followers in the scientific community is the so-called 'Kleinhans'sche Fassung' (Pedersen (1900:87)). In this scenario, the change was restricted to the context $]_{\sigma} \text{RV}$. However, Jamison (1983:202-12) showed that at least for *áya*-formations the restriction to positions followed by non-obstruents is unnecessary. As evidence she quotes examples like *tāpáyati* and *pātáyati*. This position was strengthened by Hajnal (1994:220), who concludes his investigation into thematic nouns with the remark that "[v]ielmehr kommt man [...] nicht umhin, eine Brugmansche Regel ohne Einschränkung und damit in ihrer Urfassung zu postulieren."²

Another refinement, which has recently been suggested by Holst (2004), restricts the law to accented PIE $*ó$. As this version of the law clearly conflicts with the pattern found in the Vedic *áya*-formations (Sihler (1980:874-5), Jamison (1983), Lubotsky (1989)) and in oxytone thematic nouns (Hajnal (1994:208-9)), I will not dwell on it here.³ All in all, it seems that (2) is the most adequate and most widely accepted version of the law.

However, there is a slight drawback concerning the data used so prominently in recent times to strengthen BL. As mentioned, the law affects ablauting $*o$ only. As a consequence it is restricted to ablaut-inducing contexts. Since qualitative ablaut was restricted to morphologically complex structures at least from

²For an evaluation of the strength of these data cf. below.

³In the light of the fact that the recent interest in BL was kindled mainly by the *áya*-formations and, to a lesser extend, thematic nouns, it comes as a surprise that Holst did not deal with them. Holst (email) suggested that the *áya*-type with long $/\bar{a}/$ ultimately goes back to forms with PIE $*\bar{o}/$. Pending a thorough investigation of the data, this claim seems dubious at best.

late PIE onward, it may have been a morphonological rule. This radical position is taken by Kuryłowicz (1977:163-79), who claims that the lengthening emerged in contexts with **o* followed by an obstruent. In his account, the lengthening is a contrast-enhancing “procédé morphologique *additif*” (Kuryłowicz (1977:169)), which ultimately goes back to an analogical extension from patterns like $T_1 R T_2 \acute{a} / T_1 a R T_2 \acute{a}$ similar to those found in root nouns. Only then did the lengthening spread to the position before sonant “due à ‘l’expressivité’ de la longueur redondante” (Kuryłowicz (1977:169)). Kuryłowicz’s scenario might seem far-fetched (cf. Sihler (1980)), yet the use of morphonological devices to mark contrast in paradigms and in derivation is quite common in the languages of the world, including the Indo-European ones. Kiparsky (2010:148-9) also takes BL to be a morphonological process. He assumes that “[i]t functions as the counter part to zero grade, in the sense that it applies to the same set of vowels that can undergo zero grade [...], but in complementary contexts when not followed by an accented morpheme.” The idea is inspired by the fleeting vowels of Slavic languages (Kiparsky (2010:148)). However, as Kiparsky differentiates between fixed *o* and fleeting *o* purely on the basis of the fact that some undergo BL whereas others do not, the proposal is not falsifiable. This immunization is pushed even further by the assumption of variably fleeting *-o-*, which may or may not lengthen (Kiparsky (2010:149)). Besides, fleeting vowels in Slavic languages ultimately go back to a phonological process: the rhythmic deletion of yers. In Kiparsky’s scenario, the origins of the fleeting vowel in PIE remain unclear. A less radical proposal capitalizing on the strong ties to morphology would be to reduce the rôle of phonological change to being merely a stepping stone for BL. In this version of the story, the sound law was originally restricted to a well-defined sub-class of BL-inducing contexts (maybe those covered by the Kleinhans’sche Fassung). Only later did it spread analogically to strengthen morphological contrast. This scenario is backed by two observations: (1) length was used as a morphonological device in PIE derivation (vṛddhi), and (2) the fact cannot be denied that the pattern with lengthened *a* actually spread in those Vedic derivative patterns which were prone to BL and still productive, viz. the *áya*-formations and oxytone thematic nouns. Scenarios like the ones sketched here cannot easily be marginalized by proponents of BL, since even they have to assume that the scope of the law was affected by analogy. Hajnal, for example, claims that in the development of barytone thematic stems, the short vowel of stems in final laryngeal (**CáRHa-*) spread to contexts without laryngeal (**Cára-*) and ultimately to roots with final obstruent (**CáCa-*) analogically. For some oxytone nouns from *Seṭ*-roots like *grāb^há-*, however, he assumes analogical leveling in the opposite direction (Hajnal (1994:210)). In a similar vein, Jamison (1983:206-7) claims analogical reasons for the short vowel in forms like *janáyati* (influence of the simple present *jánati* and other forms from roots in nasals like *panáyati*). Other irregular developments like “a tendency to abandon ablaut” (Jamison (1983:209)) are adduced to explain deviations from BL in *CRaC*-roots.

As even partisans of the law cannot avoid assuming analogical leveling it seems impossible to decide if BL phenomena are necessarily phonological in nature: Forms like the quoted *tāpáyati* may be valid data strengthening the version of BL given in (2), but they may as well be analogical extensions of a morphonological pattern.

The view of BL as a simple phonological change is therefore seriously challenged. However, the law could gain in plausibility if we were able to endow it with a reasonable phonetic history.

3 BL and phonological plausibility

BL exhibits some peculiar features under close scrutiny. Firstly, the law applies to open syllables only. This is quite surprising, as for both language specific and typological reasons short vowels should be unproblematic. Light syllables were obviously licensed in IIr. phonology – examples abound. Besides, open syllables with short nuclei are typologically unmarked (Blevins (1995:217)) and acquired early in L₁-acquisition (Fee (1996:87)).

Secondly, the question arises as to why only **o* is affected by the change. In the standard reconstruction, PIIr. **o* does not have any features which clearly set it apart from the other vowels and lead to lengthening. One might try to solve this problem by connecting BL to the ablaut origin of the vowel. However, it is hard to conceive of special features restricted only to those vowels resulting from qualitative ablaut. Neither is there any evidence for such features, nor is it clear what they are supposed to be.

To my knowledge Kobayashi (2004:26-7) was the first to tackle these questions. His solution is to actually reverse the rule. In his account, the change from **o* to *ā* was context free.⁴ The change is taken to be phonetically gradual, and it is blocked (or maybe reversed) by a repair whenever it would result in superheavy syllables.

Vedic 1.sg. *caḥāra*, then, goes back to **k^we.k^wo.re* with three open syllables. In such a context, the application of the change **o* > *ā* is not blocked as it only yields a heavy syllable: *ca.kā.ra*. In the case of 3.sg. *caḥāra*, on the other hand, the input of the rule is **k^we.k^wor.h₂e* which would yield †*ca.kār.Ha*. As this form contains a superheavy syllable, it is blocked. Kobayashi’s scenario is descriptively adequate, and its advantages relative to the traditional one are obvious. Since superheavy syllables are universally dispreferred, the distribution of *ā* < **o* is explained with recourse to a well-established fact.

However, the questions posed above still remain unanswered. Kobayashi does not address the issue as to why short **o* becomes lengthened in the first place. Also, he leaves open why the lengthening is restricted to **o* and does not affect other short vowels.

A third problem, which he does address, is the fact that superheavy syllables – although being universally dispreferred – are actually well-attested in Indo-Iranian, cf. for example Vedic *ásthāt* or *mārṣti*, and Old-Av. *sāstī*. The unproblematic nature of superheavy syllables in IIr. is further confirmed by the fact that Osthoff’s Law does not apply in this branch of IE, cf. for example Ved. *dyāus* (vs. Greek Ζῆυς), Ved. *-ais* (vs. Greek -οις, Lat. *-īs*). Kobayashi (2004:27) gives the following explanation for this apparent contradiction: firstly he maintains that contrary to the evidence, overlong syllables actually tended to be avoided in PIIr., and that is what made BL happen in the first place. However, according to him, PIE **ē* and **ō* were “marked enough to override this preference,” which restricted the general tendency to the case of BL **ō*. The immunity of **ē* and **ō* is due to a more general trait of PIIr: The protolanguage

⁴For this approach see already Burrow (1975).

tends to maximize “marked features pertaining to the root.” As an example for this feature of PIIr. he quotes “the anomalous spreading of root-final aspiration to a suffix-initial stop as in *lab^há-* < /lab^h- + -tá-/.” In other words, being lexical, PIE **ē* and **ō* (which is not the result of BL) have a feature which blocks the aforementioned tendency against superheavy syllables. However, the immediate question which arises concerning this scenario is the same as asked above concerning a special status of ablaut vowels: What is this feature supposed to be?

Summing up, we are confronted with the following alternatives. In the traditional scenario PIE **o* turns to PIIr. **ā* in open syllables, in Kobayashi’s scenario PIE **o* becomes PIIr. **ā* throughout, but the change is restricted by a constraint against superheavy syllables. In both scenarios the lengthening only affects **o*. No reason is given either for the restriction to **o* or for the lengthening. The standard approach is not committed to phonological plausibility. The restriction to **o* in open syllables is simply stated (and obviously the most elegant descriptively adequate solution). Kobayashi on the other hand acknowledges the importance of phonological plausibility by introducing the constraint on super-heavy syllables. However, a serious trade-off in his scenario is the rather *ad hoc* restriction of the postulated repair to non-lexicalized **ō*.

4 An alternative proposal

Since Kobayashi’s scenario suffers from serious shortcomings, the challenge of a phonologically satisfying explanation of BL has yet to be met. As has become clear from the previous discussion, any new proposal should address the following questions:

1. Which feature set **o* apart?
2. What was the connection between that feature and length?
3. How exactly did the change work?
4. Why was it restricted to open syllables?

4.1 The feature

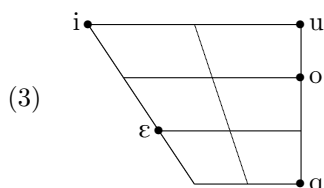
The vowel system traditionally reconstructed for PIE is undisputed and follows directly from external reconstruction. Any modification should therefore be as conservative as possible in order to avoid additional and costly hypotheses which weaken the whole enterprise. As a consequence, the input to BL should be some kind of mid-back vowel,⁵ albeit one with a phonological gestalt which differed from that of the other short vowels in making it prone to undergo lengthening. Again, it seems reasonable to narrow this difference down to one phonological feature if possible.⁶

⁵It is indeed possible that the inventory reached by external reconstruction developed out of a very different one, cf. Kümmel (2009). However, as BL was active in PIIr. the prehistory of the PIE inventory is of no importance to the present endeavour.

⁶As mentioned above, this feature is definitely not accent, although stress may actually lead to an increase in duration (see Fletcher (2010:532)).

If we look at *o*-vowels from a typological point of view we find that most often they belong to one of two groups: vowels of the type [ɔ] and vowels of the type [o]. The difference between these vowels is typically described as one between high mid vowels and low mid vowels. Actually, the feature distinguishing the two is best classified as [± tense]. In tense vowels the pharynx is widened and as a consequence the tongue dorsum is pushed upward (Stevens (1998:295)). The slightly higher position of the tongue is therefore merely an epiphenomenon. Tenseness is a complex feature which correlates to different articulatory scripts. Additionally, the widened pharynx tense vowels show a higher degree of overall muscular tension (Laver (1994:417)) and a higher degree of deformation of the vocal tract from the position of [ə] (Laver (1994:417)) than non-tense vowels. Acoustically they can be identified by less centralized formants (Ladefoged & Maddieson (1997:306), Stevens (1998:295)) and a greater acoustic attenuation (Laver (1994:417)) than their non-tense counterparts. Most importantly, however, they are distinguished by an increase in duration (Laver (1994:417), Stevens (1998:297), see Oostendorp (1995:25-38) for phonological consequences). This last corollary will be fundamental for the scenario developed here.

Therefore, I tentatively propose that PIIr. **o* had a feature [+ tense] which set it apart from the other non-high vowels in the inventory. This leads to the following short vowel system for PIIr.:



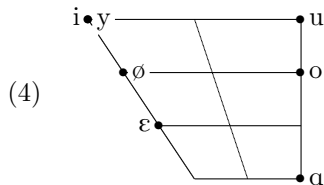
Obviously, the feature [+ tense] is not distinctive, as /*o*/ is opposed to /*ε*/ by being [+ back] and opposed to /*a*/ by being [- low]. Tenseness, then, is a redundant feature, and it might be asked if such accessory features are actually part of the phonological grammar. Structuralist phonological theory has it that phonemes are defined by distinctive features only. However, as already Trubetzkoy knew, phonemes are not abstract algebraic entities but “Lautabsichten” (Trubetzkoy (1958), Boersma (1998)) or mental representations. From this follows that every feature associated with a given phoneme must be part of its representation as long as it is not a necessary consequence of articulatory processes. In Standard German, for example, voiceless plosives have a fricative coarticulation (often described as an aspiration): /*p*/ is [p^h], /*t*/ is [t^h], and /*k*/ is [k^x]. This coarticulation is obligatory and serves to improve the perceptive cues for these sounds (Boersma (2003:36)). Neither is it randomly distributed nor has it a distinctive value, i.e. fricativization here is clearly redundant. Still,

⁷The exact value of this phoneme cannot be determined. I take it to be a [a], which is [+ back], whereas /ā/ [a:] was [- back]. As /*o*/ was the only long back vowel of Vedic, this is in accordance with the fact, pointed out by Hoffmann (1976), that when phonetically lengthened in liturgical contexts, /*a*/ was rendered as <o>. With backness being sufficient for this rendering, I do not see the need to treat /*a*/ with Hoffmann (1976:552) as [ʌ], although this remains possible. A phonetic value [ə] for /*a*/ (Lubotsky (2010)) on the other hand is less probable. [ə] being [- back], the consistent rendering of the lengthened vowel with <o> would be rather arbitrary.

it must be part of the mental representation of voiceless plosives in native German speakers. Another example is the difference in quality between Vedic and Sanskrit /a/ and /ā/. The famous last sutra of the Aṣṭādhyāyī (8.4.68 *a a iti*) makes it absolutely clear that this difference in backness was accessory, as from the point of view of the grammatical system /a/ and /ā/ behave exactly like the other pairs of short and long vowels. /ā/ was a long vowel, as can be seen in metrical texts, and it was the lengthened counterpart of /a/, which is obvious from its behaviour as a Vṛddhi-vowel and its morphological distribution (e.g. in perfect stems). The qualitative difference between the two is redundant. Still, the pronunciation of /a/ as a *samvṛta* vowel was obligatory, and this is why Pāṇini included 8.4.68 into his grammar.

Accessory features play a very important role in sound change. The development of Proto-Germanic */p/ into the homorganic fricative */f/ is best explained by assuming that */p/ was actually pronounced as *[p^h] or [p^ʰ] with an accessory (perceptual) feature [+ noise]⁸, which like in Modern German maximizes the contrast relative to */b/. The noise-feature could then be reinterpreted as distinctive, and the result is */f/ (Boersma (2003:59)). These few examples show that it is not only admissible but necessary to include redundant features into an adequate description of phonological inventories.

In the inventory proposed here for PIr. the only non-high vowel with a [+ tense] feature is */o/. Such a massively asymmetrical system may seem surprising, however, similar systems exist in various languages. A short survey shows that an asymmetrical distribution of the feature [+ tense] in mid vowels (i.e. /ε/ vs. /o/) can be found in 22 of the languages in Maddieson (1984). A typical example is Hungarian. Given below is the system of Hungarian short vowels; long /e:/, /o:/, and /a:/ are tense.⁹



The status of /o/ as a typologically unmarked vowel is further corroborated by the observation that “[i]n the higher part of the mid range, [...] there are substantially more cases of back /o/ and /“o”/ than of the front vowels /e/ and /“e”/, but among lower mid vowels /ε/ is a little more common than /ɔ/” (Maddieson (1984:125)).¹⁰ A system like the one proposed here is therefore plausible from a typological point of view.

⁸For this feature see Boersma (2003:35).

⁹For a detailed description of the vowel system of Hungarian see Siptár & Törkenczy (2000:51-6). Reiss (2003) uses the feature [± ATR] instead of [± tense]. This device, also used by Wiese (1996) in his description of German, is phonetically inadequate (see for German Kroos *et al.* (1997)). The reason for choosing [± ATR] is simply that phonologists want features to be associated with one gesture only and complex features like tenseness are therefore avoided. However, a look into West African languages where the movement of the tongue root is distinctive shows clearly that this feature does not play any role in the languages discussed here.

¹⁰Maddieson uses the notation /e/, [...], and /o/ [to] represent higher mid vowels, and /“e”/, [...], and /“o”/ to represent mid vowels” (Maddieson (1984:123)).

As already mentioned above, tenseness has an interesting corollary. It leads to an increase in duration. This is very evident in West-Germanic languages like German, English, or Dutch, where length and tenseness are closely connected. Although the issue has been hotly disputed for quite a while, it now seems reasonable to assume that in these languages, tenseness is phonological, whereas the increase in duration is merely a phonetic corollary. See Oostendorp (1995:25-38) for Dutch, Kroos *et al.* (1997) for German,¹¹ and Ladefoged (1982:80) for English. An increase in duration may remain subphonemic as in Icelandic or Scottish English. In the latter language, tense vowels may or may not be long, whereas lax vowels are always short (Aitken (1981)). Still, on the level of phonetics, the increase in duration seems to be a language universal for tense vowels.

4.2 The change

The type of sound change to be proposed here is a hypocorrection. Hypocorrections are changes which result from erroneous parsing in L_1 -acquisition. The learner “misinterprets some distortion of the incoming speech signal as realizing some property of the output of the target grammar” (Bermúdez-Otero & Hogg (2003:92), see also Ohala (1995), Hamann (2009)).

Hypocorrections play an important role in sound change. An example is the well known and frequent palatalization of velars. Experiments show that there is a high probability for [ki] to be misperceived as [ti] (Winitz *et al.* (1972)). This erroneous parsing then leads to a change involving velar coronalization (*ki* > *ti*) (Ohala (1989:182-5)).

The process leading to BL is similar. Assume as a starting point a parent generation with an inventory as given in 4. In performance, tense */o/ differed from the other non-high short vowels – *inter alia* – by an increase in duration. The parent generation took the perceptual cue resulting from this increase as a mere contextual epiphenomenon triggered by tenseness. In other words, for these speakers */o/ was still a short vowel.

However, for L_1 -learners the situation was more complicated. L_1 -learners are confronted with primary linguistic data (PLD) made up solely of sound waves which include complex acoustic information. In the acquisition process they have to decide which of the perceived acoustic data are to be taken as cues for phonological structure or features, and which are to be neglected. In solving this difficult task they have to rely completely on the distribution of patterns that occur in the PLD and can be interpreted as positive evidence for grammatical structure.¹² In this task of acquiring structural descriptions on the basis of raw acoustic data, children typically rely on their already acquired knowledge of the language (Kiparsky (2003:328)).

A learner of PIIr. therefore had to deal with the following facts: She was confronted with a vowel with less centralized formants and a greater duration than similar non-high vowels. She then had to decide which phonological structure to assign to this vowel, i.e. how to parse the acoustic event. One possibility is to do

¹¹Due to the fact that Standard German distinguishes between [e] and [ɛ:], the situation is more complicated than in the other West Germanic languages. See Wiese (1996:151,197) for discussion.

¹²Negative evidence is probably accessible to L_1 -learners via statistical analysis of the PLD, see Stefanowitsch (2008).

what the parent generation did and take */o/ as [+ tense]. Another possibility however, which is equally probable, is to associate the greater duration of */o/ relative to the other non-high vowels with its phonological specification. This error is corroborated by the fact that the learner may already have experienced that length is phonemic in the target language. If this route was taken, duration, which had merely been a phonetic corollary to tenseness, became phonological: */o/ became */ō/.¹³

As mentioned above, BL is a law with a significant amount of exceptions. Traditionally this problem is remedied by assuming analogical leveling or a relative chronology between BL and certain morphological processes. However, there is another explanation for the limited reach of BL. BL was a hypocorrection that did not alter either the phonological inventory or the phonological grammar of Proto-Indo-Iranian. During and after the time when the law was operative, short */o/ was still a phoneme of PIIr. and structures of the type *CoCV were still well-formed. BL, therefore, exhibits the typical traits of lexical diffusion,¹⁴ a type of sound change which often ceases to operate before extending to all possible candidates.

4.3 The restriction to open syllables

The scenario developed here gives an answer to the first three questions mentioned above. The one still to be addressed is the restriction to open syllables.

As far as I can see, there are two possible explanations to this restriction. The first is similar to Kobayashi's in being based on the fact that in closed syllables BL would yield three-moraic syllables. As has been shown above, it seems impossible to implement a constraint against super-heavy syllables as part of the grammar of PIIr. This syllable type is frequent in the attested languages and therefore has to be assumed for the proto-language. However, this apparent dilemma can be overcome by assuming that the tendency to avoid super-heavy syllables was not built into the grammar but was due to preferences in lexicon acquisition. Superheavy syllables are universally marked (Clements & Keyser (1983:30)), and many languages restrict the number of possible slots in the rhyme (Blevins (1995:215)). L₁-learners acquire superheavy syllables later than those with less complex rhymes (Demuth (2009:189-191)). This preference for simpler rhymes is one possible reason for the actual distribution. As the increase in duration was a mere by-product of the feature [+ tense] of */o/, the cue for length in possible BL contexts was probably weaker than in contexts with phonologically long vowels. Therefore, the misperception of */o/ as */ō/ could be blocked by a counterforce which consisted in attempting to avoid three-moraic syllables.

The second explanation of the distribution of */ō/ from */o/ is based solely on perception. Generally, vowels in open syllables are of longer duration than vowels in closed syllables (Maddieson (1985)). As a consequence, the perceptual cue triggering the reanalysis of short */o/ as */ō/ was strongest in open syllables. It is therefore possible that the threshold for the erroneous parsing

¹³This scenario is restricted to what may happen during the language acquisition process of one speaker. Due to the reasons given above I have nothing to say about the fact that this hypocorrection survived and spread in the speech community.

¹⁴To which can be added the fact that the change was not phonetically gradual. See Kiparsky (2003:316) for an overview of salient features of lexical diffusion.

was high enough to restrict it to this syllable type.

It cannot be determined which of these factors actually determined the distribution. In fact, it is possible that both were active and collectively yielded the distribution resulting from BL.

5 Summary

To sum up, the following scenario for BL has been proposed: The initial state is a vowel system in which */o/ was the only vowel with the feature [+ tense].¹⁵ This feature was redundant, nonetheless it was part of the mental representation of */o/. In performance, tense vowels are of increased duration relative to non-tense vowels. This increase is further enhanced in open syllables. For the parent generation this increase in duration was merely contextual, but for learners in L₁-acquisition the situation is more difficult. They receive perceptual cues for length when hearing */o/ and have to decide whether these cues reflect some phonological property of the vowel or not. Especially in a language with phonological length, misparsing is very plausible. A learner of PIr. may therefore erroneously perceive the duration as phonological length. Due to this hypocorrection, */o/ with the feature [+ tense] becomes phonologically long */ō/ in open syllables.

Both the initial state and the change itself are phonetically plausible. Therefore, assuming BL as a sound law of PIr. seems to be the best and least costly way to deal with Vedic and Old Iranian /ā/ from */o/. There is no need to resort to alternative explanations for the data *à la* Kuryłowicz (1977) or Kiparsky (2010).

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¹⁵This holds true at least for PIr. It remains to be seen if evidence for tense *o* in PIE can be found.

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