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On the original formulation and on the resonance over time of Grassmann's Law: remarks on a still open issue*

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The present article aims to reconsider in detail the original formulation of Grassmann's law (GL), proposed by Grassmann (1863), since the main handbooks of Indo-European linguistics often repeat an extremely concise and sometimes incomplete formulation of the phenomenon without going into the details of Grassmann's original reasoning, from which the definition of the phonetic "law" took its shape. In fact, we intend to highlight, on the one hand, the route whereby the scholar arrived at the decisive formulation of the principle which took its name from him, on the other the research ideas already present in the article of 1863 and only partially taken into account by subsequent studies. In addition to offering an overview, as complete as possible, of the resonance and influence of GL among linguists (both within a general and a historical linguistic perspective), over the years, the intent is to show the fruitfulness of ideas that still today could be used for new studies on the topic and to offer a possible, new interpretation of this phonetic change.

Keywords: Grassmann's law; Greek; Sanskrit; Proto-Indo-European; phonetics; dissimilation of aspirates.

1. Preliminary remarks

Hermann Günther Grassmann (Stettin 1809-1877),[1] besides being one of the most important mathematicians of the 19th century, was also an excellent linguist, above all an expert in Sanskrit. The extraordinary versatility with which he was endowed allowed him to study in depth a wide range of topics during his life and always to achieve

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[1] The information about Grassmann's life is taken from the ADB (*Allgemeine Deutsche Biographie*). For further information, see also Schlegel (1878), Delbrück (1877), and Schmitt (1987).

excellent results. His work as a writer and essayist was rich and varied: in addition to mathematical and linguistic works, he wrote a reading book for schools, a work on German phytonyms, an autograph collection of popular songs, a theological study and other works based on his experience as a high school teacher. The fruit of his linguistic studies were the dictionary of the Rig-Veda (Grassmann 1873) and the translation, with critical and exegetical annotations, of the Rig-Veda (Grassmann 1876-1877). Although these two works do not have the same theoretical importance as his main work in the field of mathematics,[2] they have always occupied a prominent place as essential instruments for subsequent studies. The correspondence between H. Grassmann and A. Kuhn (during the 1860s) bear witness to the close collaboration between the two and the genesis of the Rig-Veda dictionary, to which Grassmann dedicated most of his efforts.

Dealing with historical phonetics was obviously possible, and indeed fully consistent with the *forma mentis* of a scholar coming from a mathematical field, and B. Delbrück himself, with whom Grassmann was always in touch, perceived in his friend a particular constancy that led him to a definite and expressly clear formulation of the phonetic "law" which took its name from him. It was Grassmann's already well-practiced mathematical intellect that allowed him to make forays into the linguistic field with insights that would become fundamental, also in this field, for subsequent studies.

Most of the Indo-European handbooks often repeat – one from the other – an extremely concise and sometimes incomplete formulation of "Grassmann's law"[3] (henceforth GL). For this reason it seems appropriate to dwell in detail on the original text, also to highlight, on the one hand, the route which led the scholar to the decisive enunciation of the principle he identified, and, on the other, the research ideas present in the article and in large part dropped by subsequent scholars. It will be noted, of course, that in many points the scholar's exposition is significantly affected by the age and its "non-professional" character (and hence, in various points, by naivety and inaccuracies), despite the careful application of his ideas to Indo-European issues. The article *Über die aspiraten und ihr gleichzeitiges vorhandensein im an- und auslaute der wurzeln*[4] was published in 1863 in Kuhn's comparative linguistics journal. The scholar's main purpose, emphasized precisely in the introduction of the essay, was to stimulate and encourage scholars of comparative linguistics to develop research in the field he outlined, that was that of demonstrating the existence of original diaspirate[5] Proto-Indo-European (henceforth PIE) roots. The merit of the first observation of the phenomenon should not however be attributed to Grassmann, as it is traditionally believed, but to von Raumer.[6]

[2] Grassmann (1844).

[3] With the exception of Jatteau (2016), who – in a monographic study – deals extensively with the issue from all points of view.

[4] A partial translation into English of the text – written in a rather convoluted and archaic German – is found in Lehmann (1967).

[5] That is to say with two etymological aspirated stops, according to a later terminology.

[6] Cf. von Raumer (1837 and 1863).

2. Grassmann's original formulation of the phonetic "law(s)"

In the second part of the article, H. Grassmann, preparing to deal with the presence of two aspirated stops at the beginning and at the end of a root, considers it necessary to premise the enunciation of two principles whose formulation is possible on the basis of an in-depth study of the behaviour of Greek and Old Indic:

> "Wenn eine wurzel mit einer aspirate auslautet und mit einem der aspiration fähigen konsonanten beginnt, und der auslaut derselben durch einwirkung irgend eines andern lautgesetzes seine hauchung verliert, so tritt diese auf den anlaut über […]" (*ivi*: 110-111).[7]

> "Wenn in zwei konsonantengruppen eines wortes, welche durch einen vokal getrennt sind, aspiraten vorkommen, die derselben wurzel angehören, so wird eine derselben, in der regel die erste, ihrer hauchung beraubt. Nur vereinzelt geschieht dies in dem falle, wo die aspiraten verschiedenen wurzeln, oder verchiedenen suffixen, oder die eine einer wurzel, die andere einem suffixe angehört, oder wenn mehr alse ein vokal zwischen den konsonantengruppen steht (wie in ἐκε-χειρία, τηλεθόων)" (*ivi*: 111).[8]

In relation to the first statement, the scholar emphasizes the fact that it applies to Sanskrit only if the final sound of the root is a voiced aspirated stop and the initial is a non-palatal voiced stop, and, for Greek, only if the initial consonant is a dental (cf. θρίξ : τριχός, different from πάσσων : παχύς). As to the application of the phonetic change to the reduplicant, Grassmann observes that, originally, in the reduplicated forms, the aspirated stop had to be repeated as such and only later, when the roots and the reduplicant "merged" into a single linguistic sign, a dissimilation appeared for "euphony" and one of the two aspirates underwent deaspiration. The doubling of aspirates is also present in the onomatopoeic terms without the second of the enunciated laws being applied: its application, in fact, would prejudice the natural reproduction of the sound (evident in terms such as Skr. *gharghara* 'gurgling, crackling', *ghargharya* 'bell', *jhiñjhī* 'cricket' etc.).

It is from the second "law" enunciated by Grassmann that we could therefore deduce the impossibility (in Greek and in Sanskrit) of having roots that simultaneously presented an aspirated stop both in initial and in internal position. This second *Lautgesetz*, in Grassmann's opinion, does not apply to the Italic area, where formations such as Lat. *fefelli* or Oscan *fufans*, *feiho* etc. do not show any trace of the "dissimilation process": although /f/ and /h/ are spirants and not real aspirated (stops), they would perform these functions. If the "law" had already been operating before the separation of the Italic

[7] "Given a root with a final aspirate and an initial consonant capable of aspiration, and given also that the final element loses aspiration (by some separate sound law), then that feature is retracted to the initial element" (Collinge 1985: 47).

[8] "Given two consonant-groups in a word, separated by a vowel and themselves aspirated, and provided that they are within the same root, then one (and normally the first) is deprived of its breath feature" (Collinge 1985: 47).

branch[9], it would be difficult to understand the presence, in the above-mentioned words, of the sequences *f-f* or *f-h*, which presuppose older forms with two aspirated stops (therefore not dissimilated). The fact, then, that Gothic does not undergo dissimilation and attests the preservation of roots with original aspirates (evolved to plain voiced) in initial and final position, reveals a late development of this "law". According to Grassmann (1863: 113), therefore, the sound change did not apply in PIE. Similarly, the frequent occurrence of Gothic roots beginning and ending with a voiced stop leads to the conclusion that for PIE roots with two aspirates can be reconstructed.

At this point of his article, Grassmann explicitly recalls a series of theories, including those of Pott (1833-1836), Benary (1837), Schleicher (1861), and Curtius (1858-1862), who, starting from the "inusual" correspondence between forms such as Gr. πυθ- (cf. πυθμήν) and Skr. *budh-* (cf. *budhná-*), formulated different hypotheses to explain the inner "balance" of the root. After discussing the various types of "equilibrium" (according to the so-called "Gleichgewichtstheorie"), Grassmann (1863: 114-117) considers that it should rather be denied than admitted, arguing that all the anomalies and dubious hypotheses conceived for the purpose of providing some explanation in this regard are clarified once diaspirate roots are postulated. For the above-mentioned forms, then, the scholar proposes an original root beginning with $*b^h$ and ending in $*d^h$, whose first stop underwent deaspiration (in the case of Greek, after having undergone a process of devoicing). In Latin, where the effects of this "law" did not occur, the initial aspirated stop was retained as a fricative (*fundus*), whereas in Germanic it changed regularly to simple voiced (OHG *bodam*).

3. The conditions for the dissimilation between aspirates in Greek and Sanskrit: Grassmann's observations

Grassmann observes that, in Greek, if the second stop of the root is deaspirated, then it appears as a plain voiced. Among the examples quoted by the scholar (see also *infra*, § 5.1.1.), θυγάτηρ (Skr. *duhitár*), θέλγω (Old Engl. *dolg* etc.), φεύγω (cf. Lat *fugiō*, Goth. *biugan*), φιδάκνη (next to πιθάκνη, probably from $*b^hid^h$-), θιγγάνω (Lat. *fingō*, Old Ir. *digen* etc.). He therefore deduces that, at the time when the dissimilation process was operating, the aspirated stops in initial position were already voiceless, while those in internal position were still voiced (even the initial aspirates before ρ and λ seem to have remained voiced for a long time: cf. Gr. γράφω compared to Goth. *graba*, or Gr. βρεχμός compared to Old Engl. *brægan* etc.). In both Greek and Sanskrit, however, the phonetic "law" made it possible to avoid the presence of two aspirated stops in the same word.

In the conclusion of the article the scholar deals with the exceptions to the first Germanic *Lautverschiebung*. In the light of the findings of his study, the exceptions to the

[9] Nowadays, no one would describe the evolution of PIE voiced aspirates in terms of splitting "branches". However, Grassmann's essay is strongly influenced by the time in which it was written. For example, it is significant that the scholar describes the archetypical linguistic pattern as characterized by the combination of originally independent elements who would behave "wie etwa die Gewächse eine Urwaldes, jedes wurzelnd in der unmittelbaren Anschauung des Gegenstandes" (*ivi*: 82).

regularity of the so-called "Grimms's law" were recognized as regular (that is the cases in which the Germanic simple voiced *b, d, g* did not correspond to Sanskrit *bh, dh, gh* and to Greek *ph, th, kh* – as usual – but to *b, d, g*, and to *p, t, k* respectively), such as in correspondences of the type Goth. *bindan* 'to tie' : Skr. *bandhá-* 'bond, link', *bándhu-* 'relative', Gr. πενθερός 'father in law'. This exception was explained as "apparent" and not "substantial" by Grassmann through the new phonetic "law" that postulated the dissimilation process – as a factor of alteration of an older state of things – in Greek and Sanskrit, therefore a phenomenon conditioned by the context of the phonic string of the word (see Belardi 2002: 315). Grassmann had the merit, in addition to the others mentioned above, of having recognized first that the "irregularity" could sometimes arise from the languages considered more archaic and conservative, as also recalled by Lehmann (1967: 109). Of course, many of his interesting analyses are extraordinarily affected by his mathematical imprint.

4. Languages which show the effects of Grassmann's Law

Among the Indo-European languages which can be analysed in a perspective that takes into account the effects of GL we recall those which have preserved different outcomes of the original voiced and voiced aspirated stops. Greek and Sanskrit, as seen, allow this kind of investigation (cf. PIE **b^{h}ewd^h-* > Skr. *bodhati*, Gr. πεύθομαι; PIE **d^{h}eyĝ^h-* > Skr. *déhmi*; PIE **b^{h}ud^h-* > Gr. πυθμήν etc.). In the case of Latin it is certainly more difficult to find cases of dissimilation between aspirates, since its phonological system is devoid of this type of phonemes (fricatives appear instead, in initial position, as a result of the original voiced aspirates). However, there have been some attempts to find outcomes of GL also in this language.[10] Tocharian reduces the series of PIE obstruents into a single one, through a general devoicing and deaspiration process, with the exception of the alveolar /d/, that led to an outcome different from the one of the PIE voiceless and voiced aspirates. GL, then, could only be verified in roots beginning with **dh-*, and therefore it cannot be excluded (see Winter 1962 and Ringe 1996) that, in a non-attested stage of Tocharian, a dissimilation between aspirates may have occurred, such as in Toch.B *tsik-* 'fashion, shape' (cf. Goth. *digan*, Gr. τεῖχος, Ved. *dihanti*, Lat. *fingō*) < PIE **d^{h}eyĝ^h-* 'to knead (with) clay', Toch. A/B *tsäk-* 'burn up, consume by fire' (cf. Goth. *digandin*, Skrt. *dáhati*, Lat. *foveō*) < PIE **d^{h}eg^{wh}-* 'to burn', and Toch. A/B *tsuk-* 'to suck' (?) (cf. Skrt. *duhé*, Gr. τεύχω, Goth. *daug*) < **d^{h}ewg^h-* 'to produce (milk)', that could reflect the dissimilated **deyĝ^h-*, **deg^{wh}-*, and **dewg^h-* respectively.

[10] For the hypothesis of a sort of GL in Latin see Walde (1906), Longobardi (1998), Weiss (2009b: 156-163), and the summary recently presented by De Decker (2015). For the hypothesis of GL in Messapic, see Huld (1995) and Woodhouse (1998).

5. The reception of Grassmann's Law within the context of Indo-European linguistic research

Although Grassmann (1863: 81) also claimed to have started his research to stimulate other scholars to deal with the same topic, for at least a century comments on and reactions to the article of 1863 were very few and we had to wait until the Seventies of the 20th century for the debate to become complex and lively. The literature on the subject is extremely wide, and the interpretations are often contradictory. The aim of the present contribution is not to list all the handbooks of historical linguistics containing mentions, explanations or synchronic descriptions of GL, but rather to show the flourishing of specific studies appearing in the leading international journals, from the article written by Grassmann to the present day, and to show how this issue has been dealt with in different perspectives, both trying to place this linguistic phenomenon within a general framework, and connecting it with a series of phonetic changes that inevitably interfered with it.

5.1. The chronology

5.1.1. The PIE hypothesis

As mentioned above, the 1970s saw the flourishing of most studies relating to the re-interpretation of GL[11]. Its correlation with various other linguistic changes typical of Greek and Sanskrit allowed linguists, within the framework of generative grammar, to propose different solutions to the various problems of relative chronology and led them to present hypotheses of "restructuring" and "(re)ordering" of phonological rules. In this period there was no lack of debate among scholars who often "deconstructed" each other's interpretations about GL, even with great criticism. Several linguists, especially in the context of generative studies,[12] have, over time, hypothesized that the law could have been operating since PIE, founding their hypotheses on the fact that Greek and Sanskrit showed evident traces of its application. Grassmann, instead, as discussed above, ruled out any Indo-European date of the law, expressing skepticism about it.[13]

In this regard we cannot fail to mention the works of Paul Kiparsky,[14] who assumed that a first process of deaspiration took place, in Greek, at a stage when the original voiced aspirated stops were still voiced, in order to explain cases where a dissimilated voiced stop appears instead of an expected voiceless one. According to Kiparsky (1973), in particular, there was a Greek-Indo-Iranian dialectal area where deaspiration was followed (rather than preceded) by the Greek innovation consisting in the devoicing of

[11] It must in fact be kept in mind that, in this period, many were the attempts to apply the feature theory and that of rule (re)ordering to phonological rules of both PIE and individual historical languages.

[12] For a detailed review and bibliographic references, see, recently, De Decker (2015).

[13] See also Mayrhofer (1986: 115): "GRASSMANN is kein gemeindogermanischer Vorgang". Of the same opinion Fortson (2009^2: 210-211; 253) and Meier Brügger (2010^9: 269 ff.).

[14] See, in particular, Kiparsky (1973).

voiced aspirates. His analysis is based on both synchronic and diachronic phonology and is part of a theoretical framework which presupposes the so-called "rule reordering". According to his opinion, any root of the type /C^{h}VC^{h}/ would be relexicalized as /CVC^{h}/ merging with the inherited type /CVC^{h}/. Among the relic forms[15] characterized by a simple voiced stop followed by a voiceless aspirated stop (from an original diaspirate root of the type */D^{h}VD^{h}/) we recall words such as βρεχμός 'front part of the head' (Old Engl. *brægan* 'brain', Engl. *brain* etc. < **b^{h}reg^{h}-*), βόθρος, βόθυνος 'hole, trench' (Lat. *fodiō*, Lith. *bedù* 'dig' etc. < **b^{h}ed^{h}-* 'to dig, prick'), βυθός 'depth' (Skr. *budhná-* 'bottom, ground, base', Lat. *fundus* 'bottom, foundation' etc. < **b^{h}ud^{h}-*), δρύπτω 'tear' (cf. the parallel form θρύπτω 'break in pieces, spoil' < **d^{h}rub-(b^{h})-*), θιγεῖν (inf. aor. of θιγγάνω 'to touch, reach', cf. Goth. *digandin*, Lat. *fingō* etc. < **d^{h}eyĝ^{h}-* 'to knead and build with clay'), δεῖσα 'slime, filth' (< **g^{wh}eid^{h}ya-*), ἀγαθός 'good' (Goth. *gops*, Old Eng. *gōd*, Engl. *good* etc. < **sm̥-g^{h}ad^{h}-*), φείδομαι 'to save, to pardon' (beside πείθομαι < **b^{h}eyd^{h}-* 'to persuade, trust'), φεύγω 'to flee' (Lat. *fugiō*, Goth. *biugan* etc. < **b^{h}ewg^{h}-* 'id'), φιδάκνη 'jar' (beside πιθάκνη < **b^{h}id^{h}-* 'pott, bucket'), Θελγῖνες 'Telchines' (beside Θελκῖνες < **d^{h}elg^{h}-* 'to beat, hit') etc.

According to Pozza (2007 and 2010), also Gr. βαθύς could be traced back to PIE **b^{h}ed^{h}-* 'to dig, prick', from a previous *βεθύς/βοθύς, which changed to the attested βαθύς due to analogy on a morphological model characterized by the features of bisillabicity, root apophony in -α-, oxitony, and semantic affinity, that is that of the adjectives in *-ú- (see βαρύς 'heavy', βραχύς 'short, small', πλατύς 'large', παχύς 'thick', ταχύς 'quick, fast', βραδύς 'slow' etc.). The organization of the lexicon in schemes would allow to explain, according to the prototypical categorization processes, the analogical mechanism at the origin of the formation of βαθύς. "Relic" words such as those described above would allow us to identify the existence, in a certain sense, of "two" different laws, which occurred at different times and in different ways, or a prolonged effectiveness of the phenomenon (started before the devoicing of voiced aspirated stops in Greek and ended after it and after the formation of the reduplicative stems).[16] Another proposal advanced to prove an Indo-Iranian status of GL comes from Butler (1974), who imagined that the "murmur" ("glottal buzz", "breathy voice") represents the third possibility of glottal articulation, in opposition to both the voiceless and the voiced articulations (see also *infra* § 5.4.). As a consequence, if it is admitted that Iranian has in common with Sanskrit both the dissimilation of "murmur" and Bartholomae's law, there would be no *a priori* reason – according to Butler – to deny an Indo-Iranian status to GL: the later, Iranian rule "MURMURLOSS$_{\text{Iran}}$" would have removed all traces of GL, then led to relexicalization and would itself have been lost. However, the circular character of Butler's hypothesis cannot escape the reader: to demonstrate the existence of a phenomenon (GL)

[15] Among others, for the discussion of these forms, see Collinge (1985), Iverson (1985), Stanley (1985), Miller (1977), Pârvulescu (1993), De Decker (2015).

[16] Angermann (1873: 32) already hypothesized that the deaspiration could have operated in two different phases ("bald an erster, bald an zweiter Stelle"). Schwyzer (GG I: 262), then, argues, discussing Gr. βόθρος: "Dass βοθ- für richtiges *ποθ- stehe nach βαθύς (Curtius) oder etwa zu letzterem gehöre (mit "dialektischem o für α), hat nichts für sich. Zeigt βοθ- für idg. **bhodh-* dass gelegentlich einmal schon auf der Stufe der med. Asp., nicht erst der ten. Asp. dissimiliert werden konnte?". See also Pozza (1998).

in a linguistic area that does not document it (Iranian)[17], it is enough to imagine the intervention of a rule that cancelled the "murmur" (i.e. the aspiration) after the effect of GL. The hypothesis is adduced to justify the thesis, but in turn the thesis is a condition for the formulation of the hypothesis itself.

5.1.2. The hypothesis of a late application of Grassmann's law

The main counter to Kiparsky (1973) is represented by Miller (1977),[18] who reflects on more than fifteen lexical items where the initial stop is voiceless (such as τέφρα < **d*^{h}*eg*^{wh}-, πυθμήν < **b*^{h}*ud*^{h}-, πίθηκος < **b*^{h}*id*^{h}- etc.), and which cannot be explained through Kiparsky's reordering. The scholar lists the phonetic changes that must have occurred before the application of GL in Greek. Much of Miller's article is devoted to a careful observation of a decent number of epigraphic attestations, from different dialectal areas, which would demonstrate that Grassmann's law was a fairly relatively recent innovation not yet completed at the time of the earliest inscriptions (cf. cases such as Ἐπιθρέφεος, θυφλός, ἐθέθην, θυθέντος, θεθμόν etc.). As well as Sanchez Garrido's contribution (1988) – which will be treated later (cf. § 5.1.3.) – Miller's work represents a very important reference point for the analysis of the documentary data, and allows the author to evaluate them in the light of a whole series of phenomena strictly connected with GL: secondary assimilation of aspiration, restructuring of the original diaspirate root, analogical levelings, aspiration throwback (henceforth AT), graphic mistakes etc.

In the same period, we find the analyses put forward by Wyatt (1976), Janko (1977), and Lightner (1973), who stresses that the phenomenon of deaspiration and that of the fall of /h/ are two aspects of the same process of dissimilation (on the same topic, see also Christol 1972). We must also mention the theory of Allen (1976), who, within a typological perspective, imagines – considering the unquestionable similarity between the phenomenology in Greek and Sanskrit – a "phonological affinity" between the two languages: even if they behave differently in the treatment of voiced aspirated stops and in the development **s* > *h*, Greek and Sanskrit would always be in contact until the moment when a "wave" of dissimilation of the aspiration with an epicentre in one of the two linguistic areas would spread to the other. According to the scholar, the typological anomaly of the traditional tripartite system postulated for the PIE stops (**t,* **d,* **d*^{h}) was "avoided" by Greek through the devoicing of the voiced aspirates, by Old Indic through the "creation" of a fourth series of voiceless aspirated stops.

Many were the hypotheses concerning a possible application of GL to Mycenaean, where – in absence of a graphic distinction between voiceless, voiceless aspirated and voiced stops (except that for /d/) – the only clue is represented by the presence of the sign *25 *a*^{2}, which indicates /ha/.[19] To De Decker (2015) we owe a recent summary of

[17] But see *infra*, § 5.3.

[18] See also Miller (1974).

[19] While not entering into the details of the individual interpretations – mostly based on different evaluations of the relative chronology of changes within Greek – I shall only remark here that an application of

the different dating suggestions for GL. This scholar, using evidence taken from Mycenaean, Homeric scansion, augmentation and reduplication in Greek verbal morphology, aims to prove that GL was operational only after the period in which the Homeric poems were written down. That GL must be traced back to a pre-classical age is the opinion of Jatteau (2016), to whose detailed and ample study (as well as rich of bibliographical references) I refer for further details on the issue, extensively discussed by the Author. In this approach, the dissimilation process is based on the "non-limited" character of the feature [+ aspiration], which makes its location ambiguous within the signal.

5.1.3. The Greek epigraphical sources

Collinge (1985), as known, collected all the references to GL,[20] discussing the issues connected with domain, extent, chronological and local interference (including some reference to the epigraphical material), and phonetic and diffusional variety of the linguistic change. Still today his work represents the most comprehensive and in a certain sense up-to-date synthesis of the main issues connected with GL both in Greek and in Sanskrit, even if the bibliographical references, obviously, stop in 1985[21].

Blümel (1982), in his work about Aeolic inscriptions, reflects on GL by observing that aspirates in flexional or compositional morphemes have no "dissimilative power" over the aspirate of the root, and that the law, therefore, acts only within the domain [+ ROOT].[22] The scholar underlines that isolated forms such as Boeot. ἐκηχειρίαν (IMagnesia 25.11), Lesb. ἐκεχειρίαν (IG 12,2 S: 138.13) from *ἐχε#χειρίαν and ἀμπεχ- (Beot. [ἀ]μπεχόνιον DGE 462.b 11 in comparison to ἀμφίθιουρον IG 7: 2876.9/10) from *ἀμφι#εχ- would seem to bear witness to the fact that originally GL was not blocked by any word or morpheme boundary. The field of action of the law would have been synchronously opacified, and the forms that escaped earlier dissimilative processes in a free context would have then been lexicalized.

GL in pre-Mycenaean was hypothesized by: Szemerényi (1958), Scherer (1959), Heubeck (1970), Dressler (1975), Wyatt (1976), Rix (1976), Neumann (1979), Gamkrelidze (1981), Lanszweert (1994) etc. Among the scholars in favour of a post-Mycenaean application of GL, we should mention Ruijgh (1967), Lejeune (1968 and 1972), Kerschensteiner (1969), Chadwick (1973), Janko (1977), Heubeck (1980), Belardi (1981), Risch (1983), Collinge (1985), Morpurgo Davies (1985), Bartoněk (1987), Plath (1987 and 2001-2002), García Ramón (1990), Meier-Brügger (1992), Doria (1979 and 1995), Garrett (2006), Vine (2014). For a post-Homeric application of GL, Miller (1977), Mayrhofer (1986: 112-115), Dubois (1988), Sanchez Garrido (1988), De Decker (2015). In the framework of a diachronic dimension, especially regarding the relative chronology of GL in respect of Greek phonetic changes, we cannot fail to mention the proposals put forward by Belardi (1981 and 2002).

[20] The scholar also points to the works of those who disagreed with the law, including Sag (1974 and 1976), Bubeník (1976), and Hastings (1978).

[21] See Jatteau (2016) for a recent and detailed monographic study about GL.

[22] Cf., among those who considered the effects of the law beyond the morpheme boundary, Anderson (1970), Kiparsky (1973), Miller (1974) and Dressler (1976).

Stanley (1985) – as well as Kiparsky (1973) and, later, Pârvulescu (1993)[23] – also considers the devoicing of voiced aspirated stops as following the effect of GL and proposes to study a factor in her opinion closely related to that law: the accent. She thinks there must have been a "variant" of GL, determined by the accent, able to deaspirate a dental that was followed by a sequence "accented vowel – aspirated consonant – vowel" (such as in ἐτέθην < *ἐθέθην): therefore there would have existed in Greek two different laws, the former strictly regressive (and limited to the roots), the latter determined by the accent (as in the example above mentioned).

Starting from Kiparsky's article (1973), Sanchez Garrido (1988) makes use of an accurate philological analysis of the Greek epigraphic documentation, which demonstrates a lack of effectiveness of the phenomenon between the 6th and the 4th century BC. She stresses that, while the classical texts attest, without exception, the outcomes of dissimilation, the inscriptions of some dialectal areas behave less coherently, demonstrating a late application of the sound shift. According to her opinion, the cases of dialectal inscriptions attesting forms that escape GL (θύχα, χάλχας, Φίθων, θεθμόν, φεφύλακσο etc.) testify that the dissimilation law had not yet been rooted to the point that it could conflict with an earlier norm, of "non-dissimilation", which instead allowed sequences of two aspirates. In her view, GL began to be effective in the post-Mycenaean era, even if its definitive affirmation, which took place very slowly, was stabilised only in the Hellenistic period. In addition, Sanchez Garrido (1988) examines the etymologies provided by Kiparsky (1973) to show a PIE date for GL and underlines a series of problematic aspects connected with them (cf. *supra* Miller 1977, § 5.1.2.). The reason why many variants and graphical oscillations are documented in the inscriptions would be due to the existence of other competing synchronic phonetic rules, which gradually came into conflict with GL. Especially in Attic, GL becomes systematic by the end of 5th century BC.

Slings (1986) discusses the Greek aspirated perfect form Gr. εἴληφα (< λαμβάνω 'I take')[24] to demonstrate a late application of GL, because of the fact that, in classical Attic, epigraphical forms such as καθειληφότων (IG II^2 682, 10; after 256/5 BC); καθειληφότος (IG II^2 682, 10; after 256/5 BC) and ἀφειληφότας (IG I^2 108, 20; 410/9 BC) could represent relics of the pre-Grassmann period.[25] He then argues that the loss of the aspiration in the first syllable, in the more recent and widespread attested formation εἴληφα (documented only from Sophocles onwards), should date back to the Classical period. Even in the opinion of De Decker (2015: 161) we are dealing with a formation apparently created when GL had not yet operated.

[23] According to whom, Gr. θυγάτηρ 'daughter' (Skr. *duhitár*, Av. *dugədar-*, *duγdar*, Goth. *daúhtar*, OHG *tohter*, Toch. B *tkācer*, Lyc. *kbatra*, Hitt. *duttariyati/a-* 'a female functionary' etc.) comes from *d^{h}ewg^{h}- 'to produce something of utility' (cf. Skr. *duhé* 'to give milk') and would have meant '(female) worker'. For the (nowadays generally accepted) reconstruction of a proto-form with a laryngeal, *d^{h}ugh$_2$tér, see, among others, Werba (2007).

[24] But see also Ringe (1984) for a different opinion about the chronology of the facts.

[25] Threatte (1980: 463, 505) seems to subscribe to this view, albeit hesitantly, pointing to the absence of counterexamples. Scholars normally explain this phenomenon as due to Attic substandard assimilation of aspirates. See also Miller (1977: 146-147) for these epigraphical forms, used to prove that GL had not yet operated.

5.2. The phonetic and diatopic variety of Grassmann's law in Greek

As for the phonetic variety of the application of the law, we can recall the discussion put forward by Langendoen (1966), who underlines that GL applies in Greek – within the root – only if the initial consonant is a dental (in cases such as τριχός < **d^{h}rig^h-* or τίθημι < **d^{h}ē-* etc.) or a laryngeal fricative (< **s*, such as in ἔχω < **seĝ^h-* etc.), and that an initial labial or velar stop never alternates with the corresponding aspirated. So, in the case of Gr. πεύθομαι, the PIE root, **b^{h}ewd^h-*, must have been inherited by Greek as **peut^h-*, since the labial in the root never appears as aspirated within the paradigm of the verb πεύθομαι; had the original Proto-Greek root been **p^{h}eut^h-*, then we should have expected (see also *infra*, § 6) a future form such as **φεύσομαι (instead of the attested πεύσομαι).[26] According to Hoenigswald (1965: 59), then, the fact that the PIE root **b^{h}ewd^h-* yields Greek **peut^h-* could be explained as a reassignment of phonemes in a "neutralized" area, and not as a step in a merger process, since **pewd^h-* is excluded as a source:[27] "Precisely for this reason, occasional Greek forms like θυφλός for τυφλός 'blind' have little importance. They should certainly not be taken as manifestations of a serious assimilatory trend capriciously counteracting the fundamental dissimilation. The fact is rather that aspiration functions in Greek very largely as a property of the (discontinuous) consonant sequence as a whole, its precise location in one segment or another remaining for some time non distinctive". As highlighted by Collinge (1985: 53), initial psilosis must skew the reflexes of Grassmann's law, obscuring the consistency of its output, especially in forms of the type ἔχω : ἕξω. Moreover, alternations such as δέκομαι versus δέχομαι, doublets such as χιθών versus κιθών,[28] or secondary assimilation (if to be interpreted as such)[29] such as West Ionic θυφλός for τυφλός etc. further complicate the situation. Finally, we cannot omit mentioning the fact that also in the case of the aorist passive, GL does not seem to apply regularly: the suffix **-d^{h}ē-* > *-t^{h}ē-* (a typically Greek innovation) does not usually trigger the effects of dissimilation (except in rare cases such as ἐτέθην and ἐτύθην), for which forms such as ἐθρέφθην, ἐθράχθην etc. are documented.

This variety of conditions of Greek, with respect to what seems to be the apparently strong regularity of the deaspiration in Indo-Aryan, constitutes a particularly remarkable

[26] This is generally interpreted, instead, as an analogical restructuring on the simple voiceless labial of the present stem.

[27] According to the restriction which prohibits voiceless stops from appearing together with aspirates. Otherwise there would have been cases of homonymy between the outcomes of **pewd^h-* and **bhewd^h-*.

[28] Even if in these cases we are probably dealing with *Wanderwörter*, which, as such, often behave differently as far as phonetics is concerned.

[29] Sometimes explained as mere insensitivity to the law – in cases such as θυφλός, θιθέμενος etc. – or as secondary assimilations of aspiration – in cases such as θεθίς for τηθίς –, sometimes as analogical restorations – in cases such as πάσσων instead of *φάσσων on παχύς –, sometimes as due to the presence of a morphological boundary – in cases such as φάθι, ἐχύθην etc.

feature, which clearly distinguishes the mechanism of application of the phenomenon in the two linguistic areas.[30]

5.3. "Local ordering" of rules: the interrelation between Grassmann's law and Bartholomae's law in Sanskrit

As it's well known, Bartholomae's law (henceforth BL) is the sound shift through which, in Indo-Iranian, a cluster formed by an "aspirated voiced stop + voiceless stop" changes into "voiced stop + voiced aspirated stop", due to a progressive assimilation of both voicing and aspiration (see Skr. **rud^h-tá- > *rud^h-d^{h}á- > rud-dhá*) of the type **D^{h}T > DD^h*. A form like *buddhá-* results from the interaction of three rules: the original diaspirated root **b^{h}ud^h-* (+ suffix *-tá-*) undergoes, respectively: GL – with the loss of the aspiration in the first phoneme – BL, encountering the suffix *-tá-* and, finally, CR (i.e. Cluster Rule), with loss of the aspiration in the first stop of the consonantal cluster. The issues connected with the interrelation between GL and BL, and more specifically the difficulty of establishing a relative chronological order between the two laws within the synchronic derivation, are multiple and very complex, and the different interpretations are often discordant. For this reason – given the purpose of the present work – the topic will not be studied in depth as it would deserve, but we limit ourselves to briefly mentioning the main scholars who have addressed the issue critically.[31]

Within the framework of generative studies, we recall the interventions of Zwicky (1965) and Kiparsky (1965), who have tried to formulate a linear-consequential order of such phenomena,[32] while Anderson (1969 and 1970), discussing a modified version of Kiparsky's notion of marked and unmarked order of rules, has put forward an alternative proposal, based on the so-called "local ordering",[33] according to which the relation between the various linguistic changes takes place according to an *a priori* "unmarked" order that can therefore differ according to the forms. The interaction between GL and BL, in essence, does not define a mutually "marked" or "unmarked" order. In such a case, "the order of application must be explicitly stated in the grammar" (Anderson 1970: 394). The conclusions reached by Anderson are taken into consideration by Mey (1972), who proposes a "combined" law of assimilation of voicing and aspiration in the pre-consonantal position in order to explain the outcomes of BL, and intends to consider GL, which he connects with the preceding law, as part of a more general process of eliminating aspiration.

[30] Many, of course, are the works of historical linguists who have dealt with the analysis of GL in Greek, trying to justify the exceptions to its regularity – it is therefore impossible to mention all of them. However, we can recall, for its dialectal diffusion, Moralejo Alvarez (1973), Miller (1977, cf. *supra*, § 5.1.2.), Threatte (1980), Blümel (1982), Dubois (1988); for a systematic treatment within the synchrony and diachrony of Greek, Schwyzer (1939), Lejeune (1972), Collinge (1985), Méndez Dosuna (1985), Sihler (1995).

[31] See Mayrhofer (1986: 115-117).

[32] For more information about Zwicky's and Kiparsky's theories in relation to the criticisms made against them by Anderson (1970), see Vennemann (1979).

[33] For the interrelation between BL, GL and deaspiration in cluster (otherwise known as "cluster rule", i.e. CR), see, among others, Darden (1978) and Scharfe (1996).

Phelps (1975 and 1976), on the contrary, distances herself from Anderson's thesis, arguing that it is preferable to linearly order the main linguistic changes operating in Sanskrit and rejecting, as a consequence, Anderson's solution to the problem (i.e. his "local ordering"), which, in her opinion, "does not provide an automatic procedure for selection of a correct order of the rules for each form from among the very orderings it makes available" (cf. Phels & Brame 1973: 400). She also rejects Sag's interpretation (see *infra*), stating that that GL applies, in Sanskrit, only to aspirates that agree in voicing correlation: the only domain in which GL fails to apply is therefore the one in which there is no voicing correlation between aspirates.[34]

Sag (1976) criticizes, in turn, the hypotheses proposed by Phelps (1975 and 1976, see *supra*) and Hoard 1975 (see *infra*), who had expressed strong skepticism about his proposal (Sag 1974), based on the tradition dating back to Pāṇini, that is reconstructing roots with just one aspiration and rejecting the idea of underlying diaspirate roots:[35] underlying diaspirates and GL would have been eliminated from Sanskrit through restructuring. He claims that reduplicated consonants are deaspirated without exception and that the rule that deaspirates reduplicated consonants has nothing to do with the rule that accounts for the dialectal variants – which, instead, sometimes oscillate between forms with initial aspirate or non-aspirate (see § 5.1.3).

Sag's opinion is shared by Schindler (1976), who analyses the linguistic rules operating in Proto-Indo-Iranian and Old Indic and their interactions on a synchronic level. According to him, the paradox associated with the mutual interactions between these laws is a strong argument in favour of a system like the one hypothesized by Sag (1974). If only mono-aspirated roots are postulated, then AT (see, for example, τρέφω : θρέψω, θρίξ : τριχός etc.) is to be interpreted as a process that, when necessary, moves the aspiration leftward, onto the initial stop.[36] Moreover, Schindler (*ivi*: 626) adduced actual evidence (Av. *xumba-* = Skr. *kumb^{h}á-* 'pot' < PIIr. **k^{h}umb^{h}a-* 'pot') that GL could not have applied before the Proto-Indo-Iranian period, and that therefore it cannot be a historically shared change between Greek and Sanskrit. Hoard (1975: 218) underlines his fundamental objection to Sag's analysis, arguing that "the rules he gives as Regressive Aspiration Assimilation and Deaspiration are almost totally unnatural and use the braces notation to include dissimilar items in what are actually discrete and incommensurate environments" and proposes, within the framework of sandhi phenomena in Sanskrit, a linear order: deaspiration of Consonants, GL, BL.

The difficulty, for modern phonology, of a unique and univocal formulation of the dissimilation law in Sanskrit was also noted by Stemberger (1980), who, in agreement with Phelps and Brame (1973) – see *supra* –, explains the application of GL in forms such as Skr. *dugdha-* etc. as conditioned by /dh/ which appears as a result of the conso-

[34] But see *infra* Schindler's etymology of Skr. *kumbha-* 'pot' < Proto-Indo-Iranian **khumbha-* 'pot'.

[35] Cf. Borowsky & Mester (1983: 52): "The data suggest two possible explanations; one posits diaspirate roots and deaspirates one of the consonants of the root. We will refer to this as the *Grassmannian* analysis. The second, the *Paninian* analysis, analyses roots as mono-aspirate and moves the aspiration when necessary".

[36] In the opinion of Kiparsky (1973), the form [Th … T-] is derived from the underlying form /T … Th-/.

nantal cluster (acting on a surface level). The transparency of the law would have been compromised if the second root consonant had been held responsible for the dissimilation (which, in fact, does not emerge as such – /gh/ or /h/ – in the surface structure). The analysis of the scholar, in essence, is based on the assumption that it is necessary to look for the conditions for the effect of GL in the attestations found at a surface level only. According to his opinion, then, two constraints must therefore be referred to GL: both aspirates must be part of the same morpheme and both of them must constitute the beginning of the respective syllables.

As to GL in Sanskrit we should also recall the work of Ejerhed (1981), who hypothesizes that the Sanskrit aspirated stops should be interpreted as a group composed of a consonantal segment /C/ followed by a segment /h/ [+ Consonantic – Vocalic], rather than as a single consonantal segment characterized by the feature [+ aspirated]. Ejerhed intends to address the issue of GL by reformulating the phenomenon as a transformational phonological rule, which is envisaged as the result of the "movement" of the /h/ segment.

Within the framework of the so-called process-morphology and that of autosegmental phonology we cannot fail to mention, respectively, on the one hand, Janda and Joseph (2002), on the other, Borowsky & Mester (1983), Kaye & Lowenstamm (1985) and Calabrese & Keyser (2006). Kaye and Lowenstamm (1985), in particular, suggest that, in Sanskrit, aspiration should be seen as one of the prosodic features that – together with vocal folds relaxation – manifest associative (autosegmental) properties able to realize complex phonemes, among which the series of voiced aspirates. The representation proposed by the two scholars for the original diaspirate roots consists of hierarchical structures associated with the so-called "segmental melody" of the single root. Faced with such a point of view, there would no longer be any need to formulate general explanations in the form of a "law", and therefore the reason for postulating a phenomenology such as GL would be lacking.

Moreover, it is worth mentioning Kobayashi (2004), who, in a very wide work on Indo-Aryan consonants, discusses in depth – within the theoretical framework of optimality theory – the main issues related to the interrelation between GL, BL and CR. Kobayashi analyses also the PIE diaspirate verbal bases wondering if these forms could be reconstructed for Indo-Aryan too or if, instead, for Sanskrit, we should better think of bases in which the presence of the double aspiration is due to AT. Recently, an up-to-date and in-depth analysis of the correlation between GL and BL has been proposed by Jatteau (2016: 594 ff.), who interprets the aspiration as an autosegment. In such a representation, there is only one aspirate by morpheme, whose position is determined by the context.

5.4. Grassmann's law and the reinterpretation of the PIE stop system

It is not my intention, nor does it fall within the purposes of this contribution, to express an opinion on the reconstruction of the PIE stop system from a typological point of view. For the most recent theories, alternative to the traditional reconstruction of a tri-

or quadripartite system (based on the opposition of voicing and aspiration), according to which the PIE voiced aspirates could be replaced with "breathy-voiced' or "murmured" stops (cf. also Clackson 2011: 48 ff.), see, in particular, Weiss (2009a)[37], followed by Kümmel (2012), to whose works I refer for details.

During the Seventies, Hopper (1973) and Gamkrelidze and Ivanov (1973)[38] independently proposed a reinterpretation of the PIE stop system characterized by the three series of glottalized, voiced aspirates and voiceless aspirates (where aspiration is considered an irrelevant distinguishing feature), known as the Glottalic Theory (GT). According to this new perspective, they interpreted GL as an alternation between aspirated and non-aspirated allophones already in the PIE system, and not as the result of a dissimilatory process acting independently in Sanskrit and in Greek. We are in the presence, in essence, of a distributional variation of certain phonemes in PIE. Iverson (1985), who disagrees with the traditional view of an independent effect of GL in Greek and Sanskrit, proposes an analysis in which the traditional voiced are interpreted as ejectives. According to this interpretation, GL would have been shared by Greek and Sanskrit and would consist of "the distributional stipulation of the plain voiced allophone as the manifestation of the murmured phoneme when another murmured phoneme follows" (*ivi*: 208).

According to Salmons (1991), then, if the GT is applied to the analysis of GL, and the original series of voiced stops are reinterpreted as "allophonically aspirated", the pertinence of GL is transferred from the phonological to the allophonic level, and it is easier to refer it to PIE: in this way problems connected with relative chronology in Greek are solved, and it is no longer necessary to propose an independent origin of a relatively rare phenomenon such as dissimilation in two distinct but related languages such as Greek and Sanskrit. He proposes a "demarcational" motivation for GL, recognizing a prosodic, suprasegmental, demarcating function of the phenomenon: aspiration and glottalization of the stops had the function of signalling the beginning or the end of the roots and "reinforcing" the first or the last syllable.

5.5. Grassmann's law as a listener's hypercorrective process

Recently, most studies concerning GL have tried to observe the phenomenon from a more general[39] – and "cognitive" – point of view, keeping in mind the mechanisms of

[37] M. Weiss uses cross-linguistic evidence taken from the Central Tai language Cao Bang, spoken in northern Vietnam, for imagining, for the PIE stop system, a three-way distinction of voiceless, voiced, and breathy-voiced stops; first proposed by Haider (1983), this "theory" analyses Cao Bang's recent history to outline a path by which a system of implosive and voiced stops could become a system of voiced and murmured stops (see Barnett 2018 for a recent and detailed overview of the various proposed phonological systems of PIE and for insights through experiments using modern empirical methods.

[38] See also Gamkrelidze (1981), Gamkrelidze and Ivanov (1986) and, on the same topics, Bomhard (1986).

[39] In a perspective that takes into account linguistic universals, there have been studies which have focused on various dissimilation processes very similar to GL (sometimes regressive, sometimes progressive), such as those discovered by Allen (1976) for Harauti (a dialect of Rajasthani); De Reuse (1981) for Ofo (an extinct Amerindian language); Gupta (1982) for colloquial Hindi; Thompson & Thompson (1985) for Salish (a group of languages of the Northwest Pacific); Mohanty (1987) for Oriya (a modern Indo-Aryan language); Celliah

sound production and perception triggered by both the speaker and the listener, with the aim of better motivating a process, like that of dissimilation, which is normally considered sporadic and, therefore, not systematic.[40] Garrett (2015: 10), in particular, stresses that: "The three most important 'minor' sound change types are dissimilation, non-local displacement (metathesis), and unconditioned saltatory change […]. These have indeed played a key role in inspiring a new approach to sound change, one emphasizing the role of perceptual factors in addition to articulation". Several crucial and influential studies by Ohala (1989, 1992, 1993, 2010 etc.) have provided further insight into the issue of a coarticulation-hypercorrection process, according to which, when hearing a word with two aspirates in proximity, the listener may interpret the aspiration on the former as due to an erroneous speaker's production, and may then suppress it when speaking. Dissimilation, in Ohala's words (2000: 56), "arises due to the listener's mis-application of […] corrective processes". That of Ohala, in substance, is a perceptually based dissimilation process, and GL, then, as far as at least its production is concerned, cannot be considered a "natural" phonetic process.[41]

A very important element which one should consider, in relation to GL, is in fact shown by the errors of parsing, which, according to Ohala, represent a fundamental cognitive point of observation. A "well-constructed" parsing must be able to produce clear "sections" of the word, sections whose boundaries appear independent. The more transparent the morphological boundary is to the speaker, the more it can be "bypassed". Accurate parsing requires that the component parts be separately and clearly identifiable. The optimal conditions for this to happen is when the parts are freely combinable and independent of one another (for this issue, see also Belardi 1981). Phonetic changes generally seem not to override the word-boundary (see also Chomsky & Halle 1968: 366): the word is a string of highly lexicalized phonetic segments, and therefore presents the maximum ambiguity for the listener. It is precisely within it that the biggest errors of evaluation are made, which is why the processes of hypo- and hyper-correction are limited within the word, and do not override its "boundaries". The situation, however, is very complex since a word, from a phonological point of view, is not simply determined

(1997) for Meithei, a Tibeto-Burman language; Schadeberg (1999) for Makhuwa, a Bantu language spoken in Mozambique; Shosted (2007), Svantesson et al. (2005), Svantesson & Karlsson (2012) and Jatteau & Hejná (2018) for Mongolian and for some dialects of Mongolian; Blust (2012) for Austronesian languages; Beguš (2016) for Georgian; Hejná (2016) for Aberystwyth English; Gopal (2017) for Tangkhul (a Sino-Tibetan language) etc. According to Ohala (1992), in particular, it is precisely the comparison with these dissimilations in non-Indo-European languages (as well as the evidence for GL in Tocharian, see § 4.) that removes the apparent singularity of GL.

[40] See also Ohala (2000: 56) on dissimilation processes: "These are 'unnatural' sound changes in the sense that, first, we are unable to invoke any principle of speech production that would predict changes in this direction". On this topic, see also Ohala (2003).

[41] The issue – as underlined, among others, by Halle (1973: 928) – "turns on whether Grassmann's law does or does not represent a natural phonological process". Kiparsky (2001: 658), on the same topic, argues that "dissimilation is not a natural articulatory process. Therefore, it must arise by means of perceptual reanalysis. But the reanalyzed form should be a well-formed structure of language, hence in particular one representable in terms of its authentic phonological inventory […] dissimilation is regular where it serves to implement constraints such as Grassmann's law, and the same is true of methatesis".

by a sequence in which alternations of morphological boundary appear and one should therefore take different definitions of "word" (prosodic, syntactic etc.) into account.

6. The "instability" of GL: from diachronic to synchronic perspective

The great "instability" of GL, as we have seen, seems to allow its classification among sporadic phonetic changes. Zukoff (2012), for example, analyses GL and the resulting dissimilation in the reduplicant as a consequence of the "emergency of the unmarked" (*ivi*: 154), arguing that the reduplicant morpheme is, in a certain sense, empty. He therefore proposes that the dissimilation is related to the non-lexical character of the reduplicant morpheme, whose structure and segmental content vary depending on those of the initial stop of the root.

De Angelis (2018 and forthcoming), moreover, dealing in particular with the effects of GL in the Greek reduplicant, i.e. in the perfect forms, argues in favour of the morphological nature of the process that generates non aspirated segments in the reduplicant, which he also interprets as typologically characterized by the presence of unmarked features, among which also non aspirated stops can be included (if compared with the respective aspirated ones). Jatteau (2016) provides an in-depth and up-to-date analysis of GL, the effects of which are articulated with the other properties of aspiration on the synchronic and diachronic level. In her opinion, the limitation of its effects to the morpheme is due to a reduction of domain.

These interpretations, if framed within all the topics here discussed, and if connected in particular with those which have shown a sort of "instability" of GL (in both time, space, and morpho-phonological domain), seem to open up new perspectives which, in a sense, undermine the alleged regularity of GL, and reveal instead a certain "weakness" of this sound shift. So, if we recall Miller's opinion[42] about the restructuring of an original diaspirate form due to the dissimilatory process, restructuring that gave rise to underlying mono-aspirated roots (GL being replaced by a synchronic sub-rule of AT which was later partially deleted due to levelings),[43] it cannot be excluded that, in synchrony, GL stopped to act as a rule.

Starting from an application of GL on diaspirate PIE roots (of the type */d^hVb^h/, for example) which generated outcomes characterized by a regressive dissimilation (/tVp^h/), two different synchronic (re)analyses – again following Miller (1974: 228-229) – are possible. The first possibility is to interpret the alternations in forms such as Greek pr. τρέφω versus fut. θρέψω or genit. τριχός versus nomin. θρίξ (with AT, in the forms which show the aspiration in the first stop) as outcomes of a previous diaspirate root, through "extraction" of a common denominator /threph/. The second one, on the contrary, is to reanalyse the alternations as product of AT (which applies only to original diaspirate roots) and therefore to consider one form as basic and the other as derived from it. This second option, according to Miller (1974), was chosen by both Greek and Sanskrit. The

[42] Miller (1977).

[43] For the environment in which aspiration throwback (AT) operates see in particular Miller (1974).

surface alternation of aspirate / non-aspirate stops was gradually leveled due to the disappearance of the AT rule, which gradually ceased to apply (see cases such as pres. τεύχω versus aor. ἔτευξα instead of **ἔθευξα from an underlying */$d^{h}ewg^{h}$/, or pr. πυνθάνομαι versus fut. πεύσομαι instead of the expected **φεύσομαι from an underlying /*$b^{h}ewd^{h}$/ etc.).

7. Concluding remarks

If we analyse GL according to such a perspective, new interpretative possibilities open up, first of all that of the inexistence of GL in synchrony: the speaker restructures the form that, synchronically, only shows a simple alternation of aspirate and non-aspirate stops, instead of a "regular" dissimilation, which, in this case, it is conceivable only in diachrony. To support the hypothesis outlined here, the following factors can be stressed:

- the inconsistency of GL with regard to the stops involved, see § 5.2. (it acts on the dentals, it is sporadic with labials and velars, see παχύς versus πάσσων – instead of **φάσσων – or ἐχύθην from χέω – instead of **ἐκύθην –, but, regularly, ἐθέθην from θίθημι etc.);
- the hypothesis (see De Angelis, 2018) that the deaspiration in the reduplicant – the only domain where dissimilation seems to operate regularly – is due to a morphological change which is different from GL;
- the inconsistency of GL within the epigraphic dossier, see § 5.1.3. (lack of application of the sound shift, or secondary assimilation of aspiration at distance?);
- the problematic chronology of the phonetic change (see, on one hand, the relic forms listed in § 5.1.1.; on the other, its late operativity in the epigraphic material, see §§ 5.1.2. and 5.1.3.);
- the inconsistency as to the progressive or the regressive direction of the dissimilation process (cf. Skr. *dákṣu* 'burning, flaming' which alternates with *dhákṣu*, or *ádukṣat* besides *ádhukṣat* < *$d^{h}eg^{wh}$- etc.);
- the fact that dissimilation processes are generally labeled as sporadic and non-systematic sound changes.

The critical summary here presented has shown how GL has been "successful" over the years and was intended to offer a clearer picture of the evolution of the different perspectives on the phenomenon in the light of concomitant linguistic theories. This has hopefully showed that the topic is still a fruitful field of research, and that it can be re-analysed both from a general point of view – taking into account various parameters, such as the acoustic-phonetic field, the cognitive framework, or aspects connected both with morpho-phonetic naturalness or with production and perception strategies – and from an historical perspective, working on epigraphic data and carefully evaluating some specific formations, such as the aorist passive in Homeric Greek, for example, that could be useful for new interpretations of the phenomenon. In any case, we have also tried to show how the formulation (actually, the formulations) proposed by H. Grassmann repre-

sents only some of the reflections contained in the article of 1863, from which interesting insights emerge, which then would be deepened in subsequent studies.

Several issues are involved: if there was only one application of GL, if this application was late, and if it is a process surfacing sporadically in time and space, or we are dealing with different "waves" of a single phenomenon, whose effects were prolonged over time. Perhaps its domains have to be better circumscribed, perhaps it is a "natural" process, or, on the contrary, it is due to hypercorrective processes. Probably, as discussed *supra* (cf. § 6), GL did not operate anymore in synchrony, acting only in diachrony. What is certain, in conclusion, is that Grassmann's expectation, namely that his research would stimulate further investigations in the same field of studies ("und zu dieser untersuchung anzuregen, soll der hauptzweck des gegenwärtigen aufsatzes sein"),[44] has not been disappointed.

References

ADB = *Allgemeine deutsche Biographie herausgegeben durch die Historische Commission bei der königl. Akademie der Wissenschaften* (1875-1912). Leipzig: Duncker & Humblot.

Allen, William S. 1976. The PIE aspirates: phonetic and typological factors in reconstruction. In Juilland, Alphonse (ed.), *Linguistic studies offered to Joseph Greenberg on the occasion of his sixtieth birthday*, 237-247. Saratoga: Anma Libri,

Anderson, Samuel R. 1969. *West Scandinavian vowel systems and the ordering of phonological rules*. (Unpublished doctoral dissertation, MIT.)

Anderson, Samuel R. 1970. On Grassmann's law in Sanskrit. *Linguistic Inquiry* 1/4. 387-396.

Angermann, Constantin T. 1873. *Die Erscheinungen der Dissimilation im Grieschischen. Ein Beitrag zur grieschischen Lautlehre*. Leipzig: Hirzel.

Barnett, Philip. 2018. *A markedly different approach. Investigating PIE stops using modern empirical methods*. Master's Thesis. University of Kentucky. Theses and Dissertations-Linguistics. 28 (https://uknowledge.uky.edu/ltt_etds/28). (Accessed 2019-12-02.)

Beguš, Gašper. 2016. *The phonetics of aspirate dissimilation: Grassmann's law in Georgian*. Poster presented at the *South Caucasian Chalk Circle* – SCCC – Paris. (https://www.academia.edu/28677814/The_Phonetics_of_Aspirate_Dissimilation_Grassmanns_Law_in_Georgian). (Accessed 2019-12-02.)

Bartoněk, Antonin. 1987. On the prehistory of ancient Greek. *Studi Micenei ed Egeo-Anatolici* 26. 7-20.

Belardi, Walter. 1981. *Fonologia indoeuropea*. Roma: Kappa.

Belardi, Walter. 2002. *L'etimologia nella storia della cultura occidentale*. Roma: Il Calamo.

Benary, Albert A. 1837. *Die römische Lautlehre sprachvergleichend dargestellt*, vol. 1. Berlin: Josas Verlagsbuch.

Bomhard, Allan R. 1986. The aspirated stops of Indo-European. *Diachronica* 3/1. 67-79.

Borowsky, Toni & Mester, Ralf-Armin 1983. Aspiration to roots. Remarks on the Sanskrit diaspirates. In *Papers from the nineteenth regional meeting of the Chicago Linguistic* Society, 52-63. Chicago: Chicago Linguistic Society.

Blümel, Wolfgang. 1982. *Die aiolischen Dialekte. Phonologie und Morphologie der inschriftlichen Texte aus generativer Sicht*. Göttingen: Vandenhœck & Ruprecht.

Blust, Robert. 2012. One mark per word? Some patterns of dissimilation in Austronesian and Australian languages. *Phonology* 29/3. 355-381.

Bubeník, Vit. 1976. Review of *A.H. Sommerstein, The sound pattern of ancient Greek, Oxford, Blackwell, 1973*. *Lingua* 38. 170-173.

Butler, Johnatan L. 1974. A murmured proposal regarding Grassmann's law. *Indogermanische Forschungen* 79. 18-30.

[44] Grassmann (1863: 81).

Calabrese, Andrea & Keyser, Samuel J. 2006. On the peripatetic behavior of aspiration in Sanskrit roots. In Baković, Eric & Ito Junko & McCarthy, John J. (eds.), *Wondering at the natural fecundity of things: essays in honor of Alan Prince*, 71-94. Santa Cruz, California: Booksurge Publishing.

Chelliah, Shobhana L. 1997. *A Grammar of Meithei*. Berlin: de Gruyter.

Chadwick, John. 1973. *Documents in Mycenaean Greek*. Cambridge: Cambridge University Press.

Chomsky, Noam & Halle, Morris. 1968. *The Sound pattern of English*. New York, London: Harper & Row.

Christol, Alain. 1972. Phonologie des aspirées grecques et parfait à aspirée. *Bulletin de la Société de Linguistique de Paris* 67. 69-83.

Clackson, James. 2011[3]. *Indo-European linguistics*. Cambridge: Cambridge University Press.

Collinge, Neville E. 1985. *The laws of Indo-European*. Amsterdam, Philadelphia: Benjamins.

Curtius, Georg. 1858-1862. *Grundzüge der griechischen Etymologie*. Leipzig: Teubner.

Darden, Bill J. 1978. Local ordering versus multiple application of phonological rules. In Farkas, Donka & Jacobsen, Wesley & Todrys, Karol W. (eds.), *Papers from the fourteenth regional meeting of the Chicago Linguistic Society April 13th-14th 1978 (CLS 14)*, 65-75. Chicago: Chicago Linguistic Society.

De Angelis, Alessandro. 2018 [2019]. La legge di Grassmann in greco come regola morfologica. *Atti del Sodalizio Glottologico Milanese* 13. 43-56.

De Angelis, Alessandro. forthcoming. The phonetic prehistory of Grassmann's law in Greek, *Folia Linguistica Historica*.

De Decker, Filip. 2015. Another attempt at a chronology for Grassmann's law in Greek. *Journal of Indo-European Studies* 43/1. 140-177.

De Reuse, Willem J. 1981. Grassmann's law in Ofo. *International Journal of American Linguistics* 47/1. 243-244.

Delbrück, Berthold. 1877. Nekrolog auf Hermann Graßmann. *Augsburger Allgemeine Zeitung* 291. 4371.

Doria, Mario. 1979. Riflessioni sulla cronologia relative di alcuni mutamenti fonetici del greco premiceneo. In Carruba, O. & Pavia, Aurora (eds.), *Studia Mediterranea Piero Meriggi Dicata*, 121-147.

Doria, Mario. 1995. Mutamenti fonetici e tratti morfologici del greco antico in prospettiva diacronica. *Incontri Linguistici* 18. 137-140.

Dressler, Wolfgang. 1975. Zur Rekonstruktion phonologischer Prozesse im Altgriechischen: Grassmanns Gesetz. In Mares, Franz W. & Miazek, Bonifacy & Sturm-Schnabl, Katja (eds.), *Bereiche der Slavistik: Festschrift zu Ehren von Josip Hamm*, 53-67. Wien: Verlag der österreichischen Akademie der Wissenschaften.

Dressler, Wolfgang. 1976. Können Morphemfugen die Domäne phonologischer Prozesse begrenzen?. In Pohl, Heinz D. & Salnokow, Nikolai (eds.), *Opuscula Slavica et Linguistica. Festschrift für A. Issatschenko*, 123-137. Klagenfurt: Heyn.

Dubois, Laurent. 1988. *Recherches sur le dialecte arcadien*. Louvain-La-Neuve: Peeters.

Ejerhed, Eva I. 1981. The analysis of aspiration in Sanskrit phonology. *Nordic Journal of Linguistics* 4/2. 139-159.

Fortson, Benjamin W. 2009[2]. *Indo-European language and cuture: An Introduction*. Chichester (UK), Malden (Mass.): Wiley-Blackwell.

Gamkrelidze, Tamaz V. 1981. Language typology and language universals and their implications for the reconstruction of the Indo-European stop system. In Arbeitman, Yoel & Bomhard, Allan R. (eds.), *Bono Homini Donum. Essays in historical linguistics in memory of J. Alexander* Kerns, 571-609. Amsterdam: Benjamins,

Gamkrelidze, Tamaz V. & Ivanov, Vyacheslav V. 1973. Sprachtypologie und die Rekonstruktion der gemeinindogermanischen Verschlüsse. *Phonetica* 27/3. 150-156.

Gamkrelidze, Tamaz V. & Ivanov, Vyacheslav V. 1986. On the reconstruction of Proto-Indo-European stops: glottalized stops in Indo-European. In Shevoroshkin, Vitalij V. & Markey, Thomas L. (eds.), *Typology, relationship and time: A collection of papers on language change and relationship by Soviet linguists*, 87-109. Ann Arbor: Karoma.

García Ramón, José Luis. 1990. Mykenisch *e-qi-ti-wo-e /(h)ekwhthiwohe(s)/* "umgekommen, tot", homerisch ἔφθιται, ἔφθιεν, ἔφθιτο und das Perfekt von idg. **dhwhei-* im Griechischen. *Münchener Studien zur Sprachwissenscahft* 51. 7-20.

Garrett, Andrew. 2006. Convergence in the formation of Indo-European subgroups: phylogeny and chronology. In Forster, Peter & Renfrew, Colin (eds.), *Phylogenetic methods and the prehistory of languages*, 139-151. Cambridge: McDonald Institute for Archaeological Research.

Garrett, Andrew. 2015. Sound change. In Bowern, Claire & Evansin, Bethwyn (eds.), *The Routledge handbook of historical linguistics*, 227-248. London, Routledge.
Gopal, Deepthi. 2017. Aspiration 'dissimilation' in Tangkhul Naga prefixation. In *Proceedings of the 2016 annual meeting of phonology*. *Linguistic Society of America 1-8*. https://journals.linguisticsociety.org/proceedings/index.php/amphonology/article/view/3999/3755. (Accessed 2019-12-02.)
Grassmann, Hermann. 1844. *Die Ausdehnungslehre. Ein neuer Zweck der Mathematik*. Leipzig: Wigand.
Grassmann, Hermann. 1863. Über die Aspiraten und ihr gleichzeitiges Vorhandensein im An- und Auslaute der Wurzeln. *Kuhn's Zeitschrift* 12. 81-138.
Grassmann, Hermann. 1873. *Wörterbuch zum Rig-Veda*. Leipzig: Brockhaus.
Grassmann, Hermann. 1876-1877. *Rig-Veda.* Übersetzt *und mit kritischen und erläuternden Anmerkungen versehen*. Leipzig: Brockhaus.
Gupta, B.P. 1982. A rule of deaspiration in colloquial Hindi. *Indo-Iranian Journal* 24/3. 191-200.
Haider, Hubert. 1983. Der Fehlschluss der Typologie. In Meid, Wolfgang (ed.), *Philologie und Sprachwissenschaft. Akten der 10. Osterreichischen Linguisten-Tagung Innsbruck, 23.-26. Oktober 1982*, 79-92. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.
Halle, Morris. 1973. Review of *P. Ladefoged*, *Preliminaries to linguistic phonetics, Chicago, University of Chicago Press, 1971*. *Language* 49/4. 926-933.
Hastings, A. 1978. *Should Grassmann's law be repealed?* (Paper Presented at the 53th Annual Meeting of the Linguistic Society of America, Boston).
Hejná, Michaela. 2016. Dissimilation can be gradient: evidence from Aberystwyth English. *Papers in Historical Phonology* 1. 359-386.
Heubeck, Alfred. 1970. Review of *C. Ruijgh*, Études sur la *grammaire et le vocabulaire du grec mycénien*, *Amsterdam, Hakkert, 1967*. *Indogermanische Forschungen* 75. 312-315.
Heubeck, Alfred. 1980. Zum Volksnamen der Thessaler. In Colakova, Kristalina (ed.), *Studia Linguistica in Honorem of V.I. Georgiev*, 301-309. Sofija: Izdatelstvo na Balgarskata Akademija na Naukite.
Hoard, James E. 1975. Incorporating Grassmann's law into Sankrit phonology. *Proceedings of the Berkley Linguistic Society* 1. 207-220.
Hoenigswald, Henry M. 1965. A property of Grassmann's law in Indic. *Journal of the American Oriental Society* 85. 59-60.
Hopper, Paul J. 1973. Glottalized and murmured occlusives in Indo-European. *Glossa* 7/2. 141-66.
Huld, Martin. 1995. Grassmann's Law in Messapic. *Journal of Indo-European Studies* 23. 147-157.
Iverson, Gregory K. 1985. Grassmann's law in Indo-European. *Folia Linguistica Historica* 6/2. 203-213.
Janda, Richard D. & Joseph, Brian D. 2002. Sanskrit as she has been misanalyzed prosodically. In Singh, Rajendra (ed.), *Yearbook of South Asian languages and linguistics 5*, 59-90. New Delhi: Sage Publications.
Janko, Richard. 1977. A note on the date of Grassmann's law in Greek. *Glotta* 55. 1-2.
Jatteau, Adèle. 2016. *Le statut phonologique de l'aspiration en grec ancient*. Thèse doctorale, Université Paris 8.
Jatteau, Adèle & Hejná, Miša. 2018. Gradient dissimilation in Mongolian: implications for diachrony. *Papers in Historical Phonology* 3. 28-75.
Kaye, Jonathan & Lowenstamm, Jean. 1985. A non-linear treatment of Grassmann's law. In Berman, Stephen & Cohe, Jae-Woong & McDonough, Joyce (eds.), *Proceedings of North East Linguistic Society 15*, 220-233. Amherst, University of Massachusetts: GLSA.
Kerschensteiner, Juła. 1969. Review of *C. Ruijgh*, Études sur la *grammaire et le vocabulaire du grec mycénien*, *Amsterdam, Hakkert, 1967*. *Gymnasium* 76. 85-88.
Kiparsky, Paul. 1965. *Phonological change*, unpublished Doctoral Dissertation, MIT (in Bach, Emmon & Harms, Robert T. (eds.), *Universals in Linguistic Theory*, 171-202. New York: Rinehart & Winston, 1968).
Kiparsky, Paul. 1973. On comparative linguistics: the case of Grassmann's law. In Sebeok, Thomas (ed.), *Current trends in linguistics*, 115-134. The Hague: Mouton.
Kiparsky, Paul. 2001. The phonological basis of sound change. In Goldsmith, John A. (ed.), *The handbook of phonological theory*, 640-670. Oxford: Blackwell (reprint of the edition of 1995).
Kobayashi, Masato. 2004. *Historical phonology of Old Indo-Aryan consonants*. Tokyo: Research Institute for Languages and Cultures of Asia and Africa, Tokyo University of Foreign Studies.

Kümmel, Martin Joachim. 2012. Typology and reconstruction: The consonants and vowels of Proto-Indo-European. In Whitehead, B.N. et al. (eds.), *The sound of Indo-European. Phonetics, phonemics, and morphophonemics*, 291-329. Copenhagen: Museum Tusculanum Press.

Langendoen, D. Terence. 1966. A restriction on Grassmann's law in Greek. *Language* 42/1. 7-9.

Lanszweert, Rene. 1994. Grassmann im Griechischen. Zur umstrittenen Chronologie eines unbestrittenen Lautgesetz. In Dunkel, Georg E. et al. (eds.), *Früh-, Mittel-, Spätindogermanisch. Akten der IX. Fachtagung der Indogermanischen Gesellschaft vom 5. bis 9. Oktober 1992 in Zürich*, 185-200. Wiesbaden: Reichert.

Lehmann, Winfred P. 1967. *A reader in the nineteenth-century historical Indo-European Linguistics*. Bloomington, London: Indiana University Press.

Lejeune, Michel. 1968. Une presentation du Mycénien. *Revue des Études anciennes* 69. 280-288.

Lejeune, Michel. 1972. *Phonétique historique du Mycénien et du grec ancient*. Paris: Klincksieck.

Lightner, Theodore M. 1973. On the formulation of Grassmann's law in Greek. In Anderson, Samuel & Kiparsky, Paul (eds.), *A Festschrift for Morris Halle*, 128-130. New York: Rinehart and Winston.

Longobardi, Giuseppe. 1998. *A New glance at Grassmann's law*, preliminary draft, Università di Trieste.

Mayrhofer, Manfred. 1986. *Indogermanische Grammatik, I/2: Lautlehre. Segmentale Phonologie des Indogermanischen*. Heidelberg: Winter.

Meier-Brügger, Michael. 1992. *Griechische Sprachwissenschaft*. Berlin, New York: de Gruyter.

Meier-Brügger, Michael. 2010[9]. *Indogermanische Sprachwissenschaft*. Berlin, New York: de Gruyter.

Méndez Dosuna, Julian. 1985. *Los dialectos dorios del noroeste. Gramática y studio dialectal.* Salamanca: Universidad de Salamanca.

Mey, Jakob L. 1972. Was Bartholomae really a Grassmann? *Nordic Journal of Linguistics* 26. 81-89.

Miller, D. Gary. 1974. Some problems in formulating aspiration and deaspiration rules in ancient Greek. *Glossa* 8. 211-232.

Miller, D. Gary. 1977. Was Grassmann's law reordered in Greek? *Zeitschrift für vergleichende Sprachforschung* 91. 131-158.

Mohanty, Panchanan. 1987. Deaspiration in Oriya. *General Linguistics* 27/3. 145-152.

Moralejo Alvarez, Juan J. 1973. *Gramática de las incripciones délficas (fonética y morfología, siglos VI-III a.C.)*. Santiago de Compostela: Universidad de Santiago de Compostela.

Morpurgo Davies, Anna. 1985. Mycenaean and Greek language. In Morpurgo Davies, Anna & Duhoux, Yves (eds.), Linear B: A 1984 *Survey*. *Proceedings of the Mycenaean colloquium of the VIIIth congress of the international federation of the societies of classical studies (Dublin, 27 August-1st September 1984)*, 75-125. Louvain-la-Neuve: Cabay.

Neumann, Günther. 1979. Telphousa. *Zeitschrift für vergleichende Sprachforschung* 93. 85-89.

Ohala, John J. 1989. Sound change is drawn from a pool of synchronic variation. In Breivik, Leiv E. & Jahr, Ernst H. (eds.), *Language change: Contributions to the study of its causes*, 173-198. Berlin: de Gruyter.

Ohala, John J. 1992. What's cognitive, what's not in sound change. *Lingua e Stile* 28. 321-362.

Ohala, John J. 1993. Sound change as nature's speech perception experiment. *Speech Communication* 13. 155-161.

Ohala, John J. 2000. The phonetics of sound change. In Kreidler, Charles W. (ed.), *Phonology. Critical concepts. IV. From rules to constraints*, 44-81. London, New York: Routledge.

Ohala, John J. 2003. Phonetics and historical phonology. In Joseph, Brian D. & Janda, Richard D. (eds.), *The handbook of historical linguistics*, 669-677. Malden (MA) & Oxford: Blackwell.

Ohala, John J. 2010. The relation between phonetics and phonology. In Hardcastle, William J. & Laver, John & Gibbon, Fiona E. (eds.), *The handbook of phonetic sciences*, 653-677. Oxford: Blackwell.

Pârvulescu, Adrian. 1993. IE **dhughətḗr* "daughter" and Grassmann's law. A phonetic and semantic analysis. *Indogermanische Forschungen* 98. 55-91.

Phelps, Elaine. 1975. Sanskrit diaspirates. *Linguistic Inquiry* 6/3. 447-464.

Phelps, Elaine. 1976. Boundaries and Grassmann's law in Sanskrit. *Proceedings of the annual meeting of the Berkeley Linguistics Society* 2. 330-338.

Phelps, Elaine & Brame, Michael K. 1973. On local ordering of rules in Sanskrit. *Linguistic Inquiry* 4/3. 387-400.

Plath, Robert. 1987. Hauchdissimilation im Mykenischen? *Münchener Studien zur Sprachwissenschaft* 48. 187-193.

Plath, Robert. 2001-2002. Nochmals zur Datierung des grassmannschen Gesetzes im Grieschischen. *Studia Minora Facultatis Philosophicas Universitatis Brunensis* 6-7. 241-250.

Pott, August F. 1833-1836. *Etymologische Forschungen auf dem Gebiete der Indo-Germanischen Sprachen, unter Berücksichtigung ihrer Hauptformen: Sanskrit, Zend-Persisch; Griechisch-Lateinisch; Littauisch-Slawisch; Germanisch und Keltisch*. Lemgo: Meyersche Hof-Buchhandlung.

Pozza, Marianna. 1998. *La legge di Grassmann riconsiderata alla luce delle nuove acquisizioni dell'indoeuropeistica*, tesi di laurea non pubblicata (Università La Sapienza).

Pozza, Marianna. 2007. Il greco βαθύς tra etimologia di parola ed etimologia di sistema. *Studi e Saggi Linguistici* 45. 71-98.

Pozza, Marianna. 2010. Un caso di colonnarità nella morfologia derivazionale: il gr. βαθύς. In Putzu, Ignazio et al. (eds.), *La morfologia del greco tra tipologia e diacronia. VII Incontro internazionale di Linguistica greca. Cagliari. 13-15 settembre 2007*, 367-384. Pavia: Franco Angeli.

Raumer, Rudolf von. 1837. *Die Aspiration und die Lautverschiebung. Eine sprachgeschichtliche Untersuchung*. Leipzig: Brockhaus.

Raumer, Rudolf von. 1863. *Gesammelte sprachwissenschaftliche Schriften*. Frankfurt a.M., Erlangen: Heyder & Zimmer.

Ringe, Donald A. 1984. εἶλεφα and the aspirated perfect. *Glotta* 62. 125-141.

Ringe, Donald A. 1996. *On the chronology of sound changes in Tocharian*. New Haven: American Oriental Society.

Risch, Ernst. 1983. Probleme bei der Schreibung von Hiat und Kompositionsfuge im Mykenischen. In Heubeck, Alfred & Neumann, Günther (eds.), *Akten des VII. Internationalen Mykenologischen Colloquiums in Nürnberg vom 6.-10. April 1981*, 374-390. Göttingen, Vandernhoeck & Ruprecht.

Rix, Helmut. 1976. *Historische Grammatik der Griechischen*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Ruijgh, Cornelius J. 1967. *Études sur la grammaire et le vocabulaire du grec mycénien*. Amsterdam: Hakkert.

Sag, Ivan A. 1974. The Grassmann's law ordering pseudoparadox. *Linguistic Inquiry* 5/4. 591-607.

Sag, Ivan A. 1976. Pseudosolutions to the pseudoparadox: Sankrit diaspirates revisited. *Linguistic Inquiry* 7/4. 609-622.

Salmons, Joseph. 1991. Motivating Grassmann's law. *Historische Sprachforschung* 104/1. 46-51.

Sanchez Garrido, Maria del Carmen. 1988. Norma y uso y método generative: el caso de la ley de Grassmann. *Revista Española de Lingüística* 18. 149-167.

Schadeberg, Thilo C. 1999. Katupa's law in Makhuwa. In Hombert, Jean-Marie & Hyman, Larry M (eds.), *Bantu historical linguistics. theoretical and empirical perspectives*, 379-394. Stanford, California: CSLI Publications.

Scharfe, Hartmut. 1996. Bartholomae's Law revisited or how the Ṛgveda is dialectally divided. In Schmidt, Hans-Peter & Wezler, Albrecht (eds.), *Veda-Vyākaraṇa-Vyākhyāna. Festschrift Paul Thieme zum 90. Geburtstag am 18. März 1995 dargebracht von Schülern, Freunden und Kollegen*, 351-377. Reinbek: Inge Wezler Verlag für Orientalistische Fachpublikationen.

Scherer, Anton. 1959. *Handbuch der griechischen Dialekte*. Heidelberg: Winter.

Schindler, Jochem. 1976. Diachronic and synchronic remarks on Bartholomae's and Grassmann's law. *Linguistic Inquiry* 7/4. 622-637.

Schlegel, Victor. 1877. *Hermann Grassmann. Sein Leben und seine Werke*. Leipzig: Brockhaus.

Schleicher, August. 1861. *Compendium der vergleichende Grammatik der indogermanischen Sprachen. Kurzer Abriss einer Laut- und Formenlehre der indogermanischen Ursprache*. Weimar: Bohlau.

Schmitt, Rüdiger. 1987. Elf Briefe Hermann Grassmann an Adalbert Kuhn. *Zeitschrift für vergleichende Sprachforschung* 100/1. 12-34.

Schwyzer, Eduard. 1939. *Griechische Grammatik*. München: Beck.

Shosted, Ryan K. 2007. A psychoacoustic basis for dissimilation: Evidence from Tangkhul Naga. In Trouvain, Jürgen & Barry, William J. (eds.), *Proceedings of the XVIth International congress of phonetic sciences*, 1937–1940. Saarbrücken: Universität des Saarlandes.

Sihler, Andrew L. 1995. *New comparative grammar of Greek and Latin*. New York, Oxford: Oxford University Press.

Slings, R.S. 1986. ΕΙΛΗΦΑ. *Glotta* 64. 9-14.

Stanley, Patricia C. 1985. Grassmann's law, Verner's law, and Proto-Indo-European root structure. *Indogermanische Forschungen* 90. 39-54.

Stemberger, Joseph P. 1980. Another look at Grassmann's law. *Glossa* 14/1. 113-135.

Svantesson, Jan-Olof & Karlsson, Anastasia. 2012. Preaspiration in modern and old Mongolian. In *Per Urales ad Orientem. Iter polyphonicum multilingue. Festskrift tillägnad Juha Janhunen på hans sextioårsdag den*

12 februari 2012. Suomalais-Ugrilaisen Seuran Toimituksia = Mémoires de la Société Finno-Ougrienne 264. 453-464.

Svantesson, Jan-Olof et al. 2005. *The phonology of Mongolian*. Oxford: Oxford University Press.

Szemerényi, Oswald. 1958. Mycenaean Greek. *The Classical Review* 8. 7-26.

Thompson, Laurence C. & Thompson, M. Terry. 1985. A Grassmann's law for Salish. In Acson, Veneeta Z. & Leed, Richard L. (eds.), *For Gordon H. Fairbanks*, 143-147. Honolulu: University of Hawaii Press.

Threatte, Leaslie. 1980. *Grammar of Attic inscriptions.* Vol. I. *Phonology.* New York, Berlin: de Gruyter.

Vennemann, Theo. 1979. Grassmann's law, Bartholomae's law, and linguistic methodology. In Rauch, Irmengard & Carr, Gerald F. (eds.), *Linguistic method. Essays in honor of Herbert Penzl*, 557-584. The Hague: Mouton.

Vine, Brent. 2014. Grassmann's law. In Giannakis, Georgios K. (ed.), *Encyclopedia of ancient Greek language and linguistics*, vol. 2, 26-27. Leiden & Boston: Brill.

Walde, Alois. 1906. Aspiratendissimilation im Lateinischen. *Indogermanische Forschungen* 19. 98-118.

Weiss, Michael. 2009a. "The Cao Bang Theory": Presentation held at the 28th East Coast Indo-European Conference (13th June 2009), University of Iceland, Reykjavík.

Weiss, Michael. 2009b. *Outline of the historical and comparative grammar of Latin*. Ann Arbor: Beech Stave Press.

Werba, Chlodwig H. 2007. Sanskrit *duhitár-* und ihre (Indo-)iranischen Verwandten. In Schweiger, Günter, *Indogermanica. Festschrift Gert Klingenschmitt. Indische, Iranische und Indogermanische Studien dem verehrten Jubilar dargebracht zu seinem fünfundsechzigsten Geburtstag*, 699-734. Taimering: Schweiger-Verlag,

Winter, Werner. 1962. Die Vertretung indogermanischer Dentale im Tocharischen. *Indogermanische Forschungen* 67. 16-35.

Woodhouse, Robert. 1998. Grassmann's law before consonant shift in Messapic and Pelasgian. *Journal of Indo-European Studies* 26. 469-475.

Wyatt, William F. 1976. Early Greek /y/ and Grassmann's law. *Glotta* 54. 1-11.

Zukoff, Sam. 2012. *The phonology of verbal reduplication in ancient Greek: an optimality theory approach.* MA Thesis. University of Georgia.

Zwicky, Arnold M. 1965. *Topics in Sanskrit phonology*, unpublished Doctoral Dissertation, MIT.