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Verner's law, phonetic substance and form of historical phonological description

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Abstract

In this article, I show that the spirantization part of Grimm's law and Verner's law (intervocalic voicing) were part of a single, hence synchronous, process. The reasoning goes in two steps: (i) with the adoption of the Glottalic Theory it becomes clear that both laws are in an Elsewhere relationship, and (ii) an analysis in OT terms reveals that the laws are related. Looking at the revised PIE obstruent inventory I conclude that deglottalization of the original ejectives is the trigger of the now combined laws.

1 Introduction

This paper deals with the laws of Grimm and Verner, which play a major part in the transition from Proto-Indo-European (PIE) to Proto-Germanic (PG). I will show (or recall) that the traditional view on the Germanic sound changes encounters many difficulties, both methodological and factual. Then, I will present a new analysis in which Grimm's and Verner's laws are in fact part of a single historical phonological process.

2 An outline of the traditional view

2.1 The PIE obstruent system

The Neogrammarian view on the PIE obstruent inventory as put forth by Brugmann and Delbrück (1897-1916) and later slightly modified by Lehmann (1952), involves a series of 12 stops and a single fricative, cf. the overview in (1) (*tenues, mediae and mediae aspiratae* are the traditional Neogrammarian terms for voiceless, voiced and breathy voiced stops respectively):

(1) PIE obstruent inventory (traditional view):

	voiceless stops (*tenues*)	voiced stops (*mediae)*	breathy voiced ('voiced aspirated') stops (*mediae aspiratae*)	fricative
labial	p	b	b^h	
dental	t	d	d^h	s
velar	k	ɡ	$ɡ^h$	
labiovelar	k^w	$ɡ^w$	$ɡ^{hw}$	

We can thus represent the PIE obstruent system in the following simplified diagram (where the uppercase characters generalize over the places of articulation):

(2) PIE obstruent system: T D D^h (in four places of articulation), *s*

2.2 The Proto-Germanic accent change

Very early on in the history of PG, there was an accent shift from the free lexically determined stress system (as still found in, e.g., Russian) to a word or root initial stress. According to several authors adhering to the traditional view (e.g., Lehmann 1961:69) this would have conditioned the Germanic sound shift (Grimm's Law, see section 2.3, below). An example of correspondences with other IE languages is given is given in (3):

(3)	*Proto-Indo-European (PIE)*	*Sanskrit (Skr.)*	*Ancient Greek*	*Gothic, Old English (OE)*
	*pətḗr	pitár-	πατήρ [paˈteːr]	fádar (*Gothic*) fǽdar (*OE*)

2.3 Grimm's Law

Grimm's Law consists of three 'acts': voiceless plosives spirantize (act 1); breathy voice plosives become fricatives (act 2) and voiced plosives become voiceless (act 3):

(4) Grimm's Law (Rask 1918, Grimm 1922 + later amendments)

a. (act 1)	p > f	t > θ	k > χ (h)	k^w > $χ^w$ (h^w)
b. (act 2)	b^h > *β (> b)	d^h > *ð (> d)	g^h > *ɣ (> g)	g^{hw} > *$ɣ^w$ (> g^w)
c. (act 3)	b > p	d.> t	g > k	g^w > k^w

As one can see, act 2 leads to an unattested voiced fricative that is subsequently changed into a stop by a supposed occlusivization process. I will come back to this process below in section 3.3. Grimm's Law can be represented schematically as in (5):

(5) Diagram of Grimm's Law

	Pre-PG		PG1		PG2
a. (act 1)	T	→	Þ	- - - - →	Þ
b. (act 2)	D^h	→	*Ð	→	D
c. (act 3)	D	→	T	- - - - →	T
		Grimm's Law		occlusivization	

Examples of the workings of the law with correspondences between PIE and English (and Dutch for one example) are given in (6):

(6) a. (act 1)	*<u>p</u>e(d > *foot*	*<u>t</u>rei̯ > <u>th</u>ree*	*<u>k</u>āt- > <u>h</u>ate*	*<u>k</u><u>u</u>od > <u>wh</u>at*
b. (act2)	*<u>b</u>^{h}rā́tēr > <u>b</u>rother*	*<u>d</u>^{h}ugəter > <u>d</u>aughter*	*<u>g</u>^{h}aidos > <u>g</u>oat*	*<u>g</u>^{wh}ermos > <u>w</u>arm*
c. (act3)	*<u>b</u>end- > <u>p</u>en*	*<u>d</u>ekm > <u>t</u>en*	*<u>g</u>elə- > <u>c</u>old*	*<u>g</u>^{w}a- > <u>c</u>ome; <u>kw</u>am* (pret., Du.)

2.4 Verner's Law

One type of apparent counterexamples to Grimm's Law is what Lottner (1862) called *grammatischer Wechsel* 'grammatical alternation'. This concerns the fact that the reflex of a voiceless stop in PIE is not always a voiceless fricative in Germanic languages, but sometimes a voiced plosive. Examples are given in (7).

(7) a. Original /*p/ (no examples of the alternation in the modern languages)
OE *hebban - hōf hōfon hafen* ('lift' cf. *heave*)

b. Original /*t/ (the alternation survives in modern German)
OE *cweþan (cwiþþ) cwæþ - cwǽdon cweden* ('say': cf. *quoth*)
OE *sēoþan (sīeþþ) sēaþ - sudon soden* ('boil' cf. *seethe*)
Modern German: *schneiden - schnitt geschnitten* 'cut')

c. Original /*k/ (survives in modern German and Dutch)
Modern German: *ziehen ziehe – zog gezogen* ('pull')
OE: *þeon (þīehþ) þāh - þigon þigen* ('prosper' cf. German *gedeihen*)
Modern Dutch: *zien zie gezien - zag zagen* 'see', Dutch lost intervocalic *h)*
Modern Dutch: *slaan sla - sloeg sloegen geslagen* ('beat')

Verner (1876) analyzes these alternations as being related to the position of the original PIE accent. His law states (1876:114):

> Indogerm. *k, t, p* gingen erst überall in *h, þ, f* über; die so entstandenen tonlosen fricativae nebst der vom indogermanischen ererbten tonlosen fricativa *s* wurden weiter inlautend bei tönender nachbarschaft selbst tonend, erhielten sich aber als tonlose im nachlaute betonter silben.
>
> "IE *k, t, p* first shifted to *h, þ, f* in all environments; the voiceless fricatives thus originating, together with the voiceless fricative *s* inherited from Indo-European, then became voiced medially in voiced environments, but remained voiceless when they were the final sounds of accented syllables."[1]
> (Translation by Lehmann 1967)

(Verner uses here the expression 'final sounds of accented syllables', because he believes that intervocalic consonants belong to the formal syllable (Verner 1876:117). We will come back to this in section 6). The working of the law can be illustrated by the forms in (8):

(8)

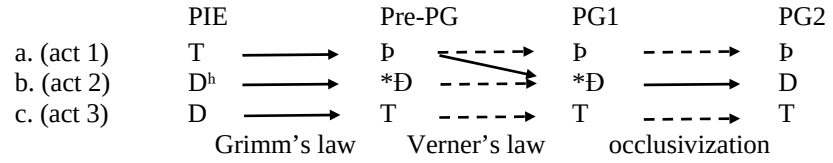
Proto-Indo-European (PIE) (reconstructed)	*Sanskrit (Skr.)*	*Ancient Greek*	*Gothic, Old English (OE)*	*Modern High German*
*bʰrā́tēr	bʰrā́tar-	φρᾱ́τηρ ('pʰra:te:r)	brōþar (*Gothic*) brōþor (*OE*)	Bruder
*pətḗr	pitár-	πατήρ (pa'te:r)	fadar (*Gothic*) fæder (*OE*)	Vater

In the word for 'brother' *t* in PIE, Sanskrit and Ancient Greek correspond to *þ* (i.e., *θ*) in OE and Gothic by the working of the spirantization part (act 1) of Grimm's Law. Verner's Law does not apply here, because the preceding vowel is stressed. By contrast, in the word for 'father', in PIE, Sanskrit and Ancient Greek *t* corresponds not to *θ*, but to *d*. In most modern languages, like Dutch, English and Icelandic, this contrast has levelled out, but it remained High German, despite additional shifts.

As Verner mentions in his own description of the law, cited above, the law applies only medially. However, many scholars, like Jespersen (1933:230), assume that the law applies also word-finally. I will come back to this below.

The functioning of Grimm's and Verner's laws combined is shown in the diagram below:

(9) Diagram of Grimm's and Verner's laws



Verner mentions that he cannot derive *D* directly form *T*, "for this would be a sound innovation *directly counter to the main direction* ('hauptrichtung') *of the sound shift* (i.e., act 3 of Grimm's law, *D* > *T*, RN), which produced a voiceless stop from the Indo-European voiced stop" (1876:101, translation by Lehmann 1967, italics mine). It is for this reason that he has to assume that his law applies after that of Grimm, and that he has to assume that occlusivization applied across the board.

[1] Verner uses here the expression 'final sound of accented syllables', because he believes that intervocalic consonants belong to the formal syllable[1] (Verner 1876:117). I will come back to this in section 6.

3 Problems related to the classical view

The classical view of the PIE obstruent system and the PG sound changes give rise to a number of problems. They concern the (i) typology of the PIE obstruent system, (ii) the relative timing of the Germanic sound shifts and the shift to PG initial accent, (iii) the alleged occlusivation process (iv) the fact that s does not undergo occlusivisation and (v) the number of changes Germanic must have undergone vis-à-vis PIE, compared to the classic languages like Sanskrit and Greek.

3.1 The typological improbability of the classical obstruent inventory

The first problem concerns the typological improbability of the alleged PIE obstruent inventory. As mentioned by several authors (e.g., Pedersen 1951, Martinet 1955, Jakobson 1958), the occurrence of *mediae aspiratae*, i.e. voiced aspirates (in fact: murmured plosives), without voiceless plosives is typologically very strange. On top of this, there are problems regarding the fact that the occurrence of *b* is rare in PIE and that there is an apparent constraint against the combination: voiced plosive, vowel, voiced plosive (the so-called **deg constraint*) in PIE. Under the traditional model these facts remain unexplained. For more details on these points, see Salmons (1993:16-18).

3.2 The relative chronological ordering of Grimm's and Verner's law

A second problem is the relative ordering of Grimm's and Verner's Laws. Lehmann (1952), and many others with him, assumes that the shift to initial accent has triggered Grimm's Law. If this is indeed the case, the assumption that Verner's Law applied after the working of Grimm's leads to a paradox, since it refers to the original PIE accent.

3.3 The alleged occlusivization process

The third problem concerns Verner's Law and the invoked occlusivization process. A main problem here is that the intermediate stage of voiced fricatives, which should have resulted after the application of Verner's Law and before occlusivization, has not been unambiguously attested. It is true certain PIE voiceless plosives occur as voiced fricatives in historical data. However, it is more straightforward to derive these from voiced stops than vice versa, because occlusivization is much less common than spirantization. On top of that, there are several indications that the examples of the original *mediae aspiratae* (voiced aspirates) that indeed show up as voiced fricatives in historical records, probably have gone through a stage where they were voiced plosives (Luick 1964, cited by Vennemann 1984:7).

3.4 *s* does not undergo occlusivization

A fourth problem, which is related to the previous one, is that precisely the only attested fricative, i.e. *s* in PIE, which changed to *z* in PG after a non-stressed vowel by Verner's Law, did not undergo the alleged occlusivization. This casts further doubts on the assumption that occlusivization took place at all. To my knowledge, this problem has hitherto gone unnoticed.

3.5 The position of Proto-Germanic and Sanskrit compared to PIE

Under the traditional view, the 'classic languages' (especially Sanskrit) seem close to PIE but Germanic seems to have undergone very important sound changes in the transition from PIE. In their admiration or even adulation of Sanskrit and other classic languages, the Neogrammarians gave no attention at all to the logical possibility that it is Sanskrit that has undergone important changes compared to PIE.

4 The Glottalic Theory and its consequences for Verner's Law

Due to the typological improbability of the PIE obstruent inventory (cf. section 3), the classical view on the PIE obstruent inventory alternatives were developed in the past decades. Emonds (1972), Hopper (1973, 1997a, b, 1982), Gamkredlidze & Ivanov (1973, 1995), Kortlandt (1978, 1985) and Vennemann (1984) have all produced alternatives to the classic inventory, whereby, with the exception of Emonds,[2] the voiced stops were replaced by voiceless glottalized stops (ejectives). These models are subsumed under the name of 'Glottalic Theory' For the ease of exposition I give here Hopper's (1973, 1997a, b, 1982) model, but the point made in this article is also holds for the other models of the Glottalic Theory, and *mutatis mutandis*, for Emonds' theory.[3]

(10) Hopper's (1973, 1997a, b, 1982) glottalic model compared to the traditional model (Lehmann 1952)

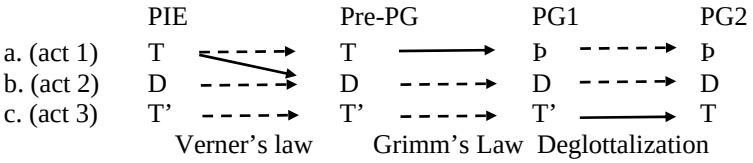
Series I	Series II	Series 3
Traditional model (Lehmann 1952)		
b, d, g	b^h, d^h, g^h	p, t, k
Glottalic model (Hopper 1973, 1997a, b, 1982)		
p', t', k'	b, d, g	p, t, k

With this model, the typological problems concerning the obstruent inventory have been resolved: there are no longer voiced aspirates, the rarity of the occurrence of *b* (which is *p'* under the glottalic model) is normal for glottalic obstruents, and the glottalic equivalent to the **deg*-constraint (ejective-vowel-ejective) is typologically straightforward.

This model has important consequences for Verner's Law. As noted by Vennemann (1984:20-22, 1985:533-535) Verner's law can now be assumed to have taken place before the spirantization part of Grimm's law, and so it simply changed voiceless obstruents into voiced ones, i.e. mostly voiceless stops into voiced stops, but also *s* to *z*. This is so, because the change T > D has does not go anymore against the 'main direction' (see section 2.4), i.e. act 3 of Grimm's Law Grimm's, which has now become *T'* > *T*. This assumption, which has been endorsed by Kortlandt (1985), solves two major problems mentioned in section 3: that of the relative chronology of Grimm's and Verner's laws as well as that of the non-application of occlusivization to *s*. And, thirdly, it can now be assumed that a more likely spirantization process has applied to certain voiced plosives resulting form the application of Verner's law, rather than that an occlusivisation has applied to certain voiced fricatives the evolve as a result of Verner's law in the traditional ordering of Verner's law applying chronologically after Grimm's law.

Thus, the diagram of the Germanic sound changes in (9) can now be modified and simplified:

(11) Diagram of Verner's and Grimm's laws under the Glottalic Theory and the relative ordering proposed by Vennemann's (1984)



Concerning Grimm's Law, it can be concluded that act 2 (which was $D^h > Ð > D$) has disappeared, because PIE D^h has been replaced by *D*, so there is no change (*D* remains *D*). Concerning act 3, we see that PIE *D* has been replaced by a glottalized stop, *T'*, so act 3 now represents a deglottalization process instead of a devoicing process. From now on we will refer to act 1 of the now less complex Grimm's Law as 'Germanic Spirantization., and to act 3 as '(Germanic) Deglottalization'.

[2] Emonds (1972) replaces the voiced stops of the classic model by plain voiceless ones and the plain voiceless stops by aspirated voiceless ones.

[3] For an overview of the different models within the Glottalic Theory see Salmons (1993:31) and Vennemann (2006:130).

5 Verner's and Grimm's laws from a synchronic perspective

As we have just seen, there are many advantages to the assumption of the Glottalic Theory and the chronological ordering of Verner's law before Grimm's law. However, as we have seen, this assumption is motivated by the problems that arise if one assumes the reverse order. There is no principled reason not to assume that both processes applied at the same time. If we do that, we look at them as rules in a synchronic phonological system. If we then formulate Verner's law and the Germanic Spirantization as phonological rules in SPE-style, as in (12) and (13) below, a very interesting picture emerges:

(12) Verner's Law[4]

$$\begin{bmatrix} -\text{voice} \\ -\text{constr.gl.} \end{bmatrix} \rightarrow [+\text{voice}] \,/\, \begin{bmatrix} \text{V} \\ -\text{stress} \end{bmatrix} ([+\text{voice}])\ \_\_\ \text{V}$$

(13) Grimm's Law, act 1: Germanic Spirantization

$$\begin{bmatrix} -\text{voice} \\ -\text{constr.gl.} \end{bmatrix} \rightarrow [+\text{cont}] \qquad (\text{no context})^{5}$$

The feature [– constricted glottis] is used here to restrict the class of undergoers of the shifts to voiceless plain stops, thus excluding glottalized stops. As one can now see, Germanic Spirantization is in an *Elsewhere relationship* with Verner's Law. Or, otherwise stated, the context of Verner's Law is *properly included* in that of Germanic Spirantization. Hence, the order of application: (i) Verner's Law, (ii) Germanic Spirantization follows automatically from Kiparsky's (1973, 1982) Elsewhere Condition (or from the principle of Proper Inclusion Precedence proposed by Koutsoudas, Sanders and Noll (1974)): by these principles, Verner's Law has precedence over Germanic Spirantization because its domain of application is more specific.

By our experiment of regarding Germanic Spirantization and Verner's law as part of a synchronic phonological system the Elsewhere relationship between the structural descriptions of the Germanic Spirantization and Verner's law indicates that these laws must be somehow related: it is striking that these two most famous Germanic sound shifts have exactly the same undergoer, i.e. a voiceless obstruent, and that their order of application can be determined by a general principle. Therefore, one is tempted to investigate the hypothesis that the Germanic Spirantization and Verner's Law were in fact part of a single process, or were triggered by the same phenomenon. I will do this in the next section.

6 An optimality-theoretic account of Grimm's and Verner's laws

We will now attempt an analysis within the framework of Optimality Theory. We can assume that the Germanic shifts were part of a push chain. Push and pull chains are usually taken to have been conceived by Martinet (1955), but were in fact already proposed in one way or the other precisely for the Germanic sound shifts by Grimm himself (1848:393, writing about 'vehicles moving in circles'), Luick (1896, 1964:805, using the terms 'eviction principle' and 'chain reaction'), Kretschmer (1932:272-273, using the term 'prophylactic measure') and Fourquet (1948). They were also proposed by Jespersen (1909) for what since has become known as the Great English Vowel Shift.

Adopting the Glottalic Theory, we can assume that the glottalized stops of PIE deglottalized as a result of the need to maintain contrast, there was a push chain. The original plain stops, here indicated as T_1, were evicted by the deglottalization of *T'*, becoming T_2, where the subscript '2' indicates the new

[4] The specification ([+ voice]) must be part of the rule because Verner's law also applied aferter a non-stressed vowel followed by a voiced consonant, cf. the PG past participle **wurd-* 'turned',(where the first vowel does not bear stress, and the *d* resultt from the application of Verner's law).

[5] I abstract here away from the fact that spirantization does not apply of the stop in question if a plosive is preceded by *s*. This is of no consequence for the matter discussed here.

arrival of this segment in this mode of articulation. In an OT analysis, the fact the T_1 has to move out is expressed by a constraint *T_1. Unlike normal OT constraints, this constraint is of course not universal, but derivative of the principle of contrast preservation.

So, if T_1 is evicted, to what mode of articulation can it move? This of course is decided by the working of general OT constraints. I assume the following constraints:

i. A constraint *T_1: an original voiceless plain stop is forbidden. This constraint induces both spirantization and voicing. This constraint is of course not universal (and thereby is not a regular OT constraint) but is the formal expression of the pushing power that results of the need to maintain contrast and the origin of which is the deglottalization of T'.
ii. A markedness constraint: INTERVOIVOI: Non-glottalic consonants should be specified [voiced] if between other segments specified [voiced]. This is an enlargded version of intervocalic voicing, because it also applies after voiced consonant (see note 3).
iii. A faithfullness Contraint: Identposttress (Laryngeal) (IDENTPOSTSTRLAR). Consonants directly after a stressed vowel should be faithful to the underlying laryngeal specification. This constraint is an expression of the views of expression of De Jong, Beckman and Edwards (1993) who state coarticulation is reduced in stressed environments, thus impeding intervocalic voicing.
iv. A faithfullness contraint: IDENTLAR. Do not change the lagryngeal specification of a segment
v. A faithfullness contraint: IDENT-[CONT], which says the the specification of [cont] should be maintained.

Three of these constraints, INTERVOIVOI (at least in the form of intervocalic voicing), IDENTLAR and IDENT-[CONT] figure widely in the OT literature and therefore need no further motivation here. I will come back to IDENTPOSTSTRLAR below.

An example of the working of these constraints is given in the tableaus (14, 15), with the Gothic forms *brōþar* and *fadar* taken as examples:

(14)

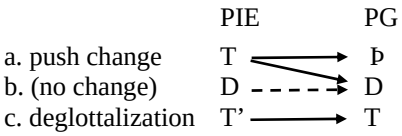
ˈbroːtar	*T_1	IDENTPOSTSTRLAR	INTERVOIVOI	IDENTLAR	IDENT-[CONT]
ˈbroːtar	*!				
ˈbroːdar		*!		*	
☞ ˈbroːθar			*		*
ˈbroːðar		*!		*	*

(15)

paˈtar	*T_1	IDENTPOSTSTRLAR	INTERVOIVOI	IDENTLAR	IDENT-[CONT]
paˈtar	**!		*		
baˈdar				**!	
baˈθar			*!	*	*
☞ faˈdar				*	*
faˈθar			*!		**
faˈðar				*	**!

As one can see, the Proto-Germanic facts are born out by this analysis. The diagram of the Germanic shifts given in (9) and (11) is thus simplified further:

(16) Diagram of the Germanic shifts in the light of the Glottalic Theory, the pushing power of Deglottalization and OT.



I should shortly discuss here the nature of the constraint IDENTPOSTSTRLAR. As mentioned, This constraint is based on the observation by De Jong, Beckman and Edwards (1993) who state coarticulation is reduced in stressed environments, thus impeding intervocalic voicing. An alternative analysis would be to assume that postvocalic consonants are in coda position in after a stressed vowel, a position taken for English by Hoard (1971) Selkirk (1982) and J.C. Wells (1990) (note that this partially reflects Verner's own postion when he states that intervocalic consonants belong to the former syllable, see footnote 1). Then, the well-known constraint NOVOICEOBSTRUENTCODA could replace IDENTPOSTSTRLAR. However, this would also predict voiced obstruents in coda's to be devoiced, which probably did not happen in PG (although it there was indeed final devoicing in Gothic).

7 Conclusion

In this paper, I have shown that Grimm's and Verner's laws can be analyzed a two subprocesses of a single process that was essentially a (complex) sound shift under the influence of the pushing power of Deglottalization (which takes the place of act 3 of Grimm's law). This pushing power resulted from the need to maintain contrastivity between original glottalized stops and original plain voiceless stops. In order to do this, the Glottalic Theory had to be adopted, which enabled a change T > D without going 'against the main direction of the sound change'. I also assumed with Verner himself and modern scholars like Mańczak (1990), but *contra* various others, that Verner's law does not apply word-finally and is thus essentially intervocalic voicing.[6] This made it possible to see the fact of Verner's law as the result of a contraint of intervocalic voicing (or more precisely a version of intervocalic voicing that applies also after a voiced consonant).

The major upshot of the above analysis is that the Germanic spirantization (act 1 of Grimm's Law and the intervocalic voicing (Verner's Law)) are related and therefore necessarily synchronous. One does not, therefore, have to answer the question whether Grimm's Law preceded or followed Verner's Law. Neither does one have to wonder why in the transition form PIE to PG there were two processes that applied to the same original segments, i.e. plain voiceless stops, but were nevertheless unrelated. Under the above analysis they were indeed related.

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[6] This confirms a dictum by an early researcher on Verners's Law: "And if the true nature of Verner's law be sufficiently understood, it will be obvious that its conditions are exactly those most favorable to intervocalic voicing." (F.L. Wells 1903-1905:526).

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