

A Phonology–Morphosyntax Interface Explanation of the “Nasal Infix” in (Proto-)Indo-European

INTRODUCTION: In the verb system reconstructed for Proto-Indo-European (PIE), a root is inherently telic (“Aorist”) or atelic (“Present”) (Lundquist and Yates 2018). Verb stems of the opposite category can be derived through affixation. For example, the atelic root $\sqrt{\text{dejk}^j}$ ‘point out’ (1a) has a morphologically unmarked Present stem, and derives a marked Aorist stem through suffixation of /-s/ and lengthening of the root vowel. Conversely, the telic root $\sqrt{\text{werh}_1}$ ‘say’ (1b) has an unmarked Aorist stem and derives a Present stem through suffixation of /-je/. (All PIE forms are reconstructed and transcribed in IPA.)

(1)	Root	Present stem	Aorist stem
a.	Atelic root: $\sqrt{\text{dejk}^j}$ ‘point out’	/dejk ^j -/ (simplex)	/d ^é :jk ^j -s-/ (derived)
b.	Telic root: $\sqrt{\text{werh}_1}$ ‘say’	/wér(h ₁)-je-/ (derived)	/werh ₁ -/ (simplex)

While the /-s/ suffix is perhaps the only securely-reconstructible Aorist stem-building morpheme, there are many more reconstructible Present stem-building strategies, such as in (2). Standing out among these Present-forming affixes is the so-called “nasal infix” *-né- (2e), which is the only infix reconstructible for all of Indo-European. While the reduplicated present (2d) also stands out as the only prefix, prefixal reduplication is independently reconstructible elsewhere in the verb system (Lundquist and Yates 2018).

(2)	Present-forming affix	Telic root	Derived Present stem
a.	/-je/	$\sqrt{\text{werh}_1}$ ‘say’	wér(h ₁)-je-ti ‘say-PRS-3SG’
b.	/-sk ^j é/	$\sqrt{\text{g}^w\text{em}}$ ‘step’	g ^w ṃ-sk ^j é-ti ‘walk-PRS-3SG’
c.	/-éje/	$\sqrt{\text{sed}}$ ‘sit’	sod-éje-ti ‘set.down-PRS-3SG’
d.	/RED-/	$\sqrt{\text{deh}_3}$ ‘give’	d ^é -deh ₃ -ti ‘PRS-give-3SG’
e.	/-né-/	$\sqrt{\text{jewg}}$ ‘yoke’	ju(né)k-ti ‘yoke(PRS)-3SG’

In this paper, we develop an explanation for the unique infixing behavior of PIE *-né- following Zukoff 2023’s analysis of infixation, which relates morphophonological alignment to morphosyntactic structure. We argue that while the other Present-forming affixes are Aspect heads, *-né- (at least originally) indicated causative semantics and belonged to the verbalizing category *v* (Kratzer 1996). Given the appropriate theory of the phonology–morphology interface, this structural distinction can explain *-né-’s distinct ordering behavior.

ANALYSIS OF INFIXATION: We model the ordering facts using alignment constraints (McCarthy and Prince 1993) of the type schematized in (3), following Zukoff 2023’s analysis of prefix–infix alternations in Arabic.

- (3) **Definition.** ALIGN-*x*-R: Assign a violation for each segment between the right edge of the word and the right edge of the morpheme that expones *x*.

The infix–suffix distinction can be captured via two different alignment rankings with respect to the root (assuming all alignment constraints are right-oriented and outrank CNTG-ROOT (5)): a suffixal morpheme’s alignment constraint *outranks* the root’s (4a); whilst an infixal morpheme’s alignment constraint *ranks below* the root’s (4b). In this framework, the ordering of suffixes is derived from the ranking of their alignment constraints, with higher-ranked alignment constraints corresponding to suffixes nearer to the right edge.

- (4) a. **Suffix.** ALIGN-*x*-R \gg ALIGN-ROOT-R b. **Infix.** ALIGN-ROOT-R \gg ALIGN-*x*-R

- (5) **Definition.** CONTIGUITY-ROOT: Assign a violation for each string that intervenes inside of the Root.

Using these ranking schema as a model, we can use the ranking in (6) to derive the infixal behavior of *-né- in (7) alongside the suffixal behavior of *-sk^jé in (8) (and the other aspect markers). (/j(e)ug/, /pr(e)k^j/ = Roots, /t/ = Agr, and /i/ = T; candidates display regular voicing assimilation and sonorant syllabification.)

- (6) **Ranking.** ALIGN-T-R \gg ALIGN-AGR-R \gg ALIGN-sk^jé-R \gg ALIGN-ROOT-R \gg ALIGN-né-R \gg CNTG-ROOT

(7)	/jug, né, t, i/	ALIGN-T-R	ALIGN-AGR-R	ALIGN-ROOT-R	ALIGN-né-R	CNTG-ROOT
a.	juk-t-i-né	*!*	***	****		
b.	juk-t-né-j		**!*	****	*	
c.	jug-né-t-i		*	***!*	**	
d.	ju(né)k-t-i		*	**	***	*
e.	i(né)wk-t-i		*	**	****!	*
f.	né-juk-t-i		*	**	****!*	

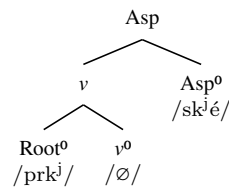
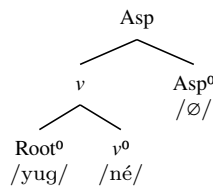
(8)	/prk ^j , sk ^j é, t, i/	ALIGN-T-R	ALIGN-AGR-R	ALIGN-sk ^j é-R	ALIGN-ROOT-R	CNTG-ROOT
a.	prk ^j -t-i-sk ^j é	*!*	****		****	
b.	prk ^j -t-sk ^j é-j		**!*	*	****	
c.	prk ^j -sk ^j é-t-i		*	**	****	
d.	pr(sk ^j é)k ^j -t-i		*	***!	**	*
e.	p(sk ^j é)rk ^j -t-i		*	***!*	**	*
f.	sk ^j é-prk ^j -t-i		*	****!*	**	

RELATIONSHIP BETWEEN ORDERING AND STRUCTURE: Zukoff 2023 connects the alignment analysis of Arabic’s prefix–infix alternations to independently identifiable distinctions in morphosyntactic structure, via the “Mirror Alignment Principle” (MAP) in (9). Zukoff’s analysis is as follows (alignment is left-oriented in Arabic). The second head to combine with Root asymmetrically c-commands Root, so its alignment constraint will outrank ALIGN-ROOT via the MAP; these structures result in prefixation. But the first head to combine with Root *does not* asymmetrically c-command it. This means that MAP does not posit a ranking, allowing for a default preference for higher ranking of ALIGN-ROOT to kick in, resulting in infixation.

(9) **Mirror Alignment Principle.** If a terminal node α asymmetrically c-commands a terminal node β , then the alignment constraint referencing α dominates the alignment constraint referencing β .

Applying the same reasoning to the PIE suffix–infix alternation, we generate the structures in (10). *-né- must be the first head to combine with Root, generating infixation (10a); *-sk^jé (and the other suffixal morphemes) must be the second head to combine with Root, generating suffixation (10b). The distinct structures for *-né- and *-sk^jé are only sensible if the two morphemes belong to different categories. As such, we treat *-sk^jé (and the other suffixal morphemes) as true Aspect heads, but identify *-né- with the verbalizing category v .

- (10) a. PIE ju(né)k-t-i (> Sanskrit *yunákti*)
‘yoke(NE)-3SG-PRS’
- b. PIE prk^j-sk^jé-t-i (> Sanskrit *prcchāti*)
‘ask-SKÉ-3SG-PRS’



EVIDENCE FOR NÉ AS v : We argue that *-né-, uniquely amongst the Present stem-building morphemes, is associated with causativity/transitivization (Meiser 1993, Yates 2015:169–74). While not apparent in every attested case, it is clearly continued in Anatolian, e.g. Hittite \sqrt{hark} ‘die’ \Rightarrow *har*(*ni*(*n*))*k* ‘destroy’, and detectable in other IE languages, e.g. PIE $\sqrt{pleh_1}$ (> Greek *plē-to* ‘became full’) \Rightarrow PIE /p_l(né)h₁-/ ‘fill’ (> Vedic *prnā-ti* ‘fills’). Hence, the infix differs from other Present-forming affixes like -sk^jé, which seem to affect aspect but not argument structure.

CONCLUSION: Under our analysis, -né- is of category v , which derives its unique infixing behavior. This further predicts that, since -né- is not of category Aspect, it should be able to cooccur with other overt Aspect markers. In fact, this pattern is observed in Hittite, where the imperfective suffix -ške (< PIE -sk^jé) can be added to nasal-infixed verbal stems, e.g., Hitt. *har*(*ni*(*n*))*k*-iške- ‘destroy-IPFV’. We suggest that Hittite is archaic in this respect, and that the Present-stem forming function of the nasal-infix observed in the other IE languages is the result of a later innovation, its integration into the Present–Aorist aspectual opposition.