Proto-Indo-European Nasal Infixation Rule

Paolo Milizia
Università degli Studi di Roma "La Sapienza"

This paper argues for a set of hypotheses concerning the PIE nasal infixation process used to form present stems (e.g. **li-ne-k^{w}-* from **leiḳ^{w}-*): the infix originated from the metathesis of a suffix; infixation and suffixation were originally in complementary distribution; infixation only occurred with roots ending in an obstruent. On the other hand, it is shown that the distribution of the suffix **-neu-* indicates that at an early PIE stage this suffix must have attached only to roots ending in a sonorant. About the origin of **-neu-* a hypothesis is proposed which accounts for the distributional data. Moreover, a new corroboration of the hypothesis that PIE laryngeals were fricative and not vocalic segments is highlighted.

1 Subject[1]

The PIE nasal infixation process used to form present stems of the type **li-ne-k^{w}-* (from **leiḳ^{w}-*) was already recognized as an anomaly at the beginning of Indo-European studies (an extensive history of the problem in the 19th century can be found in Kuiper 1937:3-34).

In fact, what seemed strange to several scholars of the 19th and 20th centuries, including F.B.J. Kuiper, was the fact that a suffixing language par excellence such as Proto-Indo-European could allow infixation: "*Dise bildungsweise [...] mit dem morphologischen principe des indogerm. [...] in widerspruch steht*" (Schleicher 1862:576); "*Uridg. Infigierung anzunehmen ist prinzipiell unzulässig*" (Kuiper 1937:34). The nasal infix was viewed as an anomalous element compared to the other PIE affixes, and the infixation problem was, therefore, perceived as an issue concerning the internal consistency of the PIE

[1]The subject of this paper is the main thesis of my doctoral dissertation (Università degli Studi di Milano, Dottorato in Glottologia e Filologia, 2003; tutor Prof. Celestina Milani). I am grateful to the Program in IE Studies at the UCLA for allowing me to present this paper at the XV UCLA IE Conference, and thank the participants in the conference and an anonymous referee of this journal for their comments. I would like to express my gratitude to Professor Walter Belardi, who introduced me to IE linguistics.

morphological system.

Nowadays, we can say that the question is to be stated in somewhat different terms. As was shown by Joseph Greenberg, because of the fact that it generates discontinuous morphemes, infixation consitutes a crosslinguistically marked phenomenon: "If a language has discontinuous affixes, it always has either prefixing or suffixing or both" (Greenberg 1963:73). In this framework, it does not seem surprising that a certain language can have several suffixes but only one infix.[2]

On the other hand, precisely because of the markedness of infixes, it makes sense to wonder how and why infixation can originate in spite of its disadvantageous properties. That is to say that the problem is not represented by the presence of infixation in a suffixing language, but by infixation *per se.* Therefore, even if the grounds on which several 19th and 20th century scholars pursued it were somewhat different from ours, the aim of explaining how a PIE nasal infix originated still remains totally valid.

In this paper, I will try to show that a comprehensive re-examination of the comparative data and of the typological issues related to PIE infixation can allow us both to understand how the infix must have originated and to reconstruct the synchronic rule which governed its distribution. We will begin our discussion by introducing three major problems related to our subject.

2 The Reanalysis Hypothesis and its Difficulties

The first Indo-Europeanists anticipated both possible kinds of explanation which are described in the more recent literature about infixation emergence: genesis via metathesis (cf. *infra*) and genesis via reanalysis. However, at least since the appearance of Kuiper's monograph, the hypothesis that PIE nasal infixation originated via reanalysis, which was proposed in the Neogrammatical period by Ernst Windisch (1873:407), but had been already anticipated by Theodor Benfey (1842:329; cf. Kuiper 1937:10), has become the most supported one. The postulated phenomenon perfectly corresponds to the kind of reanalysis that Russell Ultan (1975:180) calls "entrapment."

According to this explanation, the last segments of the roots which receive the infix were originally autonomous

[2]It has to be added that, according to Belardi's interpretation (1993), discontinuous morphemes play a major role also in PIE Ablaut.

elements (suffixes or "root extensions"). Therefore, infixed stems were originally double suffixed stems, i.e. stems containing a nasal suffix followed by a second suffix (or by a "root extension"). Then the second suffix was reanalysed as a part of the root. As a result of that, the nasal suffix became an infix:

**lei̯-* (root) + *-k^{w}-* (suffix/root extension) → **lei̯k^{w}-* (root);
**li-* (root) + *-ne-* (suffix) + *k^{w}* (suffix/root extension) → **li-* (root) + *-ne-* (infix) + *-k^{w}-* (root).

Two major difficulties undermine this hypothesis.

The first difficulty concerns the fact that the reanalysis explanation implicitly relies on a not uncontroversial assumption about the morphemic status of the so-called "root extensions." Namely this hypothesis would work correctly if it were proved that, at the PIE stage which immediately preceded the occurrence of the reanalysis, these root extensions were synchronically autonomous and productive elements, which could be attached not only to roots, but also to stems containing a root plus a suffix. In other words, at that stage, root extensions and nasal affix would have had a similar morphemic status.

From this point of view, Kuiper was perfectly consistent. According to him, segments such as **k^{w}* in **lei̯k^{w}-* were morphemes having not only the property of attaching to the end of a base but also that of expressing a grammatical meaning: "*Welche die ursprüngliche Bedeutung dieser Formantia gewesen ist, läßt sich nicht mehr ermitteln. Soviel steht aber wohl fest, daß sie dem Präsens entweder determinative oder indeterminative Bedeutung verliehen*" (Kuiper 1937:63). Now, what else could a right-attached grammatical morpheme be if not a suffix? Root extensions were, therefore, viewed by Kuiper as suffixes, or even better as verbal suffixes originally used to form present stems.[3]

The idea that root extensions could be considered as grammatical morphemes has been shared by many scholars. According to Antoine Meillet's view, for instance, (see, e.g.,

[3]It has to be remarked that Ultan, who, in his paper, accepted the hypothesis that the PIE nasal infix originated via reanalysis, was misled by Kuiper into considering root extensions as aspect suffixes: "the [...] suffix became an infix once the older aspect suffixes that followed it [...] fused with the roots they occurred with" (Ultan 1975:182).

Meillet 1937:176), "root extension" and "suffix" are in fact simply two sorts of affixes coexisting in the same reconstructed morphological system and distinguished by synchronical properties. In particular, a root extension is a suffix which has the property of not determining the lexical category of the formations it occurs in. As is well known, Émile Benveniste (1935) developed his theory of the root along the same line; according to him, the third consonantal segment of a root, such as $*k^w$ in $*le\underline{i}k^w$-, is always to be interpreted as an autonomous element, belonging to the class of what he called "suffixes."

This kind of interpretation fails to take into account the fact that, in opposition to what occurs in the case of true PIE suffixes, in which the *reconstructa* consist of both a determinable form and an at least partially definable grammatical meaning, in the case of root extensions, we have a reconstructed form which only consists of one segment and a not even partially defined reconstructed meaning. Besides its form, the only property of a root extension which is definable is that it attaches itself to the end of a root. Now, if two comparanda do not have a comparable meaning but only a presumed comparable morphotactic property, the probability that their similarity is due to chance is obviously high. Thus, in comparison with a hypothesis that reconstructs a suffix like, e.g., **-ske/o-*, a hypothesis that reconstructs a root extension as a true morphological element is intrinsically weaker.

In fact, many root extensions could be nothing more than a reconstructive mirage. As Helmut Rix has recently pointed out, we must consider the possibility that several segments traditionally labeled as root extensions might be the result of reanalysis: "*Sicherlich können durch Uminterpretation von nominalen Suffixbildungen oder Verbalkomposita [...] schon im Urindogermanischen neue Wurzeln entstanden sein, was freilich von Fall zu Fall nachzuweisen wäre. Ohne einen solchen Nachweis bleibt der Begriff der Wurzelerweiterung rein synchron-deskriptiv und damit ohne Bedeutung für eine historische Analyse*" (*LIV* 6-7).

Another interpretation views root extensions as reflexes of suffixes that belonged to a prehistorical stage preceding the one reconstructable by means of the comparative method (so in Narten 1967:63). This view, which could explain why it is not possible to reconstruct the original function of such units, is very similar to that maintained by Georg Curtius (1879:78), the scholar to whom we owe the term "*Wurzelerweiterung*" itself.

The reanalysis hypothesis and the stratification hypothesis do not necessarily conflict with each other, since it is possible that some root extensions are of the one and some of the other type. Yet they both conflict with the hypothesis that PIE nasal infixation originated via reanalysis in that they do not assign to root extensions a morphemic status similar to that of nominal and verbal suffixes.

A second difficulty depends on the fact that, according to the reanalysis hypothesis, all the roots capable of receiving the infix, or at least all the ones that were capable of receiving it since the moment of its creation, would have been 'extended roots.' The case of the root **ieu̯-* (*IEW* 508), a synonym of **ieug-* (cf. OInd. *yunákti* 'yoke'), is too little evidence to corroborate this hypothesis. Rather, as has been pointed out by Jens E. Rasmussen (1990:192-193), if the last segments of these roots had originally been autonomous elements, each one of them would have been originally attachable to every root. Thus, the original system would have allowed, e.g., **li-ne-g-* and **li-ne-d-* besides **li-ne-k^{w}-*, and **b^{h}i-ne-k^{w}-* and **b^{h}i-ne-g-* besides **b^{h}i-ne-d-*. Even allowing that some combinations would have been ruled out by semantics, if the reanalysis hypothesis were correct, we would certainly have some reconstructable pairs of the type **li-ne-k^{w}-~ *li-ne-g-*.

3 The Distributional Gap

A second major issue concerning the PIE nasal infix is represented by the fact that it is not possible to reconstruct infixed stems derived by roots ending in *j, r, l, m, n*.[4]

The presence of a distributional gap did not escape twentieth-century scholars' notice (cf. Kuiper 1937:85). According to Manuel García Teijeiro (1970:56), **-ne-i̯-* stems were avoided in the proto-system because they would have been morphologically ambiguous, due to the existence of a suffix in **-i̯-* which was – just like the nasal infix – a marker of present action. So the scholar was compelled to find an explanation for the lack of reconstructable **-ne-r-*, **-ne-l-*, **-ne-m-*, **-ne-n-* stems which is totally different from that proposed by him for the lack

[4]Despite some attempts at finding historical reflexes of **-ne-i̯-* stems (Sandoz 1974; Praust 1998:121-135), the existence of this distributional gap remains generally accepted. Moreover, it is generally acknowledged that Lithuanian infixed stems derived from bases ending in *r, l, j, v* are later analogical formations (cf. Stang 1966:338).

of **-ne-i̯-* stems (see García Teijeiro 1970:51). According to Rasmussen (1990:194-195), infixed **-ne-i̯-* stems would have been replaced already in the proto-language by corresponding suffixed **-neH-* stems. The starting point of this process would have been represented by infixed stems derived from roots ending in *-Hi̯-*; these roots, since the sequence *-Hi̯-* undergoes metathesis in the zero grade, would have had a regular infixed stem ending in **-i-ne-H-*.

These explanations are unsatisfactory in that they abandon the aim of finding a comprehensive solution for the distributional gap problem.

4 Difficulties Related to Saussure's Hypothesis about the Origin of the Suffix **-neu̯-*

A third important issue concerns the hypotheses about PIE nasal present stems proposed by Ferdinand de Saussure in his *Mémoire* (1879:240-244). Saussure formulated two parallel hypotheses, the first about the origin of the suffix **-neH-* (in Saussure's notation **-neA-*) and the second about the origin of the suffix **-neu̯-*.

According to this explanation, the PIE suffix **-neH-* (cf. OInd. *-nā-*) originated from the reanalysis of infixed **-ne-H-* stems, i.e. of infixed stems derived from roots ending in *H*. Symmetrically the PIE suffix **-neu̯-* (cf. OInd. *-no-*) would have originated from the reanalysis of infixed **-ne-u̯-* stems, i.e. of infixed stems derived from roots ending in *u̯*.

This proposal had the advantage of giving a plausible reason for the existence of three PIE affixes (a nasal infix, a suffix **-neH-* and a suffix **-neu̯-*) which have similar forms and identical functions, a fact that could hardly be attributed to chance.

Nevertheless, the assumption of a symmetrical development of the two nasal suffixes is not supported by the historical data. Indeed, the two hypotheses in which Saussure's explanation is articulated are not equally corroborated. The first hypothesis, which concerns the origin of the suffix **-neH-*, is strongly corroborated by the fact that we have a large number of reconstructable infixed stems derived from roots ending in *H*, i.e. a large number of those kinds of stem from whose reanalysis the suffix **-neH-* must have originated.

By contrast, the second hypothesis, which concerns the origin of the suffix **-neu̯-*, lacks a similar corroboration. As we

will see in the next paragraph, there is no reconstructable infixed stem derived from a root ending in *u̯*. Moreover, later, in paragraph 8, we will point out another argument which prevents us from retaining Saussure's explanation.

5 Non-existence of PIE **ne-u̯-*infixed stems

The *LIV* contains only two reconstructed PIE **ne-u̯-*infixed stems with attested phonologically expected reflexes: **kl̥-ne-u̯-* (cf. OInd. *śr̥ṇóti* 'hear') and **gʰ₂-ne-u̯-* (cf. Gk. γάνυμαι 'be glad').[5] Both reconstructions are to be rejected.

The PIE nasal present stem of the root **ḱleu̯-* (*LIV* 334-335) represents one of the not so frequent cases in which reflexes of a PIE stem have been preserved in more than one language, so that the correspondent asterisked form can be considered as a true reconstruction and not as a mere transposition. Now, the attested comparanda point unequivocally to the reconstruction of a forerunner **ḱlu-neu̯-* and not †**kl̥-ne-u̯-*.[6]

Avestan has a present *surunaoiti* 'hear', whereas a forerunner †**kl̥-ne-u̯-* would have given the outcome **sərənaoiti*. Shughni, a modern Iranian language belonging to the group of the Pamiri languages, has preserved a stem *x̌in-* 'hear', which also can only be explained by starting from a PIE **ḱlu-neu̯-*; actually *x̌* is the regular outcome of a sequence *sr*, and a sequence *sr* is expected in a reflex of **ḱlu-neu̯-* (PIE **ḱl* > PIrn. **sr*), but not in a reflex of †**kl̥-neu̯-* (PIE *kl̥* > PIrn. **sər*). Old Irish has *-cluinethar* 'hear'. Now, from PIE. **kl̥neu̯-* we would expect **klinu-*, whereas *-cluinethar* must continue a form **kluni-*. The hypothesis (Thurneysen 1923) that **klinu-* became **kluni-* via metathesis of *i* and *u* is ad hoc. McCone (1991: 13) observes that in Proto-OIr the suffix **-nu-* was uncommon, while the morph **-ni-* was relatively common. He suggests that this fact may have induced the displacement of the two vowels, but he also proposes an explanation which dispenses with the metathesis (1991: 22): **-nu-* was replaced by **ni-* because uncommon, and **kli-* was replaced by **klu-* under the influence of pret. pass. **klu-to-*. But if we start from PIE **ḱluneu̯-*/**ḱlunu-* >

[5]Due to lack of space I will not discuss all the **-ne-u̯-* stems whose reconstruction has been proposed, but only those **-ne-u̯-* stems whose reconstruction has been accepted in the *LIV*. I hope to be able to publish a revised version of my doctoral dissertation shortly which will contain a discussion of the other cases too.

[6]I use the raised cross (†) to mark impossible forms.

**klunu-* and accept McCone's suggestion about the replacement of **-nu-* by **-ni-*, no further assumption is needed to explain the OIr form. Finally, if we accept Klaus T. Schmidt's proposal (1992:111-112), according to which TA and TB *käln-* 'resound' constitute a reflex of the PIE stem at issue, we can find in this form further support for the reconstruction of a PIE stem **kl̥u-neu̯-*; from *+*kl̥-ne-u̯-*, we would have had a primary sequence *ln*, which would have been assimilated to *ll*, whereas the lack of assimilation points to the original presence of a segment *u* between the two sounds, which is exactly what we have in **kl̥u-neu̯-*.[7]

It was Saussure's authoritativeness that induced several scholars to consider all the testimonies of the other languages as results of later analogical innovations (see *LIV* 334-335), and to reconstruct a PIE *+*kl̥-ne-u̯-* on the sole basis of OInd. *śr̥ṇóti*. An analogical innovation is a not unlikely phenomenon, but the co-occurrence of several not unlikely phenomena is a far less likely one, so that it would be difficult to understand why the spirit of the analogical change should have been as pitiless as a Greek Erinys precisely towards the reflexes of *+*kl̥-ne-u̯-*. On the other hand, among those who did not accept Saussure's interpretation of OInd. *śr̥ṇóti*, there are authoritative scholars such as Karl Brugmann (1913:326) and Antoine Meillet (1909).

If we were sure that PIE allowed infixation with roots ending in *u̯*, we could consider both the forms **kl̥u-neu̯-* and *+*kl̥-ne-u̯-* as possible and consider OInd. *śr̥ṇóti* as a reflex of the latter. Since, on the contrary, the set of the historical data points to the fact that PIE roots ending in *u̯* could *not* receive the infix, this form is to be explained in a different way. Among the possible explanations, it is worth mentioning that proposed by Osthoff (1881:215), according to which OInd. *śr̥ṇo-/ śr̥ṇu-* < **kl̥uneu̯-/*kl̥unu-* shows a loss of *u* analogous to the loss of *i* in *tr̥tī́ya-* 'third' < **trit(i)i̯o-*[8] (other explanations of OInd. *śr̥ṇóti*,

[7]It must be added that Baloochi *sunant* 'they hear', which could theoretically represent a reflex of a PIE **kl̥neu̯-*, is in fact an unreliable form in that it can – and, in my opinion, must – represent an Indo-Aryan loanword (Korn 2003). The forms Middle Persian *ā-šnūdan*, New Persian *šunūdan* 'hear', and Middle Parthian *ə-šnṓ* 'hear' (imperative) are not relevant to our problem because they are connected to PIE **ksneu̯-* and not to PIE **kleu̯-* (cf. *EWA* I, 441).

[8]Some scholars have maintained that Skt. *tr̥tī́ya-* constitutes the reflex of a PIE **tr̥t(i)i̯o-*, from a base **ter-* which can be reconstructed on the basis of forms like Hitt. *te-ri-i̯a-an-na-* 'third' (cf. *IEW* 1091). Although this base **ter-* can have

based on the assumption of analogical changes, were proposed by Meillet [1909] and Vittore Pisani [1930:140-141, n. 435]).

As for **gh₂neu̯-* (*LIV* 184), Gk. γάνυμαι may be connected to a root **geh₂-* rather than to a root **geh₂u̯-*. The existence of a base **geh₂-* is proven by the etymologically related Greek noun γάνος 'gladness, brightness' (neuter *-n-es-/-os-* stem)[9] Moreover, a *d*ʰ-extended variant **geH₂dʰ-* (*LIV* 184) of the root **geH₂-* can be found in Gk. γηθέω 'rejoice'. Therefore, the possible PIE etymon of Gk. γάνυμαι has to be analysed as **gH₂-neu̯-* and not as ***gH₂-ne-u̯-*.

We can, therefore, conclude that PIE **ḱlu-neu̯-* and **gH₂-neu̯-* are not *ne*-infixed but *neu̯*-suffixed stems.

Other infixed presents derived from roots ending in *u̯* referred to by the *LIV* are, in fact, **-ne-H-* stems derived from a root ending in *-Hu̯-* with laryngeal metathesis, and have, therefore, nothing to do with the problem of the origin of the suffix **-neu̯-*.

One more form has to be mentioned: Arm. *erdnowm* 'swear' from PIE **dʰreu̯-* (*LIV* 155). This verb, classified in the *LIV* among the infixed stems, points, in fact, to a PIE *neu̯*-suffixed stem **dʰru-neu̯-* (from an infixed stem **dʰr̥-ne-u̯-* we would have had PIE **-r̥-* > Arm. *-ar-*).[10]

Some scholars believed they could find instances of *ne-u̯-* infixed verbs by arguing that certain **-neu̯-* stems were derived not from a simple root but from the correspondent *u*-extended root variant (see, e.g., Strunk 1967: 61). Therefore, according to this approach, it would suffice to find a historical reflex of an *u*-extended variant of a root to claim that the correspondent **-neu̯-* stem is a *ne-u̯-*infixed one.

In this regard, we must remark that even if besides a root X there is a reconstructable *u*-extended variant X*u-*, a correspondent reconstructable stem X*neu̯-* can always be

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existed, Av. *θritiia-*, Lat. *tertius* (from **tr̥t-* we would have had **tort-*), Goth. *þridja* show that the PIE word which meant 'third' and ended in *-tio-* had the form **trit(i)io-* and not ***tr̥t(i)io-* (see also Emmerick 1992:178-179; OPrus. *tīrts* 'third' is reshaped under the influence of *kettwirts* 'fourth').

[9]Gk. γαίων 'exulting', whose segment *i* seems to point to an original sequence *u̯i*, Gk. γαῦρος 'proud', and Lat. *gaudeō* 'enjoy' can at any rate be considered as forms derived from an *u*-extended variant of the root **geH₂-*.

[10]An analogous case is represented by the nasal present stem of the root **ḱlei-*. This proto-form is classified in the *LIV* (332) among the infixed stems, but its reflexes (cf. Av. *-sirinaoiti*) point to a suffixed forerunner.

interpreted as a *neu̯*-suffixed stem derived from the non-extended variant of the root, rather than as a *ne-u̯*-infixed stem derived from the extended one. From a purely logical point of view, the only way to prove the connection between the reconstructability of a X*neu̯*- stem and that of a X*u̯*- root variant would be to demonstrate that the percentage of roots having a reconstuctable *-*neu̯*- stem is higher among the roots which have a reconstructable *u̯*-extended variant than among the whole of the PIE roots. Yet a similar demonstration has never even been attempted.

It remains to mention the fact that Hittite shows some pairs formed by an adjective in *-u-* and a correspondent *-nu-* factitive verb: e.g., *tepu-* 'little'; *tepnu-* 'make little'. According to some scholars (see, e.g., Oettinger 1979:164), *tepnu-* would be an infixed stem built on *tepu-*. In fact, there is no etymological relationship between the segment *-u-* of the adjectives and the segment *-u-* contained in the verbal suffix *-nu-*, as is made clear by the fact that adjectives in *-i-* also have correspondent *-nu-* factitives: e.g., *daluki-* 'long'; *daluganu-* 'make long'. If factitive stems had been formed by means of infixation, from an adjective in *-i-* we would have had a verb in *-n-i-*. Moreover, PIE infixation applied to simple roots, whereas forms like *tepu-* are adjectival stems in which *-u-* constitutes a suffix, not a part of the root. Hittite factitives in *-nu-* are, therefore, suffixed forms.[11]

6 The Synchronic Rule

Now that we have established that comparative data do not allow us to reconstruct infixed stems derived from roots ending in *u̯*, we have a new definition of the distributional gap; there are no infixed stems derived from roots ending in *j, w, l, r, n, m.*

If we classify the roots according to the degree of sonority of their last segments, we will notice that all the roots ending in a segment whose degree of sonority is lower than that of */n/ are able to receive the infix, whereas all the roots ending in a segment whose degree of sonority is higher or equal to that of

[11]The *LIV* (132-133) correctly interprets *tepnu-* as directly derived from the root (*$d^{h}eb^{h}$- +*-neu̯-). On the other hand, we could also imagine that some *-nu-* verbs, which were originally primary derivates, were reanalysed in Hittite as deadjectival verbs derived from an adjective stem in *-i-* or in *-u-*; this reanalysis can have created a new synchronic rule according to which factitive verbs could be derived from an adjective in *-i-* or in *-u-* by means of deletion of the last vowel of the adjectival stem and addition of the suffix *-nu-*. This hypothesis could explain the existence of several verb-adjective pairs.

*/n/ are not.

It is clear that this circumstance must be connected with the fact that the infixation process at issue concerns an infix **-ne-/-n-*, i.e. an infix which contains the protophoneme */n/. If we recall that roots ending in a sonorant, such as * *ḱleu̯-*, although not being able to receive the infix, were able to form a nasal present stem by means of the affixation of a nasal suffix like **-neu̯-* (cf. Av. *-sirinaoiti* 'lean' < PIE * *ḱli-neu̯-*), we can formulate the following synchronic PIE infixation rule:

> The roots whose last segment had a degree of sonority which was lower than that of */n/ (i.e. roots ending in an obstruent) formed their nasal present by inserting the nasal infix.
>
> The roots whose last segment had a degree of sonority which was higher or equal to that of */n/ (i.e. roots ending in a sonorant) formed their nasal present by attaching a nasal suffix.

Thus, infixation and suffixation were originally in complementary distribution: from a root ending in an obstruent like **leu̯kʷ-*we have an infixed stem like **li-ne-kʷ-* (*LIV* 407; cf. OInd. *riṇákti* 'leave'), whereas from a root ending in a sonorant like **ḱleu̯-*we have a suffixed stem like **ḱli-neu̯-* (cf. Av. *-sirinaoiti* 'lean').

7 Metathetical Origin of the Infix

The synchronic rule we have defined sheds light on the problem of the origin of the nasal infix. Studies in morphophonology have shown that metathetical phenomena are a triggering factor of infixation (Ultan 1975:178-179; Moravcsik 2000:549-550); studies in phonology have shown that prosodic and phonotactic constraints related to segments' degree of sonority are a major triggering factor of metathesis (Vennemann 1988:40).

Thus, on the one hand, we have these two typological data, and, on the other hand, we have an infixation process whose distribution is governed by the degree of sonority of root-final segments; this cannot be due to chance.

It is, therefore, to be assumed that the PIE nasal infix originated from the metathesis of a suffix; when the degree of sonority of the last segment of the root was lower than that of */n/, then the suffix underwent metathesis in order to satisfy

syllable structure constraints.

In comparison with the reanalysis hypothesis, this explanation has two main advantages: it explains the distributional gap; it postulates crosslinguistically known phenomena, such as infixation originating from metathesis and metathesis caused by syllable structure constraints.

That PIE nasal infixation could have originated from a metathetical process is not a new idea; the first scholar who proposed it – Franz Bopp (cf. Kuiper 1937:9) – also happened to be the first Indo-Europeanist. Kuiper's authoritativeness caused the misfortune of this hypothesis in the last century. On the other hand, even those scholars who maintained the metathetical origin of PIE nasal infixation, amongst whom is Rasmussen (1990:194), were unable to identify the conditions for infixation to occur because of the erroneous assumption that roots ending in *u̯* could receive the infix.

The metathetical phenomenon we have to postulate can be described by imagining a hypothetical nasal-suffixed stem derived from a root ending in an obstruent such as **leiu̯k^{w}-*.

In this case, we would have a form like **lik^{w}n(e)-*; according to the PIE syllabification rules, a 3pl. injunctive **lik^{w}-n-ent* would have received a syllabification **lik^{w}.nent*, containing a Syllable Contact *k^{w}.n* with increasing sonority, which would have represented a violation of the Syllable Contact Law (Vennemann 1988:40). An analogous case of morphophonological metathesis involving sequences containing an obstruent followed by a nasal can be found in Sidamo, a Cushitic language of Ethiopia (Moreno 1940:58-60; Vennemann 1988:55).

We may assume that the infix originated in the 3pl. and subsequently spread by means of analogy to the other forms of the paradigm. On the other hand, if we are willing to allow the possibility of a metathetic displacement of a CV sequence, we could think that also, e.g., a 3sg. injunctive **lik^{w}-ne-t* can have been changed into **li-ne-k^{w}-t* in order to avoid the syllabification **lik^{w}.net* Infixations involving the metathesis of a CV sequence are not theoretically impossible. Kashaya, a Pomoan language of northern California, has a suffix *-ta-*, a verb marker of a plural action, which, in order to satisfy particular phonotactic constraints, can move before the last segment of the base and become an infix (Buckley 2000).

On the other hand, it would be difficult to give a definitive

reconstruction of the inflectional paradigm of nasal present stems with regard to the period preceding the metathesis, not to mention the fact that it would be thinkable that, at the moment when the nasal affixation process was created, the phonotactic constraints which triggered infixation were already operating, so that the non-metathesized form can have been nothing more than an underlying form. A non-metathesized 3sg. **lik^{w}net* would seem an oddity within the PIE morphological system; a stem ending in a vowel should belong to the thematic inflectional class, whereas the comparison of the Indo-Iranian and Anatolian data points to an original athematic inflection of the infixed presents. On the other hand, it would be impossible to prove that such a form cannot have existed at a pre-Proto-Indo-European stage, at a time when the distinction between thematic and athematic inflection might not have yet been established as we know it (see, e.g., Kuryłowicz 1964:116).

It remains to consider the structural status of the metathesis. The fact that PIE possessed forms containing non-metathesized sequences obstruent + sonorant at syllable boundary (e.g. PIE **su̯opno-*, cf. Lat. *somnus*, OInd. *svápna-* [*IEW* 1048]) points to a morpho-phonological status of the phenomenon.

By no means does this constitute a difficulty; other infixation processes are known, which, although triggered by phonotactic or prosodic preferences, only occur with specific morphemes. Thus, for instance, according to the explanation given by McCarthy and Prince (1986), the Tagalog *-um-* infixation process can be seen as a means of avoiding a closed syllable; therefore, we have the infixed stem *b-um-ili* and not the prefixed stem $^{+}$*um-bili*, since the latter would have contained an initial closed syllable. Nevertheless, this kind of infixation does not occur with other affixes, and therefore the affix *ipang-* can be prefixed even to bases beginning with a consonant. In Optimality-Theoretic studies, the problem represented by differences in behavior between different affixes is overcome by assuming that alignment contraints can be morpheme-specific (Kager 1999:119).[12]

[12]The advantage of suffixation is that infixation involves a violation of an alignment constraint (the right edge of a suffix must match the right edge of the stem, and the left edge of a prefix must match the left edge of the stem); an alignment constraint can be violated to avoid violations of constraints

It must be added that the fact that the Sonority Sequencing Principle is always respected within PIE roots, which regularly present an increasing sonority from the first segment to the apophonic vowel and a decreasing sonority from there to the last segment (except for debated issues about laryngeals), shows that the proto-system was highly sensitive to sonority-related constraints.

It has, moreover, to be considered that nasal present stems could originally indicate a particular aspect or *Aktionsart* and that, as has been shown by Joan Bybee, the degree of fusion of a grammatical morpheme can be related to its function; in particular, morphemes marking aspectual categories crosslinguistically show a high degree of fusion: "Aspect conditions changes in the verb stem more frequently than any other inflectional category" (Bybee 1985:36). This can explain why the preference for morphological transparency may have hindered the metathesis of the nasal in, e.g., **su̯opno-* but not in the nasal verbal stems, characterized by a high degree of fusion.

On the other hand, sporadic instances of nasal metathesis seem to be reconstructable even outside the nasal present class. Well-known forms like Lat. *unda* 'wave' and Lith. *vanduõ* 'water', OPrus. *wundan* 'water', derived from the base **u̯ed-* (*IEW* 79), or Lat. *fundus* 'bottom', MIr. *bond* 'sole of foot', Gk. πύνδαξ 'bottom', derived from the base **bʰudʰ-* (*IEW* 174), seem to testify in favor of the possibility of PIE metatheses involving nasal segments belonging to nominal suffixes.

At this point, it should be stressed that the development imagined here is able to give a satisfactory answer to all the three major questions we mentioned in the paragraphs 1-3. The problem of the unacceptability of the traditional hypothesis about how PIE infixation originated is overcome because the reanalysis hypothesis is rejected in favour of the metathesis hypothesis. The problem concerning the lack of a comprehensive definition of the distributional gap is solved by means of the observation that this gap was determined by the

related to syllable structure, but this violation is possible only if the syllable structure constraint is higher-ranked than the alignment constraint. Therefore, if, in opposition to the PIE verbal nasal affix, the PIE nominal affix **-no-* does not trigger infixation, we can assume that the relevant syllable structure constraint is higher-ranked than the alignment constraint concerning the verbal affix, but is lower-ranked than the alignment constraint concerning the nominal affix. (ALIGN-[nominal nasal affix]-RIGHT >> SYLLABIC WELL-FORMEDNESS CONSTRAINT >> ALIGN-[verbal nasal affix]-RIGHT.)

degree of sonority of the root-final segments, according to the rule we have formulated in the previous paragraph. The problem of the lack of corroboration supporting Saussure's hypothesis about the origin of the suffix *-*neu̯*-, i.e. the absence of a number of reconstructable *ne-u̯*-infixed stems comparable with that of reconstructable *ne-H*-infixed ones, is obviously overcome by our statement that *ne-u̯*-infixed verbs did not exist at all and that Saussure's hypothesis about the suffix *- *neu̯*- is to be rejected.

On the other hand, as regards the last mentioned issue, it remains to be investigated whether it is possible to find an explanation about the origin of the suffix *-*neu̯*- which may possess the same advantage as Saussure's, i.e. that of accounting for the relationship between this suffix and the nasal infix, and which, at the same time, may match the comparative data.

8 The Suffix *-*neu̯*-: Distribution and origin

In paragraph 5. we argued that due to the absence of historical data pointing to the reconstruction of *ne-u̯*-infixed stems, Saussure's hypothesis about *-*neu̯*- is untenable. Now, we will see that there is an additional argument in favor of its rejection. Recently, the publication of the *LIV* has provided us with a comprehensive set of data about PIE verb stems. Whereas roots ending in a sonorant or glide represent only 15.65% of the total number of PIE reconstructed verbal roots, the *-*neu̯*- stems derived from a root ending in a sonorant or glide represent 57.69% of the total number of PIE reconstructed *-*neu̯*- stems (data from the *LIV*).

These data establish a connection between the distribution of *-*neu̯*- and the value of the feature [sonorant] of root-final segments. It is clear that if the distribution of the suffix had not been conditioned by the features of root-final segments, the proportion of reconstructable *-*neu̯*- stems derived from roots ending in a sonorant would have been similar to the proportion of reconstructable verbal roots ending in a sonorant. By contrast, the number of *-*neu̯*- stems derived from roots ending in a sonorant is surprisingly higher than expected.

To make clear how much higher this value is in comparison to the expected one, we can compare the observed and expected data in the following contingency table (the numbers written in italics represent the expected values).

roots	ending in a sonorant	ending in an obstruent	total
with *-*neu̯*- stem	*8.14* 30	*43.86* 22	52
without *-*neu̯*- stem	*176.86* 155	*953.14* 975	1130
total	185	997	1182

Now, the chi-square test gives us the probability that data like those we actually observe could be observed in case the possibility of adding the suffix *-*neu̯*- to a base had not been influenced at any stage of the history of the proto-language by the value of the feature [+son] of the last segmental phoneme of that base. Therefore, if we assume that at a certain PIE stage the distribution of the suffix *-*neu̯*- must have been determined by that feature value, the chi-square test will give us the probability of the hypothesis which is contradictory to ours. The contingency table shown above[13] gives $\chi^2 > 10.83$, which corresponds to a probability value lower than 0.001 (cf. Fisher and Yates 1953).

It is now clear that, since accepting Saussure's hypothesis about the suffix *-*neu̯*- would make it difficult to explain the relationship between the distribution of this suffix and the feature [son] of root-final phonemes, we must conclude that Saussure's hypothesis has a very slight probability of being correct.

The data shown above are only explainable by means of the assumption that, at a certain stage of the PIE evolution, the suffix *-*neu̯*- was restricted to roots ending in a sonorant.

Now, as has been shown in the previous paragraphs, the nasal infix was originally restricted to roots ending in an obstruent. It is obvious that the two restrictions must be related to each other. What, therefore, is the relationship between the suffix *-*neu̯*- and the nasal infix? It seems likely that at a certain PIE stage an original allomorphy, which involved infixation or suffixation of the same nasal affix, was replaced by a new

[13]We can use the formula $\chi^2 = (N(|AD - BC| - N/2)^2) / ((A+B)(C+D)(A+C)(B+D)) = (1182 \times (|30 \times 975 - 22 \times 155| - 1182 / 2)^2) / ((30+22) \times (155+975) \times (30+155) \times (22+975))$.

allomorphy between the infix *-*ne*- and the suffix *-*neu̯*-. In other words, the new suffix *-*neu̯*- replaced the simple nasal affix only when it was used as a suffix and not when it was used as an infix.

Since we have 57.65% of *-*neu̯*- verbs from roots ending in a sonorant and not 100%, as would be expected on the basis of our hypothesis, we must imagine that, at a subsequent stage, the suffix began spreading to roots ending in an obstruent. Such a development would be easily understandable; suffixation is less marked than infixation, so it is likely that the suffixed allomorph began spreading at the expense of the infixed one.

This process must have gone on in the history of the descendant languages. The Indo-Iranian branch shows a nasal present derived from the PIE root *H₂nek̑*- (*LIV* 282-283), which is formed by means of the suffixation of *-*neu̯*- (OInd. *aśnóti*, Av. *ašnaoiti* 'attain'), but Lat. *nancīō*, *nancāscor* 'attain' still contain the reflex of the original infixed stem; in the case of **H₂eld*ʰ- (*LIV* 262-263), only the *Rig Veda* still preserves the infixed stem *ṛṇadh-* 'thrive', which is replaced early in Old Indic by *ṛdhnó-*.

It remains to say something about the reason why the allomorph *-*neu̯*- replaced the simple nasal affix, and how it originated. I think that it is possible that this suffix was formed by adding the athematic present suffix *-*u*- (class 1e in the *LIV* [15-16]) to the nasal affix *-*ne*-. This hypothesis is essentially identical to that proposed by Brugmann in the first edition of his *Grundriss* (1892:968).

The addition of the suffix *-*u*- can be viewed as an instance of templatic morphology. Since roots ending in an obstruent represented the greater part, the greater part of nasal stems were infixed stems and were, therefore, characterized by the presence of a VC structure at the right edge. By means of the creation of the suffix *-*neu̯*- the VC structure at the right edge of the strong stem was extended to the entire class of nasal present stems: **linek̑*^{w}-; **klineu̯*-.[14]

In other words, the suffix *-*u*-, a present marker, must have been attached, among the class of nasal present stems, only to the stems in which its presence was needed to create a VC

[14]The segment -*u*- in *-*neu̯*- is an off-glide and can, therefore, be described as consonantal.

structure at the right edge, i.e. only to the suffixed stems.[15] In this framework it would be easy to explain why just this suffix, and not others, acquired this function. In order to generalize the VC edge, a morph was needed containing a single consonant and selecting the athematic inflectional class. Among the present suffixes referred to in the *LIV*, the only one that has both these features is **-u-*.

According to the hypotheses we have proposed we can imagine three PIE stages:

- Stage 1: the same affix can occur either as a suffix or as an infix: **li-ne-k^{w}-/*kli-ne-*.
- Stage 2: the simple nasal suffix is replaced by **-neu-* to generalize the VC template at the right edge of the stem: **li-ne-k^{w}-/*kli-neu-*.
- Stage 3: the suffix **-neu-* begins spreading to roots ending in an obstruent.

It remains to consider the case of historically attested thematic present stems which contain a nasal suffix and derive from roots ending in a sonorant, e.g. Lat. *linō* 'besmear', from PIE **H$_2$leiH-* (cf. Schrijver 1991:408). In the *LIV* these verbs are considered as thematizations of original *neH*-suffixed or *ne-H*-infixed stems.[16] However, if we are willing to allow that PIE thematizations of nasal presents were possible, we can think that these verbs resulted directly from the thematization of stems containing the simple nasal suffix.

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[15]That, in the formation of nasal present stems, the present marker **-u-* might have been used for a purely morphoprosodical function is not odd. *Mutatis mutandis* a phenomenon similar to that which we are proposing for PIE occurred in Italian, where the reflex of the PIE present suffix **-ske/o-* acquired a purely morphoprosodical function. In the inflectional sub-class of the *-ire* verbs consituted by the type *finire* micro-class, this reflex appears only in those present forms in which its presence is needed to assure that stress position remains unchanged across the whole inflectional paradigm (Italian /fi'nisko/ 'I finish', /fi'nite/ 'you (pl.) finish').

[16]In the latter case, the correspondent root is reconstructed in the *LIV* as ending in a laryngeal, e.g., Lat. *linō* is connected to a PIE **H$_2$leiH-* in the *LIV* (277), but to a PIE **H$_2$lei-* in Schrijver 1991:408 (cf. the short *i* of Lat. *litus*). Other possible instances of these kinds of stem are Lith. *šlinù* 'lean' (from PIE ** ĺei-*; see *LIV* 332) and two Latin verbs: *cernō* 'decide' (< **kri-nō*), if derived from a base **krei-* (Schrijver 1991:407-408; cf. Lat. *certus* < **kri-t-*), and *sinō* 'let', if derived from a base **sei-* (Schrijver 1991:408) or **ŝei-* (*LIV* 643).

9 A Corollary about PIE Laryngeals

Saussure's hypothesis about the suffix **-neH-* is still valid. A quick look at the *LIV* is sufficient to see that PIE reconstructable *ne-H*-infixed stems do exist. Most of these are **-ne-H$_2$* stems; therefore, in a trilaryngealistic framework, the reanalysis process proposed by Saussure is more likely to have involved original *ne-H$_2$*-infixed stems and to have created a suffix **-neH$_2$-*. This assumption seems to be corroborated by the Greek evidence, because Greek has *-nā-* stems but no *-nē-* or *-nō-* stems: possible *-nē-* or *-nō-* stems representing phonetic reflexes of PIE infixed **-ne-H$_1$-* and **-ne-H$_3$-* stems were eliminated and replaced by correspondent *-nū-* (← **-neu̯-*) stems because of their rareness. If Greek had inherited a suffix **-neH$_1$-* or a suffix **-neH$_3$-*, stems ending in *-nē-* or in *-nō-* would not have been so rare and their elimination would be more difficult to understand. Therefore, instead of leaving the laryngeal undetermined, I would prefer to reconstruct a PIE suffix **-neH$_2$-*.

A noteworthy corollary both of the rule we have defined above and of the existence of PIE *ne-H*-infixed stems concerns the degree of constriction of the so-called PIE laryngeal segments. The subject, which used to be among the most debated ones in the second and third quarter of the 20th century, has recently returned to the spotlight. The assumption that PIE laryngeals were vocalic segments has been defended in Reynolds et al. (2000), a paper which, in my opinion, deserves attention because it succeeds in showing that some of the arguments traditionally invoked in favor of the hypothesis that laryngeals were fricatives are, in fact, not particularly cogent.

However, a stringent argument in favor of the traditional view, according to which PIE laryngeals were fricative segments, is provided by the PIE nasal infixation rule. The implication is self-evident: only roots ending in an obstruent could receive the infix; roots ending in a laryngeal could receive the infix; laryngeals were obstruents.

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Paolo Milizia
pmilzia@tiscalinet.it

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