Language Arts 2 | 2016 | VERSION 2016-03-11 OPEN ACCESS Freely available online

Proto-Indo-European Verb Morphology. Part 1. Inflection

Roland A. Pooth*

FIU Cologne, University of Cologne‡, Leiden University‡, Max Planck Institute for the Science of Human History◊

Abstract: This article provides an overview of Proto-Indo-European verb morphology.
Keywords: Reconstruction of morphology, PIE verbal morphology, PIE aspect system, PIE grammar

**Citation: Pooth, R. A. (2016): "Proto-Indo-European Verb Morphology. Part 1. Inflection", Language Arts 2, issue version 2016-03-11, author manuscript version 2016-03-11

Editor: Dr. Roland A. Pooth, Merheimer Str. 117, D 50733 Cologne (Nippes), Western Germany

Written: Winter 2015/2016; **published** online at https://leidenuniv.academia.edu/RolandPooth, 2016-03-11

***E-mail:** roland.pooth@gmx.de

Language Arts is an open-access freesheet for linguistic arts, pre-publication, DIY publication, and post-publication amendment. It is edited by the FIU Cologne (cf. J. Beuys 1978: "Aufruf zur Alternative", Frankfurter Rundschau, Dec. 23; J. Beuys & H. Böll 1973: "Manifesto on the foundation of a 'Free International School for Creativity and Interdisciplinary Research'", in: C.M. Joachimides & N. Rosenthal (eds.) 1974: Art into Society, Society into Art: Seven German Artists [...]. Institute of Contemporary Arts, London, pp. 49ff., reprinted in: J. Beuys 1993 (C. Kuoni, ed.): Joseph Beuys in America: Energy Plan for the Western Man. Four Walls Eight Windows, pp. 149ff.), cf. https://sites.google.com/site/socialsculptureusa/freeinternationaluniversitymanifesto. The FIU logo is given here as a citation. Language Arts is published under the Creative Commons Attribution 4.0 Licence (CC BY 4.0) explicitly for post-publication amendment and supplementary correction of author manuscripts. Language Arts issues are constantly corrected. A fresh PDF version will be generated in due course. Language Arts reviewing is accomplished by means of a continuous correction process: Everybody is invited to send their comments and reviews to the editor's e-mail address. They will be attached to the fresh PDF version. Language Arts articles can be cited with reference to the issue version and the version of the author mansucript as suggested above.** Language Arts has no responsibility for the persistence or accuracy of URLs for external or third-party Internet websites referred to in this publication. The sole responsibility for the article's form and contents remains with the author. The reader should take care to download the latest Language Arts issue version from https://leidenuniv.academia.edu/RolandPooth. Language Arts is also available by e-mail.*

1 Introduction

These introductory remarks are partly identical to the ones of two foregoing articles.[1] The reader is recommended to compare the templatic analysis of PIE[2] nominal morphology to the one provided here. The linguistic reconstruction of PIE verb forms, stem formation patterns and morphosyntactic rules, as it is presented here, is based on the most archaic IE verb forms and stem formation patterns. It is predominantly grounded on the IE athematic verb stems, first of all on the patterning of the IE athematic root formations such as Vedic 3sg aor. ind. act. *ágan* 'came, went', 3sg pres. *hánti* 'slays, kills' :: Hittite 3sg pres. ind. act. *ku-e-en-zi* (OS) 'id.', etc. Likewise, however, several isolated archaisms are phonologically mapped onto PIE by undoing the respective sound laws. A form generated this way is called a phonological *Transponat* in German. I will use the convenient German term here. A phonological *Transponat* is indicated by T, e.g. ^{T}*μeu̯órti*, cf. Vedic 3sg aor. ind. mid. *ávavarti* 'returned' (RV 2.38.6a).[3] As a methodological obligation, the linguistic reconstruction of PIE verb morphology must further generally be based on comparative IE equation formulas. A comparative equation formula is indicated by Ɛ here, e.g. ^{Ɛ}*μéĝʰo/e-* imperfective stem 'to move, float'. Based on a prime axiom of comparative philology, comparative equation formulas like this are conventionally interpreted as PIE word forms. However, recall[4] that many traditional interpretations of equation formulas as PIE word forms suffer from the lack of diachronic linguistic plausibility. Recall that we have to be more skeptical about the traditional analysis because a good deal of the equation formulas, like ^{Ɛ}*μéĝʰo/e-*, are solely grounded on the IE PRODUCTIVE thematic word formation patterns, cf. Vedic pres. *váha-*^{ti} 'to move' :: Latin *uehit* (*uehere*) 'id.' :: Proto-Germanic inf. **weɣana*^{n} 'id.', etc.[5] Verb stems belonging to IE productive stem formation patterns, however, are principally prone to be innovative in a particular respect, which is to say that they may well be result of a formal or functional morphotactic or morphosyntactic innovation. Recall that equation formulas like ^{Ɛ}*μéĝʰo/e-* are thus prone to represent common IE SECONDARY EQUATIONS, such as result from a parallel but

‡ Alumnus: Dr. (2014) in Comparative Linguistics, Leiden University; M.A. in Historical-Comparative Linguistics, General Linguistics, Philosophy, University of Cologne. ◊ IE Lexical Cognacy Database (IELex) 2, Data Entry Group (supervised by P. Heggarty), 09-2015 - 02-2016.

[1] Cf. Pooth 2015a, 2015b.

[2] Abbreviations: act. = active; adj. = adjective; agt. = agentive-active; aor. = aorist (perfective) stem; Gk. = Greek; Hitt. = Hittite; IE = Indo-European; in. = inanimate; ind. = indicative; inf. = infinitive; Lat. = Latin; m. = masculine; mid. = middle; OCS = Old Church Slavonic; OHG = Old High German; OS = old script; PG = Proto-Germanic; PIE = Proto-Indo-European; plt. = plurative; pres. = so-called "present", that is, imperfective stem; redup. = reduplicated or reduplication; Ved. = Vedic, etc.

[3] The term *transponatum* (™), used in my article on PIE nominal morphology (cf. Pooth 2015b), is no longer used here.

[4] Pooth 2015b.

[5] This holds for all thematic (*-o/e-*) stems reconstructed by the *LIV*, cf. Meillet 1931, Pooth 2014b: chapters 7-8.

relatively independent formal and functional emergence, presumably in close areal dialectal contact.[6] For this reason, many traditional equation formulas are no longer automatically interpreted as belonging to the PIE verb inflection here. Again it is explicitly claimed that, before being acceptable as a potentially real and realistic PIE verb form, the given equation formula must undergo an additional methodological procedure, as it must necessarily be result of the method of INTERNAL RECONSTRUCTION,[7] that is, the equation formula must first be diachronically analyzed, interpreted, and identified as matching the most archaic PIE word formation patterns from the perspective of internally reconstructable PIE to IE morphosyntactic rules and tendencies. If necessary, an equation formula must be modified and formally retransformed to match the older and most archaic pattern, if the respective PIE pattern was evidently different and if this older pattern is evidently reconstructable. As outlined in my preceding articles, I will refrain from any automatic backprojection of SECONDARY equation formulas to avoid a diachronic misinterpretation of productive IE word formation patterns. It is necessary at this point of reasoning within a proper linguistic reconstruction to sharply distinguish between PRIMARY, more reliable equation formulas (such as *ᵍ̑ḱe̯i̯o(i)* 'lies'), versus SECONDARY, less reliable or unreliable equation formulas. Whereas the former are formally close to linear results of a common inherited word form (e.g. PIE **ḱéi̯ɔi* 'is lying, is being put down (by s.o.)') the latter are much less reliable and cannot automatically be interpreted as such linear continuations. Nevertheless, secondary equations can also be used to reconstruct PIE word forms. But these word forms need to be formally or functionally modified and morphosyntactically reanalyzed according to a more general diachronic morphosyntactic analysis of PIE. Formally and functionally, PIE word forms do not necessarily have to exactly match secondary equation formulas. They may well be proxies, as illustrated by Figure 1:

label	examples
IE forms	Vedic *váhati* :: Latin *uehit*, etc. :: Vedic *śáye*, *˚śaya(t)*, *śáya-*, etc.
IE equation formula	*ᵍu̯ég̑ʰo/e-* (cf. *LIV* s.v.)
phonological *Transponat*	**ḱe̯i̯ o(i)* ⇐ Vedic *śáye* :: CLuw. *zīyar(i)*
provisional forms	**u̯ég̑ʰo/e-*
reconstructed PIE form	**uég̑ɔ* :: **ḱéi̯ɔ*
reconstructed PIE categories	3SG.DURATIVE.DETRANSITIVE.INTRANSITIVE

Figure 1. IE forms, provisional forms (cf. *LIV* s.vv.), and reconstructed forms and reconstructed morphosyntactic categories

An example for what is implied in this section can be provided by the reconstruction of a PIE 3sg durative detransitive[8] intransitive form **uég̑ɔ* with the reconstructable meaning 'is, was moving (labile)'. This PIE so-called "Narten protomiddle" or "stative" is reconstructed here on the basis of the equation formula *ᵍu̯ég̑ʰo-* by retransforming and remodeling the equation formula into a PIE verb form. It is explicitly claimed here that the backprojected form and function of IE productive formation patterns, e.g. *ᵍu̯ég̑ʰo/e-*, AS SUCH can only have the value of a secondary, less reliable equation formula and its form and function is thus not necessarily the preceding potentially real and realistic PIE form and function, despite all previous claims of comparative philology.[9]

2 Phoneme inventory and representation

The PIE segmental phoneme inventory comprised a minimum of 31 segmental phonemes including twenty-three consonant phonemes, two semi-vowel phonemes /i u/ and six 'full' vowel phonemes /a aː ɛ ɛː ɔ ɔː/:

16 stops /p b̥ b̤ t d̥ d̤ k g̈ g̤ kʷ g̈ʷ g̤ʷ q ɢ̥ ɢ̤ ʔ/
+ 2 voiceless fricatives /s χ/ + 1 voiced fricative /ʕ/
+ 2 nasal stops and 2 "liquids" /m n r l/
= 23 consonant phonemes
+ 2 semi-vowels /u i/
+ 6 'full' vowels /a aː ɛ ɛː ɔ ɔː/
= 31 segmental phonemes
+ high and intense pitch accent (stress) ´
(+ low(ered) tone ` of stressed syllables[10])

The traditional representation is not maintained here for reasons outlined elsewhere.[11] I make use of the symbols of the International Phonetic Association (IPA). The "mediae" ⟨*b d ĝ g gʷ*⟩ are reconstructed as voiced implosive stops here. The "mediae aspiratae" ⟨*bʰ dʰ ĝʰ gʰ gʷʰ*⟩ are reconstructed as PIE breathy or murmured voiced plosives here.[12] The three "laryngeals" are reconstructed here as two fricatives /χ ʕ = h_2 h_3/ and a glottal stop /ʔ = h_1/. The PIE phonemes are given in Figures 2 and 3. Marginal PIE phonemes are enclosed in parentheses. Key to the columns: 1. plain voiceless stops; 2. breathy or murmured voiced stops; 3. voiced implosives; 4. voiceless fricatives (including the sibilant); 5. voiced epiglottal/pharyngeal fricative or approximant; 6. nasal stops; 7. lateral approximant; 8. alveolar trill or approximant; 9. semi-vowels (vocalic glides or approximants); 10. glottal stop.

	front		mid		back and rounded	
closed	*i*				*u*	
mid		*ɛ ɛː*			*ɔ ɔː*	
open			*(a aː)*			

Figure 2. PIE vowel phonemes including semi-vowels

	1	2	3	4	5	6	7	8	9	10
bilabial	*p*	*b̥*	*(b̤)*			*m*				
alveolar	*t*	*d̥*	*d̤*	*s*		*n*	*l*	*r*		
velar	*k*	*g̈*	*g̤*						*i*	
labiovelar	*kʷ*	*g̈ʷ*	*g̤ʷ*						*u*	
postvelar	*q*	*ɢ̥*	*ɢ̤*	*χ*						
epiglottal					*ʕ*					
glottal										*ʔ*

Figure 3. PIE consonant phonemes including semi-vowels

[6] Comparanda are the Germanic *have*-perfect constructions, which parallely emerged in areal contact yielding secondary equations (*Scheingleichungen*). Proto-Germanic only had possessive constructions with **haβjanan* 'to hold, keep' and **aiyanan* (**aih*) 'to own'.
[7] Cf. Fox 1995.
[8] The term DETRANSITIVE is used here for what Jasanoff 1979, 2003 has termed "protomiddle". The term intransitive solely refers to the lack of a direction marker *-t-* or *-s-*. These forms were labile: see below.
[9] Cf. Pooth 2015b: inroduction.
[10] Marking vocatives, perhaps imperative verb forms, and main verb forms of subordinate constructions, cf. Pooth 2015a, 2016b (forthcoming).
[11] Cf. Pooth 2015a.
[12] Kümmel 2012, Pooth 2015b: section 2, footnotes.

3 Morphotaxis

As argued in detail elsewhere, [13] it is inferential that PIE verb inflection was of the ROOT AND PATTERN morphology type. By definition, languages of this type are made up from a skeletal consonant frame (abbreviated CF) and a transfix or vowel melody (abbreviated VM):

> "[...] In these languages, the root in a number of common *binyanim*[14] or paradigms may be analysed as being made solely of consonants, while the pattern of vowels which are found around the consonants and the particular vowels filling up the pattern provide morphological information comparable to that often given by affixation. This analysis leads to discontinuous roots and discontinuous morphs interacting with the roots, [...]."
>
> (Bauer 2004: 93)

> "A transfix is a particular type of affix, one which is completely interwoven with its base. Typically, it is a series of vowels which surround and interact with a base which in turn can be analysed as a series of consonants. For example, Arabic *katab* 'he wrote', *kitaab* 'book', *kaatib* 'clerk' (where the root is **ktb*, indicating 'writing') illustrate the transfixes *_a_a_*, *_i_aa_* and *_aa_i_*. Such transfixes [...] are discontinuous affixes attached to discontinuous bases, [...]."
>
> (Bauer 2004: 102)

tier	segment/template	gloss[15]
vowel melody (or transfix)	*_ɛ_*	AGENTIVE or (PROTO-)ACTIVE
vowel melody template	*_V_*	SINGULATIVE or underspecified
word form CV template	*Ci-CV́C-C-C*	SINGULAR or underspecified
word form metrical structure	*σ́ σ* [16]	SINGULAR or underspecified
consonant frame	*di-d ʔ-t-i*	DISTRIBUTIVE-ro_ot-DIRECT-PROGRESSIVE
direction suffix	*-t-*	DIRECT
number marking	—	
aspect suffix	*-i*	PROGRESSIVE
PIE verb form	**didéʔti*	'does it now & then, here and there; puts s.th. here and puts s.th. there'

Figure 4. Segmental and templatic analysis of PIE **didéʔti*

inflectional		lexical + inflectional			inflectional				
tense	aspect (redup.)	inflectable base ~aspect (infix)~	aspect	mood	person/ direction	voice	number	direction	aspect/ mood
T	*RED*	*C_C*	*A*	*M*	*P*	*H*	*N*	*D*	*F*
-2	-1	0	1	2	3	4	5	6	7
é-	*$CV_3(C)(i)$*	*CV_1~n~V_2C*	*CV_4C*	*CV_5C*	*CV_6*	*CV_7*	*CV_8*	*CV_9*	*C*
	Ci		*nu*	*i?*	*m*	*χ*	*s* ~	*m*	*i*
	Cɛ		*sk*	*?s*	*u*		*n* ~ *r*	*s*	*u*
	Cé				*s*		*χ*	*t*	
	Cé: ~ *CéR*				*t*				
	C_Ci				*Ø*				
	DSTR	~ICPL~	ICPL	OPT	1EXC	DTR	PL ~	CIS[17]	PRG
	ANT/CMPL		PUNC	CON	1INC		PL	DIR(ECT)	DEB
	CONT				INV(ERSE)		COL	INV(ERSE)	
	INT				DIR(ECT)				
	MULT				ITR				

Figure 5. PIE verbal morphotaxis [aspect/mood glosses: ANT/CMPL = anterior/completive; CON = conative; CONT = continuative-frequentative; DEB = debitive; DSTR = distributive, ICPL = incompletive; INT = intensive or internally repetitive-iterative; MULT = externally multiplied; PRG = progressive-continuous]

3.1 The vowel melody

Following the terminological tradition of the autosegmental approach, as launched by McCarthy 1981, the term VOWEL MELODY (VM) is used here as a synonym of transfix. PIE morphological segments can be analyzed on different morphological levels which are termed morphological tiers or MORPHEME TIERS within the autosegmental morphological analysis. The vowel melody is analyzed as an independent segmental string, morphotactically independent from the agglutinating affixation on the skeletal consonant frame tier. It is mapped onto the underlying VOWEL MELODY TEMPLATE (abbreviated VMT) which consists of underspecified vowel slots, symbolized by *$_V_1$_* or *$_V_1V_2$_* or *$_V_1$_..._V_2_* (*V* = vowel). The different morphological tiers and segments or templates can be illustrated by Figures 4 and 6.

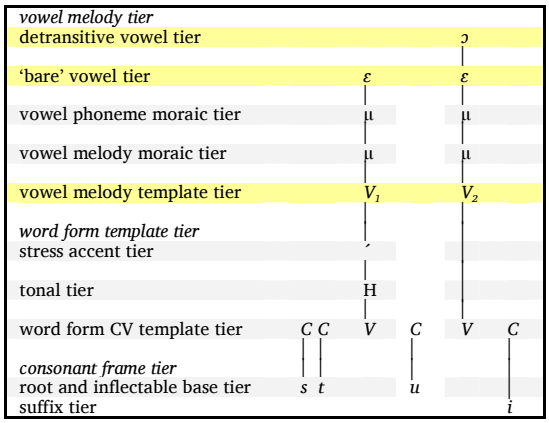

Figure 6. Segmental and templatic analysis of PIE **stéuɔi*

The word form analyzed in Figure 6, PIE **stéuɔi* 's.o. is praising s.o./s.th.; s.o./s.th. is being praised by s.o.' (> Vedic *stáve* 'id.'), was a form of the so-called "Narten type protomiddle" or "stative". In my analysis **stéuɔi* was a 3sg detransitive INTRANSITIVE form of the DURATIVE aspect with

[13] Cf. Pooth 2000: last fn., 2001, 2004a, 2009b, 2014acd, 2015ab; Tremblay 1999, 2003; for the Vedic system of root and stem formation morphology cf. Pooth 2014, chapter 2b.
[14] The term *binyānîm* (pl.) is borrowed from Classical Hebrew grammar.
[15] I use the general glosses redup- = reduplication, ro_ot- = discontinuous root, ba_se- = discontinuous inflectable base: PIE regular roots inflectable bases were interrupted by a vowel slot *_V_*, e.g. **p_k-* 'to fix wool, fix hair, comb', **ʔu_s-* 'worthy', etc. I principally follow the Leipzig Glossing Rules. Most glosses are the conventional ones, e.g. ABS = absolutive; ALL = allative-dative; AN = animate; COL = collective-sociative uncountable; DIR = direct transitive; DTR = detransitive ("protomiddle"); ERG = ergative-genitive; EXC = 1exclusive; IN = inanimate; INC = 1inclusive; INV = inverse transitive; ITR = (syntactically) intransitive; I further use the glosses PLT = plurative, VM = vowel melody or part of the vowel melody.
[16] Symbols: *σ́ σ* = trochaic foot, *σ σ́* = iambic foot.
[17] CIS = CISLOCATIVE, which I use in the sense of deictically speaker-oriented.

additional PROGRESSIVE-CONTINUOUS [18] suffix *-i*. It was encoded by the vowel melody _ɛ_ɔ_ with accent on the initial vowel _ɛ́_. This vowel melody was assigned to the underlying vowel melody template consisting of two vowels _V_1..._V_2_ (which was a PLURATIVE "chroneme"). Each PIE finite inflected verb form thus consisted of a minimum of two obligatory overt morphemes. The first obligatory overt morpheme was the skeletal discontinuous inflectable base, abbreviated IB (e.g. **d_ʔ-* 'to put, do, make; state, say'), including the proper root (R). The second overt morpheme was the discontinuous inflectional vowel melody which was completely interwoven with the discontinuous inflectable base, including the root. The other morphemes or morpheme slots could remain non-overtly zero-marked/unmarked.

C-chain	gloss	example	translation
d_ʔ-t-i	p_ut-DIR-PROGRESSIVE	**dɛ́ʔti*	'is doing (it/s.th.)'
di-d_ʔ_t	DISTRIBUTIVE-p_ut-2/3DIR	**didɛ́ʔt*	'did here/now & there/then
dɛ-d_ʔ-Ø-	ANTERIOR/COMPLETIVE-p_ut-2/3ITR	**dɛdɔ́ʔɛ*	's.o. has done and is a doer'
dʔ-i_ʔ-s	p_ut-OPT-2/3INVERSE	**dʔiéʔs*	'I wish she/he would do'
*dʔ-sk_*	put-PUNC_	**dʔskɔ́*	'did at once, suddenly, casually'
ïu~n~_ɕ_n-t	con~INCOMPLETIVE~_nect_3PL-DIR	**ïunɕɛ́nt*	'they connected (it/s.th.)'
d_n~ʔ-i_ʔ-m	p~INCOMPL~_ut-OPTATIVE-DIR	**dnʔiéʔt*	'I wish I would still be doing'

Figure 7. A few PIE consonants frames of the PIE verbs **d_ʔ-* 'to put, do' and **i_u-ɕ-* 'to connect, yoke'

3.2 The consonant frame

In addition to transfixation on the vowel melody tier PIE made use of the morphotactic strategy of agglutination on the consonant frame tier. Aspect and mood marking (in slots 1, 2, and 7), person and direction marking (in slots 3 and 6), and part of the detransitive voice marking (in slot 4) as well as (partly optional) number marking (in slot 5), was provided by agglutinating suffixation on the consonant frame tier. The agglutinating skeletal C-chain or CONSONANT FRAME, that is, reduplication prefix, inflectable base (including root), and suffix(es) is the part left over after subtraction of the discontinuous full vowels /ɛ ɛː ɔ ɔː/ from the segmental string. Recall that the inflectable base can be split up into the proper root and a derivational suffix, that is, the so-called enlargement. It is further inferential that the so-called "mobile" *s-* was a derivational or inflectional prefix: see section 8.2.

I use the underline _ (instead of the minus -) to represent a morpheme boundary in between the consonant frame and the vowel melody. The underline further indicates the position of the vowel slot within the inflectable base, e.g. **d_ʔ-* 'to put, do, make; state, say'. A few PIE verbal consonant frames or consonantal skeletons are given in Figure 7. The order of affixes in verb forms is given in Figure 5. In line 3 of Figure 5, in between the orange lines, the consonantal morpheme slots are numbered -2 to 7 with 0 being the inflectable base. *T, RED, M, P, H, N, D, F* symbolize the morpheme slots.[19] The vowel slots of the vowel melody (V_1-V_9) are included in line 4 of that Figure.

4 Internal modification

4.1 Detransitive voice marking

PIE had transfixation on the vowel melody tier, as indicated by the orange-shaded lines in Figures 6 and 11. The VOWEL MELODY TIER, as a templatic morphological analytical unit, is meant to be a superordinate tier of the detransitive vowel tier, the 'bare' vowel tier, the vowel phoneme moraic tier, the vowel melody moraic tier, and the vowel melody template tier: see Figures 6 and 11.

PIE had a binary voice system: morphologically underlying (unmarked) agentive-active (AGT) verb forms were distinguished from DETRANSITIVE (DTR) ("protomiddle") ones. In general, 3sg, 3pl, and 1pl detransitive forms were marked by the discontinuous autosegmental or suprasegmental detransitive morpheme ɔ, e.g. **kéiɔ* 'lay there, was put, laid down by s.o.', whereas 2sg, 2pl, and 2/3col forms were marked by its continuous suffixal counterpart *-χ-*, e.g. **kéiχa* 'I lay there, was put, laid down there by s.o.'. PIE detransitive voice marking can be illustrated by forms of the PIE first or NONDURATIVE-TERMINATIVE aspectual binyan in Figures 8, 9, and 10. The respective voice marker is colored red (e.g. **g̈ʷ_n-* 'to beat, slay, kill, hunt').

gloss	SINGULAR	PLURAL	
1EXC	**g̈ʷénm*	**g̈ʷnmé(s)*	
1INC	—	**g̈ʷnué(s)*	[PIE collective number
2ITR	**g̈ʷén*	**g̈ʷné(n)*	was deponential: the
2DIR	**g̈ʷént*	**g̈ʷnté(n)*	forms are given in
2INV	**g̈ʷéns*	**g̈ʷnsé(n)*	Figures 9 and 10]
3ITR		**g̈ʷnér*	
3DIR	**g̈ʷént*	**g̈ʷnént*	
3INV	**g̈ʷéns*	**g̈ʷnérs*	

Figure 8. PIE agentive-active unmarked voice forms of the first binyan

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**g̈ʷnχá*		
1INC			
2ITR	**g̈ʷnχá*	**g̈ʷnχá(n)*	**g̈ʷnáχ(m)*
2DIR	**g̈ʷntχá*	**g̈ʷntχá(n)*	**g̈ʷntáχ(m)*
2INV	**g̈ʷnsχá*	**g̈ʷnsχá(n)*	**g̈ʷnsáχ(m)*
3ITR			**g̈ʷnáχ(m)*
3DIR			**g̈ʷntáχ(m)*
3INV			**g̈ʷnsáχ(m)*

Figure 9. Corresponding detransitive voice forms marked by *-χ-*

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC		**g̈ʷnmɔ́(s)*	**g̈ʷnmɔ́(χ)*
1INC		**g̈ʷnuɔ́(s)*	**g̈ʷnuɔ́(χ)*
2ITR			**g̈ʷnɔ́m*[20]
2DIR			**g̈ʷntɔ́m*
2INV			**g̈ʷnsɔ́m*
3ITR	**g̈ʷnɔ́*	**g̈ʷnrɔ́ ~ *g̈ʷnérɔ ~ *g̈ʷnɔ́r*	
3DIR	**g̈ʷntɔ́*	**g̈ʷnntɔ́ ~ *g̈ʷnéntɔ ~ *g̈ʷnɔ́nt*[21]	
3INV	**g̈ʷnsɔ́*		

Figure 10. Detransitive voice forms marked by suprasegmental mapping of ɔ

[18] I often use the meaning labels of the aspectual and modal categories as defined by Bybee, Perkins & Pagliuca 1994: 316ff. (appendix B), but I use PROGRESSIVE in the sense of their "progressive" and "continuous".

[19] I use *H* instead of *V* to symbolized the voice suffix (*-χ-*) slot because *V* is generally used to symbolize a vowel.

[20] These were special cislocative forms with a meaning close to English 'you (pl.) here, close to me'.

[21] This was later extended to *-onto* which became abundantly productive as a post-PIE 3pl middle ending, whereas *-ont* merged with *-ent* and was reanalyzed as neoactive ending, cf. **$h_1$sént ~ *$h_1$sónt, *$h_1$sónto*.

The detransitive vowel ɔ or its feature [+round] was suprasegmentally mapped onto a 'bare' or underlying vowel /ɛ/ or /a/ which itself occupied a vowel slot of the given vowel melody template. The suprasegmental mapping of ɔ onto bare vowel /ɛ/ or /a/ can be illustrated by the analysis of the PIE 3sg intransitive transitional aspect form **gʷɔ́m(i)* 's.th. came about; s.th. is coming about', as given in Figure 11. The basic agentive-active verb form corresponding to **gʷɔ́m(i)* 's.th. came about; s.th. is coming about' (as analyzed in Figure 11) was a 2sg intransitive form **gʷém(i)* 'come; go' which was solely characterized by showing the 'bare' vowel /ɛ/ (or /a/ with *a*-roots).

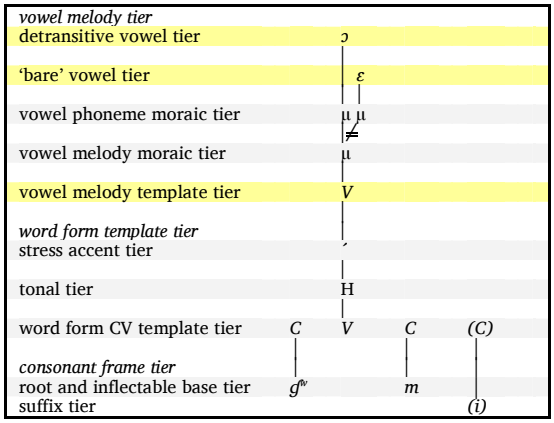

Figure 11. Suprasegmental mapping of ɔ onto ɛ, e.g. **gʷɔ́m(i)*

Recall[22] that the introduction of a vowel phoneme moraic tier and a vowel melody moraic tier helps to represent the mapping of two underlying vocalic segments /ɔ/ and /ɛ/ and the respective two moraic units of these segments onto one and the same monovocalic vowel melody template _V_1_ which was templatically monomoraic. This has the advantage of keeping the discontinuous vowel as a moraic unit in the representation of the analysis. As outlined in my article on PIE nominal morphology, [23] this vowel turns up again in derived (nominal) forms, remaining in its position in the vowel slot of the inflectable base, when the other moraic unit is transposed to another position within the word form, e.g. gen. **dɔ́rus* → abl.-gen. **dɔrués*. Recall that whether ɔ is posited to the left or right of ɛ within the analysis given in Figure 11 is irrelevant.[24]

As mentioned, the agentive-active forms only contained the 'bare' vowels /ɛ/ or /a/, e.g. **gʷém-t* 'topic came; went there'. Agentive-active verb forms were unmarked in this morphological sense. But note that agentive-active forms were not underspecified in semantic terms, since they encoded a volitional and controlling agent or a powerful natural force (e.g. in the case of **bʰuχ-* 'to grow; be(come) by nature'). The "protoactive" voice was functionally more specified compared to the underspecified IE active voice.[25] The detransitive verb forms, on the other hand, were marked in the morphological sense, but were more underspecified in semantic terms, since they denoted many different deviations from the semantic transitivity prototype.[26] It is crucial for the understanding of PIE morphosyntax recognizing that all derivational and inflected forms coded by the discontinuous vowel /ɔ/ and its continuous suffixal counterpart /-χ-/ belonged to the PIE detransitive voice category, regardless from their respective position within the given word form. Typologically, the suprasegmental mapping of the discontinuous vowel ɔ or its feature [+round] upon the bare vowel *ɛ* or else upon the vowel *a* of *a*-roots (e.g. **uag-* 'to break, split' → **uɔg-*) is one of the most fascinating properties of PIE morphology. In the system of PIE noun inflection voice marking was mainly derivational, as it was used to code detransitive stems which were derived from unmarked basic stems in the majority of cases. In the system of root nouns and root adjectives detransitive voice marking was in between derivation and inflection. In the verb system voice marking was rather inflectional, although PIE also had derivational detransitive "enlargements" *-χ-*, *-d-*, *-d̰-* (e.g. **m_l-χ-* 'be, become, make soft (grind)', **m_l-d-* ~ **m_l-d̰-* 'id.'.)

4.2 Plurative marking

PIE further distinguished a basic, underived singulative or underspecified (polysemous) monovocalic vowel melody template (_V_1_) from a specifically bivocalic PLURATIVE[27] vowel melody template (_V_1V_2_), glossed PLT here. Whereas the single (short) vowel melody template indicated verbal (and nominal) singularity (or aspectual underspecification), the geminated (long or doubled) vowel melody template was a specific marker of verbal (and nominal) plurality and plurativity, including verbal duration or a state. The plurative meaning was coded by gemination (doubling) of the vowel slot on the vowel melody tier of the word form template tier (_V_1_ → V_1V_2_), as illustrated, e.g., by PIE **stéːumi* 'is praising s.o.' in Figure 12:

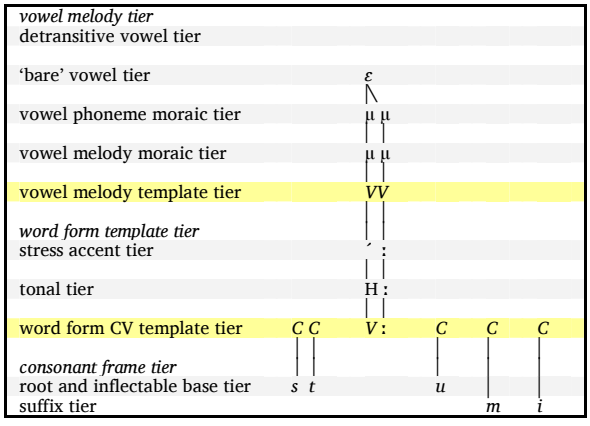

Figure 12. PIE vowel slot gemination, e.g. PIE **stéːumi*

[22] Cf. Pooth 2015a.
[23] Cf. Pooth 2015a.
[24] Cf. Pooth 2015a.
[25] Cf. Pooth 2014-10-14.

[26] Such as REFLEXIVE, SOCIATIVE-COLLECTIVE; ACCIDENTAL, FRUSTRATIVE, UNCONTROLLABLE; STATIVE-HABITUAL, etc. cf. Pooth ibid.
[27] I use this term as a functional superordinate for (verbal) PLURALITY in general, including DURATIVE, STATIVE, IMPERFECTIVE, etc. in addition to verbal PLURAL number of any participant involved in the event.

grade number	3SG.AGT.DIR	3SG.DTR.ITR(PRG)	1PL.EXC.AGT	1PL.EXC.DTR	3PL.AGT.DIR	3PL.DTR.ITR
I	*d̤ɛ́ʔt	*d̤ʔɔ́(i)	*d̤ʔmɛ́	*d̤ʔmɔ́	*d̤ʔɛ́nt	*d̤ʔrɔ́
II	*d̤ɛ́ːʔt	*d̤ɛ́ʔɔ(i)	*d̤ɛ́ʔmɛ	*d̤ɛ́ʔmɔ	*d̤ɛ́ʔnt	*d̤ɛ́ʔɔr ~ *d̤ɛ́ʔrɔ
III[d]	–	*d̤ɔ́ʔɛ(i)	–	*d̤ɛʔmɔ́	–	*d̤ɛʔɔ́r
IV[d]	–	*d̤ɔ́ʔ(i)	–	*d̤ʔmɔ́	–	*d̤ʔɔ́r ~ *d̤ʔrɔ́
V[d]	–	*d̤ɔ́ːʔ(i)	–	*d̤ɔ́ʔmɔ	–	*d̤ɔ́ʔɔr
VI[d]	–	*d̤ɔʔɛ́(i)	–	*d̤ɔʔmɛ́	–	*d̤ɔʔɛ́r

Figure 13. PIE verbal grades; [d] = deponent grade; *ɛ́* = vowel melody and accent

grade number	SG.AGT	3SG.DTR	PL.AGT	1PL.DTR	3PL.AGT	3PL.DTR
I	*ɛ́*	*ɔ́*	*ɛ́*	*ɔ́*	*ɛ́*	*ɔ́*
II	*ɛ́ː*	*ɛ́ ɔ*	*ɛ́ ɛ*	*ɛ́ ɔ*	*ɛ́*	*ɛ́ ɔ*
III[d]	–	*ɔ́ ɛ*	–	*ɛ ɔ́*	–	*ɛ ɔ́*
IV[d]	–	*ɔ́*	–	*ɔ́*	–	*ɔ́*
V[d]	–	*ɔ́ː*	–	*ɔ́ ɔ*	–	*ɔ́ ɔ*
VI[d]	–	*ɔ ɛ́*	–	*ɔ ɛ́* (~ *ɔ ɔ́*)	–	*ɔ ɛ́* (~ *ɔ ɔ́*)

Figure 14. PIE verbal grades and their vowel melodies in isolation without consonants

Recall that such a templatic morpheme is sometimes called a "chroneme" because the vowel gemination (length or doubling) conveys a specific meaning and has morpheme status. This morphological mechanism took place in parallel on the vowel melody template tier and on the word form template tier, see Figures 12 and 15.

Vowel slot gemination (length, doubling) as a plurative marker also occurred with additional suprasegmental vowel mapping, e.g. **sṵóːpi* 's.o. is falling into sleep', as analyzed in Figure 15. (Note that this form is later continued as **sṵóːpiti* ~ **sṵóːpi̯oti* ~ **sṵóːpi̯eti* or even **sṵoːpei̯eti* with accent either on the root or on the suffix[28]). Again, the position of *ɔ*, that is, whether it is posited to the left or right or whether it is mapped onto the first (_V_1_) or second vowel slot _V_2_ of _V_1V_2_ → _Vː_ within the autosegmental analyis is rather irrelevant to the overall analysis because both possible combinations */ɔɛ/* or */ɛɔ/* were realized as a long vowel [ɔː].[29]

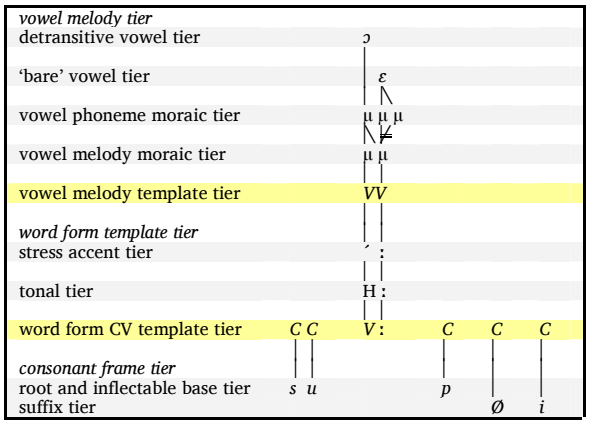

Figure 15. PIE vowel slot gemination and suprasegmental mapping, e.g. PIE **sṵóːpi* 's.o. is falling into sleep'

[28] This type is sometimes called "Klingenschmitt present", cf. Klingenschmitt 1978.
[29] Cf. Pooth 2015b.

4.2 Verbal gradation

Verbal gradation is another fascinating aspect of PIE morphology. Most of the PIE verbal skeletal consonant frames, e.g. **d̤ ʔ-* 'to put, do, make; state, say' could occur combined with several combinations of vowel melodies which paradigmatically belonged together. These are termed verbal (aspectual) "grades"[30] here; see Figures 13, 14, and 16. PIE verbal gradation was a system of internal vocalic modifications. It ran in parallel with the system of nominal gradation.[31] PIE verbal gradation is internal (aspectual) inflection (similar to Semitic transfixation), and it is a remarkable typological peculiarity of PIE.

In PIE, differently from IE languages, it was neither the root, nor the suffix (nor any "ending") that contained a particular "ablaut grade" as it is the case in IE languages. Instead, the term "grade" is now transferred to identify a property of the entire word form (e.g. PIE **uɛ́g̈ɔ(i)*) Thus, each PIE verbal finite word form belonged to a specific ASPECT(UAL) GRADE, and these are defined as a combination of vowel melodies including accent positions that were derivationally related within a system of so-called "internal derivation", which is internal inflection in the verb system. The essence of the grade system, therefore, is the classification of verbal finite word forms on the basis of their respective vowel melody and the word form accent of the word form template. Each grade, as defined, had semantic (aspectual) correlates. An overview is given in Figures 13, 14, 15. The aspect grades are numbered by Roman numbers I, II, III, IV, V, VI. Grades III, IV, V and VI were deponential and lacked agentive-active forms. These are termed 'deponent(ial) grades'. Here belonged the STATIVE-HABITUAL aspect, e.g. **u̯óidɛ(i)* 's.o. knows s.th./s.o.', etc. PIE 'deponent grades' lacked forms of the agentive voice because they were aspectual deviations from the transitivity prototype. As already mentioned, various kinds of detransitive deviations were marked by the detransitive ("protomiddle") voice; for detransitive voice marking see section 4.1.[32]

The six PIE aspectual grades can be described more detailed as follows. The forms listed below are 3rd person sg. agentive direct-transitive :: 3rd person pl. agentive direct-transitive :: 1st person pl. exclusive agentive :: 3rd person sg. detransitive intransitive :: 3rd person pl. detransitive direct-transitive (or intransitive) :: 1st person pl. exclusive detransitive.

[30] This term is borrowed from the term for tonal patterns of Hausa grammar, e.g. Hausa *jeefaà* (grade I) 'throw s.th.' :: *jèefaa* (grade II) 'throw at s.o.' :: *jeefoo* (grade VI) 'throw (in this direction)', cf. Newman 1973: 298. This term is also used to describe the aspect system of Creek (Muskogee, Oklahoma, Florida), cf. Martin 2011: 43ff., 241ff., chapters 8, 28; cf. Pooth 2015ab.
[31] Cf. Pooth 2015ab.
[32] For the PIE voice system cf. Pooth 2014-10-14; for the Vedic voice system cf. Pooth 2014: chapters 3-5.

grade	[1]3SG.AGT.DIR, [2]3PL.AGT.DIR, [3]3SG.DTR.ITR, [4]3PL.DTR.DIR, [5]3PL.DTR.ITR	description
I	[1]*d̥éʔt [2]*d̥ʔént	monovocalic (singulative) vowel melody template (_V_); pl forms and detransitive forms have their vowel outside the inflectable base; detransitive forms have their vowel in rightmost position (more towards the word end)
	[3]*d̥ʔɔ́ [4]*d̥ʔntɔ́	
II	[1]*stéːut [2]*stéunt	bivocalic vowel melody template (_V (+) V_), but irregular monovocalic vowel melody template (_V_) in 3pl forms; 'bare' vowel *é* in the leftmost position; no accent shift (= static accent)
	[3]*stéuɔ [4]*stéuɔnt ~ *stéuntɔ	
III[d]	[3]*uɔ́idɛ [5]*uɛidɔ́r	bivocalic vowel melody template (_V_+_V_); accented *ɔ́* in the vowel slot of the inflectable base in sg forms vs. unaccented *ɛ* in pl forms
IV[d]	[3]*gʰɔ́nʔ [5]*gʰnʔɔ́r ~ *gʰnʔrɔ́	structured in parallel with the agentive forms of grade I, but with suprasegmental mapping of *ɔ* in 3sg and 3pl forms
V[d]	[3]*suɔ́p [5]*suɔ́pr	structured in parallel with the agentive forms of grade II, but with suprasegmental mapping of *ɔ* in 3sg and 3pl forms
VI[d]	[3]*suɔpé [5]*suɔpér	bivocalic vowel melody template (_V_+_V_); unaccented *ɔ* in the root vowel slot in all forms; accented *é* outside the inflectable base

Figure 16. Overview and description of PIE verbal grades; pink = these forms (including corresponding progressive forms) later merged yielding a post-PIE imperfective mixed paradigm; blue: these forms later merged yielding a post-PIE non-imperfective (proto-aorist) mixed paradigm; lavender: these forms were first used as opponent middles of the post-PIE imperfective mixed paradigm (pink-shaded); orange = corresponding progressive forms (with word-final suffix *-i*) developed into imperfective present forms, whereas part of the non-progressive forms developed into IE root aorists[35]

4.2.1 Grade I

Grade I had a monovocalic underlying vowel melody template (_V_). A single accented vowel alternated between vowel slots. The occurrence of the detransitive vowel *ɔ* was restricted to a vowel slot outside the root vowel slot, e.g. **d̥éʔt* :: **d̥ʔént* :: **d̥ʔmé(s)* :: **d̥ʔɔ́* (**ǧʷnɔ́*, etc.) :: **d̥ʔntɔ́* (~ **d̥ʔɔ́nt*) :: **d̥ʔmɔ́(s)*. This grade may be termed "amphikinetic" or "holokinetic" in parallel with the terminology of the nominal inflectional types,[33] but it is better to restrict this terminology to the nominal inflection. The pattern of the PIE first root formation coded by grade I, that is, the PIE 'first binyan' is given in Figures 8, 9, 10 of section 4.1 above.

4.2.2 Grade II

Grade II had a bivocalic vowel melody template (_$V_1$$V_2$_ and _$V_1$_ ... _$V_2$_), but 3pl agentive forms were exceptionally monovocalic. The accent always remained on the first or leftmost vowel slot which was filled by the 'bare' vowel. The second vowel alternated between vowel slots outside the inflectable base. This grade II thus had a mobile second vowel that underwent vowel transposition, e.g. **stéːut* */stéɛut/ :: **stéunt* (exceptional 3pl form) :: **stéumɛ(s)* :: **stéuɔ* :: **stéuntɔ* ~ **stéuɔnt* :: **stéumɔ(s)*. This grade is termed "acrostatic" or "Narten type". Further unmarked forms with grade II had durative-interminative aspectual meaning. But punctual 1pl 2pl forms (e.g. **skʷérmɛ(s)* 'we (excl.) cut it off') also had (optional[?]) grade II marking. Grade II forms of deponent intransitive[36] and stative-dynamic verbs (e.g. **k̥i-* 'lie, lie down; be laid/put down (by s.o.)') also had stative or stative-habitual aspectual reading, aside from the (more inagentive) durative-interminative reading (e.g. **kéiɔ(i)* 'is lying, is lying down; is being put down'). The pattern of the 'second binyan' or "Narten type" is given in Figures 18 and 19.

Detransitive forms of this aspect exhibited aspecto-modal polysemy. Alongside a DURATIVE-INTERMINATIVE reading they had a PROSPECTIVE, POTENTIAL, and ABILITATIVE modal reading, e.g. **ʔésɔ* 's.o. was there for a while; will (is expected to) be there; should (is presumably) there; may be there, can (is able to) be there':

(1) a. noncanonical antipassive construction with ERG[37]
χnér-s *ǧʷénɔ* *χɔ́ui-m-s*
man-ERG slay:DUR:DTR:ITR:3SG sheep-ALL-PL
(*a*) aspectual: 'man killed/hunted (for a while) at sheep'
(*b*) modal reading: 'man (willing agent) can/may/will kill/hunt at sheep' (prospective)

b. canonical antipassive construction with ABS[38]
χnér *ǧʷénɔ* *χɔ́ui-m-s*
man.ABS dito dito
'man (non-agent) can/may/will slay/hunt at sheep'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	*prɔ́kχa	*prɛkmɔ́(s)	*prɛkmɔ́(χ)
1INC		*prɛkuɔ́(s)	*prɛkuɔ́(χ)
2ITR	*prɔ́kχa	*prɛkχá(n)	*prɛká χ(m)
2DIR	*prɔ́ktχa	*prɛktχá(n)	*prɛktá χ(m)
2INV	*prɔ́ksχa	*prɛksχá(n)	*prɛksá χ(m)
3ITR	*prɔ́kɛ	*prɛkɔ́r	*prɛká χ(m)

Figure 17. Forms of the PIE third binyan; post-PIE plural and dual forms later received innovative zero-grade (cf. Jasanoff 2003), e.g. **pr̥k-* 'to ask'

gloss	SINGULAR	PLURAL
1EXC	*prékːm	*prékmɛ(s)
1INC		*prékuɛ(s)
2ITR	*prékːk	*prékɛ(n)
2DIR	*prékːkt	*préktɛ(n)
2INV	*prékːks	*préksɛ(n)
3ITR		*prékr
3DIR	*prékːkt	*préknt
3INV	*prékːks	*prékrs

Figure 18. PIE agentive voice forms of the "Narten type" or second binyan

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	*prékχa	*prékmɔ(s)	*prékmɔ(χ)
1INC		*prékuɔ(s)	*prékuɔ(χ)
2ITR	*prékχa	*prékχa(n)	*préka χ(m)
2DIR	*prékχa	*prékχa(n)	*prékta χ(m)
2INV	*préksχa	*préksχa(n)	*préksa χ(m)
3ITR	*prékɔ	*prékɔr ~ *prékrɔ	*préka χ(m)
3DIR	*prékχa	*prékɔnt ~ *préknɔ	*prékta χ(m)
3INV	*préksɔ	[34]	*préksa χ(m)

Figure 19. "Narten protomiddle" forms [here belonged the so-called "stative" forms, e.g. **stéuɔ*, which were 3sg durative detransitive intransitve forms]

[33] Cf. Eichner 1973.
[34] [6]*-snto* should be analogical; cf. 3sg mid. *-so* → [6]*-sto*, 2pl act. *-se(n)* → [6]*-ste(n)* in analogy to 3sg act. *-s* → [6]*-st*.
[35] Cf. Pooth 2016+.
[36] Deponent intransitive verbs lacked transitive forms and were incompatible with the ergative case in "A" relation. In my view, a 3sg middle **kéito(i)* with **-to(i)* is a post-PIE innovation. An explict agent or causer in the ergative case must have triggered the use of a different verb.
[37] = S_A, cf. Dixon 1997, 2010, 2012.
[38] = S; potential and abilitative readings are not necessarily agentive.

c. **χnér* *mérɔ*
man.ABS die:DUR:DTR:ITR:3SG
(*a*) modal meaning: 'man can, may soon, will die'
(*b*) aspectual (stative) reading: 'man is mortal'

The aspectual reading is reflected by the *bhára-*^{ti} :: *φέρει* present stem; the modal reading is continued by the thematic subjunctive stem, e.g. Vedic *mára-*$^{t(i)}$, *hána-*$^{t(i)}$.

4.2.3 Grade III^{d}

Grade III^{d} was a deponential aspect grade and had a bivocalic vowel melody (_V_1_ ... _V_2_). The accented vowel *ɔ́* alternated between vowel slots and so did a second vowel, e.g. **uɔ́idɛ* :: **uɛidɔ́r* :: **uɛidmɔ́(s)*. This grade was "amphikinetic", but not "acrostatic".[39] The pattern of the PIE 'third binyan', i.e. the root formation coded by grade III, is given in Figure 17. It is inferential that it had a STATIVE-HABITUAL meaning. As mentioned in the legend to Figure 16 above, it is internally evident that the original 3pl form **uɛidɔ́r* with *ɔ* was replaced by innovative post-PIE 3pl forms **u̯eid̥r̥(s)*[40] ~ **u̯oid̥r̥(s)*[41] ~ **u̯idér*[42] ~ **u̯id̥r̥(s)* (> Vedic 3pl perf.-pres. ind. act. *vidúr*). It is further internally evident that forms of the PIE STATIVE-HABITUAL 'third binyan' merged with the agentive-active forms of the PIE DURATIVE-IMPERFECTIVE "Narten type", yielding the post-PIE general imperfective mixed "*h*$_2$*e(i)*-conjugation".[43] The PIE to post-PIE mergers are symbolized by identical colors in Figure 16 (i.e., by the pink shading).

4.2.4 Grade IV^{d}

Grade IV^{d} had a monovocalic vowel melody (_V_) and was deponential. It was structured in parallel to the agentive forms of grade I. I suggest that 1st and 2nd person forms had a vowel melody _*é*_ (in slot V_1) and were marked for detransitive voice by the suffix *-χ-* (see section 4.1). But 3rd person forms had _*ɔ́*_ instead of _*é*_. A single accented *ɔ́* alternated between vowel slots, e.g. **b̥ɔ́ud̥* 'awoke, got attentive' :: **b̥ud̥ɔ́r* :: **b̥ud̥mɔ́(s)*. The PIE root formation coded by grade IV^{d} is given in Figure 20. It had a TRANSITIONAL aspectual meaning and was also used within an oblique-agent-less passive construction.

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**gʰɛ́n?χ*	**gʰn?mɔ́(s)*	**gʰn?mɔ́(χ)*
1INC		**gʰn?uɔ́(s)*	**gʰn?uɔ́(χ)*
2ITR	**gʰɛ́n?χ*	**gʰn?χá(n)*	**gʰn?áχ(m)*
2DIR	**gʰɛ́n?tχ*	**gʰn?tχá(n)*	**gʰn?táχ(m)*
2INV	**gʰɛ́n?sχ*	**gʰn?sχá(n)*	**gʰn?sáχ(m)*
3ITR	**gʰɔ́n?*	**gʰn?ɔ́r* ~ **gʰn?rɔ́*	**gʰn?áχ(m)*

Figure 20. Forms of the PIE fourth (TRANSITIONAL) binyan, e.g. **gʰ_n?-* 'to come into being, be born; generate'; yellow-shaded forms were identical to the first binyan; 1/2sg forms later received analogical zero-grade, accent on the ending, and neoactive endings → **ĝn?χ(m̥)*

As illustrated by Figure 21, I reconstruct a 3sg detransitive intransitive form (e.g. **d̥ɔ́?*) by subtracting the progressive suffix *-i* from **d̥ɔ́?i* (> Vedic *dhā́yi* 'is put') parallel to **gʷʰénti* vs. **gʷʰént* etc., and I apply the same subtraction to **suɔ́:pi* and **suɔpéi* which I reconstruct on the basis the comparative equation formulas *^{e}su̯ópi̯o/e-*, *^{e}su̯opéi̯o/e-*. I call this kind of internal reconstruction 'retro(-grade) analogy'. I claim that a subtraction of *-i* and a subtraction of the thematic stem *^{e}-o/e-* is an utterly necessary step of internal reconstruction to re-establish the proper PIE word forms *X* = **d̥ɔ́?*, *Y* = **suɔ́:p*, *Z* = **suɔ:pé* which are not detectable by comparison alone, since they were given up or modified in all IE daughter languages. (But of course, this does not mean that they did not exist in PIE.[44])

grade I	grade IV	grade V	grade VI
**gʷʰént-i*	**d̥ɔ́?-i*	**suɔ́:p-i*	**suɔpé_i*
		(→ *^{e}su̯ópi̯o/e-*)	(→ *^{e}su̯opéi̯o/e-*)
**gʷʰént*	*X* = **d̥ɔ́?*	*Y* = **suɔ́:p*	*Z* = **suɔpé*

Figure 21. Internal reconstruction of PIE 3sg intransitive forms; orange = forms internally reconstructed by subtraction of *-eti* (which was a pleonastic neoactive imperfective ending cf. Jasanoff 2003); light green = forms internally reconstructed by retro-analogy

4.2.5 Grade V^{d}

Grade V^{d} had a bivocalic vowel melody template (_V_1V_2_ and _V_1_ ... _V_2_). It was structured in parallel with the agentive forms of grade II, but *ɔ* was mapped upon the vowel slots _V_1V_2_. I reconstruct 1sg 2sg forms with *_é:_* (**suéːpχ*, **suéːptχ*, etc.), but 3sg 3pl forms with suprasegmental *ɔ* (3pl **suɔ́pr* :: 1pl exclusive **suɔ́pmɔ(s)*). This grade was "acrostatic" and had a mobile second vowel. The 3pl form (**suɔ́pr*) was exceptionally monovocalic. It was structured in parallel to the 3pl forms of grade II (e.g. **stéur*, **stéunt*, **stéurs*). The PIE root formation coded by grade V^{d} (the PIE 'fifth binyan') is given in Figure 22.

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**suéːpχ*	**suɔ́pmɔ(s)*	**suɔ́pmɔ(χ)*
1INC		**suɔ́puɔ(s)*	**suɔ́puɔ(χ)*
2ITR	**suéːpχ*	**suépχa*	**suépaχ(m)*
2DIR	**suéːptχ*	**suéptχa*	**suéptaχ(m)*
2INV	**suéːpsχ*	**suépsχa*	**suépsaχ(m)*
3ITR	**suɔ́p*	**suɔ́pr* (~ *suɔ́prɔ*)	**suépaχ(m)*

Figure 22. Reconstructable forms of the PIE fifth (INCHOATIVE-STATIVE) binyan, e.g. **su_p-* 'to fall asleep, sleep'; I am not sure about the vocalism of the 2pl and 2col forms: maybe these forms were identical to the ones of the second binyan

Corresponding progressive forms of this pattern are continued, for instance, by Proto-Germanic **swōf(i)ja-* (> ON *sófa* 'to kill, libate') besides **swēf(i)ja-* (> ON *svæfa*) and by Vedic barytone *-ya*-presents with V$_{\breve{d}}$ddhi of the root, e.g. *śrā́mya-* 'to get tired, slack' < post-PIE **krómχi̯eti* ~ **krómχiti* (*^{e}krómh$_2$i̯o/e- pace LIV*), going back to PIE **krɔ́m(χ)i* 's.o. is slack, tired; is getting slack, tired'). On this basis, it is possible to assign INCHOATIVE-DURATIVE/TRANSITIONAL-DURATIVE as well as STATIVE aspectual meaning to this PIE 'fifth binyan' (given in Figure 22). Note that detransitive intransitive forms were labile verb forms and could be used semantically intransitively and transitively, that is, with factitive-causative reading within the PIE antipassive construction. I will return to this labile behavior in section 4.2.8.

[39] *Pace* Jasanoff 2003.
[40] With secondary accent shift.
[41] Compare 3pl **suɔ́pr*, see Figure 22.
[42] Recall that word-final /ɛ́rs/ was realized as [ɛːr].
[43] Cf. Jasanoff 2003 and his "mixed paradigm".
[44] 'Retro-analogy' belongs to the most important steps of internal reconstruction: cf. the methodological remarks given in Pooth 2015a.

4.2.6 Grade VI[d]

Grade VI had a bivocalic vowel melody template (_V_1_ ... _V_2_). The accented vowel *é* alternated between vowel slots outside the vowel slot of the inflectable base, whereas the unaccented *ɔ* remained in this vowel slot in all forms, e.g. **ɡʰɔnʔέ* :: **ɡʰɔnʔér* :: **ɡʰɔnʔmé(s)*. It is unclear whether the second vowel of the 3pl and 1pl forms was *ɛ* or *ɔ*, but maybe PIE had both variants. The PIE root formation coded by grade VI[d] (the 'sixth binyan') is given in Figure 23. It had a distributive and iterative aspectual meaning and was also used in a particular, detransitive-marked and antipassive causative construction.[45]

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**suɔpχá*	**suɔpmé(s)* ~ *-mɔ́(s)*	**suɔpmá(χ)* ~ *-mɔ́(χ)*
1INC		**suɔpué(s)* ~ *-uɔ́(s)*	**suɔpuá(χ)* ~ *-uɔ́(χ)*
2ITR	**suɔpχá*	**suɔpχá(n)*	**suɔpáχ(m)*
2DIR	**suɔptχá*	**suɔptχá(n)*	**suɔptáχ(m)*
2INV	**suɔpsχá*	**suɔpsχá(n)*	**suɔpsáχ(m)*
3ITR	**suɔpé*	**suɔpér* (~ **suɔpérɔ*)	**suɔpáχ(m)*

Figure 23. Forms of the PIE sixth (DISTRIBUTIVE-ITERATIVE) binyan

4.2.7 The reanalysis of PIE word-final segments to post-PIE stem suffixes

As already mentioned above, corresponding (*-i*-marked) progressives of this PIE sixth binyan are continued by the IE factitive and "causative-iterative" present stem:

(2) PIE 3sg **suɔpéi* + *-oi* ~ *-toi* ~ *-ei* ~ *-eti* ~ *-etoi* → post-PIE **suɔpéi̯oi* ~ **suɔpéitoi* or neoactive **suɔpéi̯ei* ~ **suɔpéiti* ~ **suɔpéi̯eti*

Likewise, corresponding 2/3col intransitive forms were pleonastically extended by the productive post-PIE 3pl endings *-ont* ~ *-onto* yielding allomorphic factitive, causative or iterative stems with a reanalyzed post-PIE neosuffix *-aχ-* (*-ah_2-*).

(3) PIE 3col itr **sɔkʷáχ* → post-PIE 3pl **sokʷáχont(o)* 'they made them follow', cf. Lithuanian *sãko* (inf. *sakýti*)

This also happened to many other 2/3col intransitive forms yielding several post-PIE stems in *-aχ-* (*-ah_2-*) with different root ablaut grades and functions comparable to the ones of their respective sources:

(4) PIE 3col intransitive (of binyan 2 or the "Narten type") **ʔésaχ* → post-PIE 3pl **ʔésaχont(o)* with all the readings of the original "Narten type" (see section 4.2.2)

The unmarked 3col forms (e.g. **ʔésaχ*) were reanalyzed as unmarked 3sg forms and could receive active (*-t*) or neoactive endings (*-e, -et*). They also received the productive post-PIE imperfective present endings: see (6):

(5) PIE 3col intransitive (of the "Narten type") **ʔésaχ* → post-PIE 3sg **ʔésaχ(t)* ~ **ʔésaχ-e(t)* → post-PIE imperfective past or subjunctive (cf. Latin imperfect *eram, erās, erat*, subjunctive *agam, agās, agat*)

(6) PIE 3col intransitive (of the "Narten type") **ǵʷʰénaχ* → post-PIE **ǵʷʰénah₂i̯ont(o)i* (**ǵʷʰénah₂i̯o/e-*): this was applicable to any other PIE 3col form in *-aχ* (but note that PIE also had denominal verb stem in *-áχ-*, see section 9.2)

[45] Cf. Pooth 2015a: last section.

As illustrated in the foregoing sections, PIE displayed minimally six binyanim that were made up from combinations of the aspect grades I-IV[d] and the unmarked underlying consonant frame, that is, the discontinuous inflectable base (including the root). These binyanim 1-6 (encoded by grades I-VI[d]) can be termed by the conventional label "root formations".

The PIE 'first binyan' had NONDURATIVE-TERMINATIVE including telic, semelfactive, and punctual-perfective as well as NEUTER aspectual meaning, cf. e.g. PIE **dʃʔɔ́* 's.o. grabbed, took, received it (non-durative aspect)' → **dʃʔɔ/é-* > Vedic thematic aor. *(á̄)da-^{t}* 'grabbed, took, received it', etc. It is continued by Vedic and Greek root presents and root aorists (e.g. Vedic *(á)dā́t* 'gave, spent', etc.), by sigmatic aorists with *e*-grade, by the thematic aorist *(á)vidát* type, and the Vedic *tudáti* present, as outlined in a forthcoming article.[46]

The second PIE root formation is identical with the so-called "Narten type" and was a DURATIVE-INTERMINATIVE and thus IMPERFECTIVE-like aspect. This second binyan is continued as IE "Narten type" present, that is, the Vedic *stáuti*, *staut* type, as the preterit of the Hittite *ḫi*-conjugation and as the Greek and Vedic sigmatic aorist forms with lengthened grade of the singular forms. The corresponding detransitive forms are continued as "Narten type" middles (e.g. Vedic *stáve*) which had further developed to thematic stems from PIE to post-PIE:

(7) PIE 3sg **b̥ʰérɔ(i)* → post-PIE **bʰéro(i)* → **bʰére(i)* ~ **bʰéret(i)* (> Vedic *bhára-^{ti}* type)

(8) PIE 3sg **ǵʷʰénɔ* → dito → **ǵʷʰéno/e-* (> Vedic subj. of the *hána-$^{t(i)}$* type)[47, 48]

The third PIE root formation was the STATIVE-HABITUAL aspect, e.g. **uɔ́idɛ(i)* > Vedic *véda* :: OCS *vědě*, etc. which also had the function of a GENERAL (habitual) present. As already mentioned in section 4.2.3, it is internally evident that this pattern merged with the "Narten type" from PIE to post-PIE yielding the so-called "Jasanoff present" or "*h_2e(i)*-conjugation". This third binyan is continued as more or less irregular non-reduplicated "perfectopresent" stem (e.g. Vedic pres. *véda*, etc.) and as major part of the Hittite *ḫi*-conjugation (e.g. Hittite 1sg *dāḫḫe*, 3sg *dāi* 'takes', etc.):

(9) PIE 3sg **ǵʷʰɔ́nɛ(i)* → **ǵʷʰóne(i)* ~ **ǵʷʰónet(i)* besides 3sg **ǵʷʰéːns* → post-PIE **ǵʷʰéːns(t)* (later yielding the IE sigmatic aorist)

PIE non-direct 3pl forms **d̥ʔér*, **d̥éʔrs* :: **d̥ʔér*, **d̥ʔérs* → **[d̥ʔɛː(ɹ)] became part of this mixed paradigm; the two latter underwent another segmental reanalysis yielding a stem in *-eː-* whith all the readings of its source(s):

(10) PIE **[d̥ʔɛː(ɹ)] → **dʰ(ʔ)eː* → post-PIE **dʰ(ʔ)éː-* 'did, put down; had just done, put down', **ʔrudʰ-éː-* 'is, was, became, had become red' (used as variant of the sigmatic stem **dʰéː(ʔ-s-* and as a perfect-like stative stem)

The Vedic so-called "passive aorist" is a (formal) relic of the fourth PIE root formation, that is, the TRANSITIONAL

[46] Cf. Pooth 2016+.
[47] Cf. Pooth 2014: chapters 7 and 8.
[48] The idea of a subjunctive suffix *-ʔo/e-* is misleading *pace* Tichy 2009. The hiat of long subjunctives is simply due to suffix doubling: /-a-a-/.

aspect (cf. Vedic *dhāyi* ‘was put there’). Its forms are reconstructed here as given in Figure 20 and outlined in section 4.2.4. Corresponding PIE progressive forms of this binyan were pleonastically extended by post-PIE productive 3sg 3pl neoactive endings *-otoi* ~ *-eti* ~ *-etoi* and *-onti* ~ *-ontoi*, etc. Moreover, many of them merged with detransitive progressive forms of the first binyan (e.g. **dʰ1ʔói* ‘s.o. is being put there by s.o.’). These also were pleonastically extended by productive neoactive endings. The most illustrative example, immediately revealing the given origin, is Vedic *duhé* ‘gives milk’ compared to Old Icelandic *dugir* (III[rd] weak class) ‘gives help’, ultimately going back to **dʰuǵói* ‘is giving product, is being productive/useful’, German “ist trefflich”. [49]

(10) PIE **dʰuǵói* (> Vedic *duhé*) → **dʰugʰói* ~ **dʰugʰóiti* (> Proto-Germanic **duɣaiþ*, etc.)

Many of these forms further underwent paradigmatic leveling to *e*-grade or zero grade of the root and are reflected by most of the IE yod-presents with *e*-grade or zero grade, e.g. Vedic *dhīyá-*[te]. A major part of the IE yod-presents thus simply reflects PIE progressive forms of the PIE TRANSITIONAL fifth binyan by continuing the post-PIE pleonastic allomorphic variants:

(11) PIE 3sg **dʰóʔi* + *-oi* ~ *-toi* ~ *-ei* ~ *-eti* ~ *-etoi* → post-PIE **dʰ(e/o/Ø)ʔi̯oi* ~ **dʰ(e/o/Ø)ʔitoi* (with varying accent position); the PIE 3pl forms of the fifth binyan were **ǵusór* ~ **ǵusrós* (→ post-PIE **ĝusrónt* ~ **ĝusróm*), as confirmed by Vedic *ajuṣran* (RV 1.71.1), etc.

(12) PIE 3sg **dʰ1ʔói* + *-oi* ~ *-toi* ~ *-ei* ~ *-eti* ~ *-etoi* → post-PIE **dʰ(e/o/Ø)ʔi̯oi* ~ **dʰ(e/o/Ø)ʔitoi* (with varying accent position); the zero grade was original to the 3pl **dʰ1ʔónti* ~ **dʰʔi̯ónti* ~ **dʰʔi̯ónti* ~ **dʰʔi̯óntoi* (→ **dʰʔi̯ó/é-*)[50]

As mentioned in the foregoing section, the progressive forms of the fifth PIE root formation were remodeled to the so-called “Klingenschmitt present” from PIE to post-PIE, e.g. Latin *sōpīre*, etc. (see Figure 23). As also mentioned there, the progressive 3[rd] sg. forms of the sixth root formation developed to the so-called “causative-iterative present”, that is, the **ĝonh$_1$éi̯o/e-* type (> Vedic *janáya-*[ti], *svāpáya-*[ti]): see examples (2) and (3) above.

All these pleonastic extensions belonged to a more general PIE to post-PIE morphological rule or tendency of ending pleonasms. This rule can be formulated as follows:

(13) PIE 3sg 3pl 2/3col INTRANSITIVE DETRANSITIVE “protomiddles” were reanalyzed as neoactives and pleonastically extended by 3sg *-e(i)* ~ *-et(i)*, 3pl *-ont(i)*, mid. *-onto(i)* when the PIE antipassive construction switched into a post-PIE nominative-accusative construction.[51]

It is further inferential that PIE lacked 3[rd] person direct and inverse forms of the binyans encoded by grades III[d], IV[d], V[d], and VI[d]. A 3[rd] person animate causer or inanimate causer or cause (in A relation[52]) had to be coded by the PIE antipassive construction:[53]

(14) a. PIE intransitive construction with inanimate S
**páχur* *ǵʔn1ʔ-i*
fire.ABS generate/be.born:DTR:ITR:3SG-PRG
lit. ‘the fire is coming into existence/is (being) born’

b. PIE antipassive construction with inanimate O
**dʰru(-χ)* *ǵʔn1ʔi* *páχun-i-s*
wood.ABS(-COL) dito fire-LOC-PL
lit. ‘woods are giving birth to the fires’[54]

The reconstruction of the PIE antipassive construction has been outlined in detail in three preceding articles. The lability of Early Vedic middles was thus a consequence of the PIE lability of detransitive intransitive forms within the original antipassive construction: see my dissertation on this topic.[55]

4.2.8 Gradation on the word form template tier

Let us return to PIE verb morphology and its inner-PIE analysis. Within the given autosegmental analysis, the PIE word form template (WFT) had the status of a templatic morpheme. This word form template determined the position of the respective vowel(s) of the vowel melody combined with the position of the word form stress accent on one vowel within the word form. The word form template was thus meaningful and belonged to a meaningful combination of templates (or form formation schemes). Thus, a particular position of the vowel(s) within a word form determined a particular meaning. For instance, a 3pl agentive direct form **dʰéʔnt* (or **stéunt*) with stressed _é_ in the vowel slot of the inflectable base (V_1) had durative-imperfective meaning, whereas the corresponding 3pl agentive direct form **dʰʔént* (or **stuént*) with _é_ before the plural suffix *-n-* and the direct transitive suffix *-t-* (in vowel slot V_6) had a nondurative-terminative meaning. Therefore, the word form template itself belonged to a superordinate paradigmatic set of word form templates. Recall that in the nominal inflection this superordinate set of templates is known as the “inflectional type”.[56] However, with regard to the root and pattern morphology system of PIE verb inflection, as outlined above, I have already been using the more conventional term BINYAN (plural BINYANIM). Recall that nominal inflectional types and verbal binyanim have a different grammatical status. As outlined in detail in my article on PIE nominal morphology,[57] each nominal stem had an underlying or basic inflectional type (e.g. **péku-* an. ‘domestic animal’, abl.-gen. **pkéus*), whereas other inflectional types had a more derivational status or were in between inflection and derivation. PIE verbal binyanim, however, were inflectional aspectual templates.[58] Never-

[49] Cf. Jasanoff 2003: 159; but note that Jasanoff’s (2003: 173, figure 6.5) further derivation of this type **bʰudʰó* ← **bʰóudʰe* suffers from the lack of a plausible motivation and internal evidence.
[50] Pooth 2016+.
[51] As initially outlined by Pooth 2004b; cf. Aldrige 2011.
[52] For the A, S, S_A, S_O, O relations cf. Dixon 1997, 2010, 2012.
[53] Cf. Pooth 2015a.

[54] The Vedic so-called “passive aorist” 3sg *ájani* (still) has a transitive and factitive-causative reading in RV 2.34.2cd *rudró yád vo maruto rukmavakṣaso vṛṣṣájani pṛśn̥yāḥ śukrá ůdhani* “wenn Rudra euch hat entstehen lassen, ihr Maruts mit dem hellen Goldschmuck auf der Brust, der Bulle, in Pr̥śnis glänzendem Euter” (Pooth). Rudra and Pr̥śnis, that is, the cloud (or cow) are normally seen as the parents of the Maruts, i.e. the storm-gods. The translation given by Kümmel 1996: 43f. “wenn für euch, ihr Marut mit dem Goldschmuck auf der Brust, gerade der Stier Rudra geboren ist im hellen Euter der Pr̥śni” makes no sense, but see Kümmel’s footnote 61; middle forms of this root are thus more generally labile in Early Vedic, cf. Pooth 2014+.
[55] Cf. Pooth 2004b, 2014, 2015a.
[56] Cf. Pooth 2015a.
[57] Cf. Pooth 2015a.
[58] Cf. Pooth 2015a, see the sections on aspect.

theless, PIE must have had quite a number of defective verbs. These verbs were restricted to a specific underlying binyan, e.g. **kéiɔ(i)* to the second aspectual binyan (the "Narten protomiddle type"). However, for other verbs (like **d̲ ʔ-* 'put, do, say') it is impossible to identify a lexically underlying binyan. For the majority of PIE verbs the aspectual binyanim were thus entirely inflectional patterns, simply because many verbs could be inflected for all (or almost all) aspects (binyanim). It can be concluded that a PIE binyan was not identical to the overall lexical paradigm. The overall PIE verbal paradigm consisted of a set of multiple aspects (binyanim). I will return to the PIE aspect (and mood) system in sections 5, 6, 7.

4.3 Plural marking by vowel transposition

It is observable that PIE verbal plural forms of the 1st and 2nd persons were "internally derived" from underlying singular forms by transposing the vowel(s) to different vowel slots within the word form on the word form template tier. This morphological strategy is here referred to by the label VOWEL TRANSPOSITION (VT).[59] Examples are:

(15) 1sg agentive **g̈ʷénm* → 1pl exclusive **g̈ʷnmé(s)*

(16) 2/3sg agentive direct **g̈ʷént* → 2pl agentive direct **g̈ʷnté(n)*

Comparative evidence strengthens the inference that PIE made abundant use of this morphological strategy which is typologically rare, but not absent.[60] Recall that it is improper to use the term "metathesis" for PIE vowel transposition. A morphological transposition or positional change of segments has a different motivation. The notion of vowel transposition implies an underlying templatic structure on a word form template tier with various vowel positions or vowel slots (*V*) where the respective vowels switch positions for morphological reasons, that is, as an inflectional and derivational morphological means. The vowel transposition, as illustrated by example (15), can be analyzed as given in Figure 24.

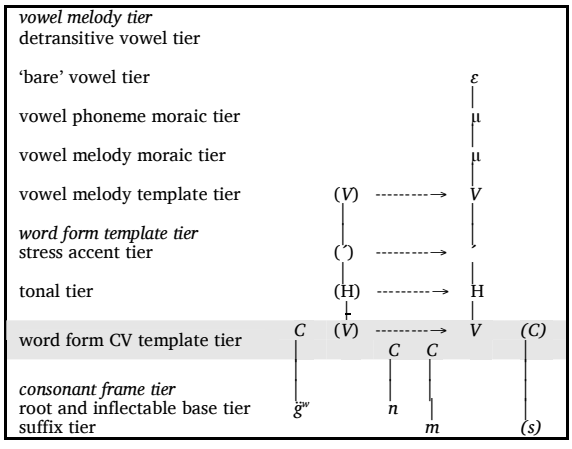

Figure 24. Complete transposition **g̈ʷénm* → **g̈ʷnmé(s)*

[59] Vowel transposition (VT) has nothing to do with word-class-changing derivation (which is often also termed "transposition").
[60] Cf. Besnier 1987 and Edwards 2014 on Amarasi.

The segmental transfer is indicated by arrows and brackets. The analytical unit (*V*) that is transferred and transposed to another position within the word form is given in parentheses. The arrows (------→) represent the segmental transfer and vowel transposition. The 1sg agentive form **g̈ʷénm* (cf. example 15), analyzed in Figure 24, had a monovocalic underlying vowel melody template (*V*) and an underlying word form template **CVC-P*, where *C̲C-* is used as a cover symbol for the inflectable base and *-P-* is used as a cover symbol for any person and direction suffix *-m-*, *-u-*, *-t-*, *-s-*, *-Ø-* filling slot 3 (see Figure 5 above). Thus the position of the vowel was assigned to a specific vowel slot within the word form on the word form template tier. Here and below, the word form CV template tier is marked by a grey shading.

4.4 Verbal gradation and vowel transposition

The morphological strategy of internal inflection and internal derivation by means of the strategy of VOWEL TRANSPOSITION can be interpreted as a phenomenon that operated on the word form template tier, as marked by the grey shading in Figures 24 and 25. Recall that PIE vowel transposition, at least synchronically, was often but not always or necessarily accompanied by an additional internal accent shift within the word form. As already outlined in the article on PIE nominal morphology, the PIE word form accent was part of the word form template. The PIE accent was thus "free", that is, principally unpredictable from syllable structure or word form structure. In word forms with more than one full vowel or semi-vowel, one of these two full vowels or a semi-vowel /i u/ was realized with a contrasting high pitch and intense stress accent, opposed to a non-intense low pitch of the other vowel or vowels in the word form. Therefore, the word form accent was not a property of any morphological unit other than the word form template morpheme, and it provided grammatical distinctions. The accent position within the word form, combined with other morphological means, was definitory for the identification of a given form as belonging to a particular paradigmatic combination of vowel melodies, that is, in the verb system to a particular grade I-IV and aspectual binyan.

This also was true for accent patterns outside the verb system. For instance, PIE verb-like adjectives[61] were derived from underlying 3sg durative-imperfective (including stative) detransitive intransitive verb forms of the second aspectual binyan by accent shift to the word final vowel:

(17) **lḗuqɔ-* 's.o. is, was bright, shining' (verb form of the so-called "Narten protomiddle type") → **lɛuqɔ́-* verb-like adjective '(it is) bright, shining' (this PIE verb-like adjective was then inflectable for case and number)

However, the PIE class of verb-like adjectives must be dealt with elsewhere.[62] Recall that in the system of verbal root and pattern morphology inflection it is impossible to identify a particular derivational base other than the lexical discontinuous inflectable base (including the root), e.g. **g̈ʷ̲n-* 'to slay, kill, hunt, beat'. Nevertheless, the following rules of PIE VOWEL TRANSPOSITION are reconstructed here

[61] Cf. Pooth 2015a.
[62] Cf. Pooth 2015a.

for the system of verbal root and pattern morphology. PIE verbal gradation must have been outcome of both vowel transposition and suprasegmental mapping of ɔ.

4.4.1 Complete transposition

The term 'complete' transposition or 'unbroken' transposition refers to a complete transferal and full transposition of a vowel (e.g. _ɛ_) from its underlying position within the word form to another vowel slot of the word form template. This morphological strategy is illustrated by examples (15) and (16) and Figure 24. The same system of complete vowel transposition was applicable to the accented full vowel _ɔ́_. Accordingly, the accented full vowel was transposed in its entirety, in parallel with the accented _é_ of the agentive-active forms. This type of transposition rule can be illustrated below. It is evident from the relationship between the following two 3sg detransitive intransitive forms:

(18) 3sg detransitive intransitive of the TRANSITIONAL aspectual binyan **d̯ɔ́ʔ(i)* (> Vedic 3sg "passive aorist" *dhāyi*) → 3sg detransitive intransitive **d̯ʔɔ́* (of the NONDURATIVE-TERMINATIVE **g̑ʷnɔ́(i)* type)

The first form was a 3sg detransitive intransitive form of the transitional aspectual binyan; it is continued as the Vedic so-called "passive aorist". The second form was a 3sg detransitive intransitive form of the nondurative-terminative aspectual binyan. It is inferential that in the system of detransitive voice marking the transitional aspect forms looks more basic than the nondurative-terminative forms in a morphological sense.

4.4.2 Reversive transposition

Another vowel transposition rule which is evident from the reconstructable PIE verb forms can be illustrated by the two 3rd person detransitive intransitive forms given in example (19) below. This particular type of vowel transposition was characterized by the internal change of paradigmatically more underlying singular forms with a vowel melody _ɔ́_ɛ_ mapped onto the geminated or doubled vowel melody template _V_1_ ... _V_2_ to "derived" plural form with reversed vowels and accent position _ɛ_ɔ́_ (e.g. 3pl **uɛiɗɔ́r*, 1pl exclusive **uɛiɗmɔ́(s)*, etc.). This internal modification, with or without additional accent shift, is labeled 'reversive' transposition here. The "derived" vowel melody also encoded PIE verb-like adjectives (e.g. **lɛuqɔ́-*), which were also derived from 3sg intransitive forms of the "Narten protomiddle type" _é_ɔ_, as illustrated by example (17) above.

(19) 3sg **uɔ́iɗɛ(i)* (> Vedic *véda*, etc.) → 3pl **uɛiɗɔ́r* (later replaced by **u̯eid-ʴ́(s)* ~ **u̯id-ʴ́(s)* ~ **u̯idé(:)r* due to the merger of this type with the "Narten type", e.g. 3sg inverse **pré꞉ks*, 3pl direct **préknt*[63])

It is thus inferential that verb forms like **uɔ́iɗɛ(i)* encoded by grade III were "internally derived" from the "Narten protomiddle or stative type" by 'reversive' transposition without accent shift, whereas verb forms like **uɛiɗɔ́r*, which also belonged to grade III, were "internally derived" from the "Narten protomiddle or stative type" by accent shift. This is illustrated by the following example:

(20) 3sg intransitive of the DURATIVE-IMPERFECTIVE aspectual binyan **d̯é?ɔ(i)* (→ **CɛCɔ́-*) → 3sg intransitive of the STATIVE-HABITUAL aspectual binyan **d̯ɔ́?ɛ(i)*

It is further inferential that forms of grade III had a stative or STATIVE-HABITUAL aspectual meaning, since Vedic 3sg ind. act. *véda* 'knows' and its IE comparanda have a stative meaning.

A second type of 'reversive' transposition yielded forms of grade VI, which can be identified with a DISTRIBUTIVE-ITERATIVE aspectual meaning, since progressive forms of this type developed into so-called "causative-iterative presents", as already outlined above:

(21) **uértɔ(i)* → 3sg detransitive intransitive distributive-iterative **u̯ɔrtéi̯(i)* (→ **u̯ortéiti* ~ **u̯ortéi̯eti* > Vedic *vartáyati*) (see example (2) above)

It is inferential that the "Narten protomiddle type" **CéCɔ* was the ultimate "derivational" base of both, forms of the stative-habitual grade III as well as forms of the distributive-iterative grade VI.

4.4.3 Broken transposition

Another vowel transposition rule which is evident from the reconstructable PIE word form can be termed 'broken' transposition. The 'broken' transposition rule was applicable to plurative word forms, that is, the ones with basic or underlying geminate vowel melody template _VV_ (realized as _V꞉_) in the vowel slot of the root or inflectable base. As illustrated by Figure 25, the vowel geminate _éɛ_ was 'broken up' into combinations of two short vowels _é_ in the vowel slot of the root or inflectable base and _ɛ_ elsewhere (_V_ + _V_).

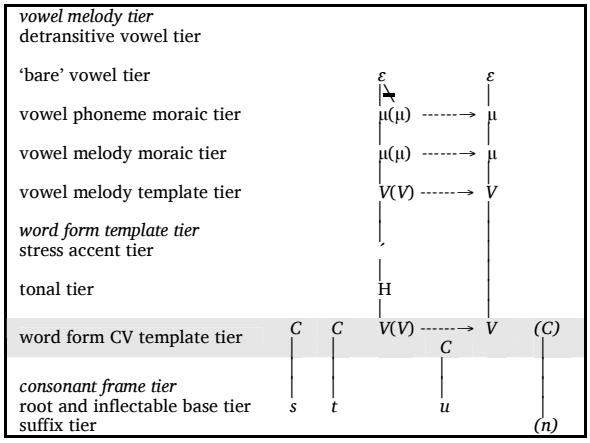

Figure 25. Broken transposition 2sg agentive intransitive (and imperative) **sté꞉u* → 2pl agentive intransitive **stéuɛ(n)*

Recall that detransitive vowel melodies were derived from the agentive vowel melodies by additional suprasegmental vowel mapping (as outlined in section 4.1). More examples of detransitive forms are given in (22), (23), and (24). (The vowel melody is colored red):

[63] Cf. Jasanoff 2003.

grade number	3SG.AGT.DIR	3SG.DTR.ITR	1PL.EXC.AGT	1PL.EXC.DTR	3PL.AGT.ITR	3PL.DTR.ITR
I	*ḍéʔt	*ḍʔ́	*ḍʔmé	*ḍʔmʔ́	*ḍʔér	*ḍʔrʔ́
II	*ḍéʔt	*ḍéʔɔ	*ḍéʔmɛ	*ḍéʔmɔ	*ḍéʔr	*ḍéʔɔr ~ *ḍéʔrɔ
III[d]	–	*ḍʔ́ɛ	–	*ḍɛʔmʔ́	–	*ḍɛʔ́r
IV[d]	–	*ḍʔ́	–	*ḍʔmʔ́	–	*ḍʔ́r ~ *ḍʔrʔ́
V[d]	–	*ḍʔ́ʔ	–	*ḍʔ́mɔ	–	*ḍʔ́ɔr
VI[d]	–	*ḍɔʔé	–	*ḍɔʔmé	–	*ḍɔʔér

Figure 26. Internal derivation of PIE verbal grades; grey: most basic form(s), light green-blue: internally derived by suprasegmental mapping of ɔ to corresponding agentive forms; orange: internally derived by vowel transposition rules and/or accent shift; red: internally derived by vowel gemination (plurative marking); white: derived by suffixation of ɔ

grade number	3PL.AGT.DIR (1)	primary [1]3PL.DTR.DIR [2]3PL.DTR.ITR (2)	[1]3SG.DTR.DIR [2]3SG.DTR.ITR [3]1PL.EXC.DTR (3)	secondary 3PL analogical to [1]3SG/ [2]1PL.EXC/ [3]3PL.AGT/ [4]3PL.DTR (4)
I	*ḍʔént	[1]*ḍʔ́nt	[1]*ḍʔtʔ́	[1]*ḍʔntʔ́
I				[3]*ḍʔéntɔ
II	*ḍéʔnt	[1]*ḍéʔɔnt	[3]*ḍéʔmɔ(s)	[2]*ḍéʔntɔ
III[d]	–	[2]*ḍɔʔér	[2]*ḍɛʔ́r	
IV[d]	–	[2]*ḍʔ́r	[3]*ḍʔmʔ́(s)	[2]*ḍʔrʔ́
V[d]	–	[2]*ḍʔ́ʔr	[3]*ḍʔ́mɔ(s)	[2]*ḍʔ́rɔ
VI[d]	–	[2]*ḍɔʔér		[4]*ḍɔʔérɔ

Figure 27. Primary and secondary PIE 3pl forms; grey: most basic form; light green: internally derived by suprasegmental mapping of ɔ to corresponding agentive forms; orange: internally derived by vowel transposition rules and/or accent shift

(22) 3sg *stéːut(i)* 's/he (topic) is praising s.o.' :: 2sg itr *stéːu(i)* :: 3sg detransitive intransitive *suʔ́ːp(i)* 's.o. is falling asleep' (see section 4.2 above)

(23) 1pl exclusive *stéumɛ(s)* 'we (exclusive) are praising s.o.' :: 1pl exclusive *suʔ́pmɔ(s)* 'we (exclusive) are falling asleep, are sleeping; we are putting s.o. into sleep' (the causative reading is found in the antipassive construction)

(24) 3pl intransitive *stéur* 'they are praising someone (someone not mentioned before)' :: *suʔ́pr* 'they are falling asleep'

The internal modifications (internal inflection, transfixal inflection) can be summarized as given in Figures 26 and 27. Most of the forms were derived from other forms by vowel transposition rules. Several detransitive forms were derived by suprasegmental mapping of ɔ onto underlying agentive-active forms. I suggest that the grey-shaded forms were the most basic one, whereas the "Narten protomiddle" form left blank (of the *kéiɔ(i)* type) was presumably originally derived by simple suffixation of ɔ to its base. The singular form of grade II and V[d] were further marked by vowel gemination (plurative marking, *V*-doubling, realized as length).

Without any further additional aspectual marking, these six aspect grades encoded the six basic aspect categories, as outlined above. But since PIE had a COMBINATORY aspect marking system, the grades could be combined with additional aspectual markers, as outlined in the following sections.

4.4.4 Primary and secondary 3pl vowel melodies

It is intricate to identify the correct grade of many 3pl forms. In any case, agentive-active "Narten type" 3pl forms seem to be the most basic and underlying 3pl forms. These forms are shaded grey in Figures 26 and 27. The 3pl forms given in column (2) of Figure 27 are interpreted as primary, that is, as more original or older. However, the status of the pink-shaded form as secondary is very insecure. Maybe it was the primary 3pl form of grade II and was derived from the (grey-shaded) agentive-active form by simple suffixation of -ɔ. But it is difficult to find a derivational base for the grade II form *ḍéʔɔnt* (given in column (2)) in that case. Moreover, the latter looks as if it was derived from the corresponding 3sg detransitive intransitive form *ḍéʔɔ* by suffixation of the plural suffix *-n-* (~ *-r-*), followed by the suffix *-t-*. It is quite tricky to identify the correct derivational direction(s) in this case. For the time being, I have decided to leave the derivational source-goal interpretations as given in that Figure.

5 Infixation

Another aspect category of the imperfective domain was the PIE nasal infix (and suffix) aspect. It is inferential that it had a strong imperfective-like meaning, simply because it is nowhere reflected as aorist in any IE language. Therefore, I suggest that this category signaled both, a narrow INCOMPLETIVE meaning as well as a broader, more polysemous IMPERFECTIVE-DYNAMIC [64] aspectual meaning. However, the evidence points towards the following restriction: This aspect category denoted incomplete dynamic events (subsuming actions and processes), but did not encode habitual or non-habitual states. It was restricted to the eventive-dynamic reading of a given PIE verb, as it could not be combined with its static reading. It was thus used broadly for any kind of incompletive and imperfective dynamic action or process.[65]

(25) *iunécǵt* /iu~n~é_ǵ-t/
connect~INCOMPLETIVE~AGENTIVE_connect-2/3DIR\SG
'3sg (topical) is/was (still) connecting/yoking (it)'

It is often said that it included a transitive factitive-causative component. However, such a component was inherently implied in the meaning of PIE agentive-active inflection, interacting with the given actional-eventive verb reading—and it is quite evident that the nasal aspect also encoded anticausative processes, e.g.:

(26) *ḍ lǵ-* 'make firm, get firm, be firm' → *ḍlnǵʔ́* 's.o. is getting firm'; detransitive intransitive forms also had factitive meaning 's.o. is making s.th. firm' in the antipassive construction; the latter was pleonastically extended to *dʰlnǵʰót* ~ *dʰlnǵʰétⁱ* with factitive meaning 's.o. is making s.th. firm' > Vedic *dr̥̄́hati* 'id.', cf. *LIV*, p. 113

[64] Including ITERATIVE reading of punctual ("semelfactive") verbs.
[65] As such, it may be comparable with the "eventive" aspect of Creek (Muskogee), but with the important exception that the PIE nasal aspect could not refer to punctual events (cf. Martin 2011, chapter 28).

gloss	SINGULAR	PLURAL (GRADE I)	PLURAL (GRADE II)
1EXC	*iunɕ́m	*iunɕmé(s)	
1INC		*iunɕúé(s)	
2ITR	*iunéɕ		*iunéɕɛ(n)
2DIR	*iunéɕt		*iunéɕtɛ(n)
2INV	*iunéɕs		*iunéɕsɛ(n)
3ITR		*iunɕ́r	
3DIR	*iunéɕt	*iunɕ́nt	
3INV	*iunéɕs	*iunɕ́rs	

Figure 28. PIE agentive forms of the nasal infix binyan

gloss	SINGULAR	SINGULAR (GRADE II)	PLURAL	COLLECTIVE
1EXC	*iunɕχá	*iunéɕχa	*iunɕmó(s)	*iunɕmó(χ)
1INC			*iunɕúó(s)	*iunɕúó(χ)
2ITR	*iunɕχá	*iunéɕχa	*iunɕχá(n)	*iunɕáχ(m)
2DIR	*iunɕχá	*iunéɕtχa	*iunɕtχá(n)	*iunɕtáχ(m)
2INV	*iunɕχá	*iunéɕsχa	*iunɕsχá(n)	*iunɕsáχ(m)
3ITR	*iunɕ́	*iunéɕɔ	*iunɕŕ́	*iunɕáχ(m)
3DIR	*iunɕtó	*iunéɕtɔ	*iunɕntó	*iunɕtáχ(m)
3INV	*iunɕsó	*iunéɕsɔ		*iunɕsáχ(m)

Figure 29. PIE detransitive forms of the nasal infix binyan

(27) *ḫ̯_uḍ̯- 'wake up, be awake, attentive' → *ḫ̯unḍ́ó 's.o. is awakening, was (still) awakening (... when x happened)', cf. *LIV*, p. 82f.

The incompletive-imperfective aspect category was expressed by infixation of the PIE nasal infix *~n~* and by suffixation of its allomorph, the nasal suffix *-n_u-*. The nasal infix consonant frame was combined with grade I, but 2pl (and 1pl[?]) agentive forms and singular detransitive forms could be combined with grade II, e.g. **iunéɕtɛ(n)*. I will return to the encoding of 2pl (and 1pl[?]) forms by grade II below. The PIE nasal infix pattern (binyan) is given in Figures 28 and 29.

The infix *~n~* and the suffix *-n_u-* were in complementary distribution, the choice of which was triggered by the structure of the root or inflectable base: Triradical inflectable bases ending in a plosive *T* or fricative (e.g. **i_uɕ-* 'to connect, yoke') had to be infixed. Inflectable bases ending in a plosive *T* or fricative *F* could be infixed or suffixed. Other inflectable bases (e.g. **ɾ̥_r-* 'to rise, raise) were suffixed by *-n_u-*. Thus, the consonant frame marked by the nasal infix *~n~* (e.g. **iu~n_ɕ-*) was derived from its root (**i_u-*) and inflectable base (**i_u-ɕ-*) by somehow 'splitting up' and 'prolonging' the monosyllabic inflectable base template on the word form template tier yielding a metrically disyllabic nasal infixed consonant frame CV_x*~n~*$\_V_2$*C-*, e.g. **i_uɕ-* → **iu$_\sigma$~n~$_V_2$ɕ-* (with $_\sigma$ = syllable boundary; V_x represents the additional vowel slot of the initial syllable). The inflectable base template was thus split up into its consonantal onset *C(R)-* and the base-final consonant *-C*, and the nasal infix *~n~* including a following vowel slot $\_V_2\_$ was infixed in between these two segmental strings, as illustrated by the Figure 30ff.

Inflectable bases including a sonorant /m n l r i u/ (cover symbol *R*) or two sonorants of the shapes *C_RC-*, *CR_C-*, *CR_RC-* (e.g. **ʔl_uḍ̯-* 'to go up, grow, increase') thus underwent syllabification of the sonorant preceding the base-final consonant (e.g. **ʔlu~n~$_V_2$_ḍ̯*). This sonorant was syllabified as the nucleus of the initial syllable. The first vowel slot V_x of the disyllabic nasal infixed consonant frame CV_x*~n~*$\_V_2$*C-* did not belong to the vowel melody template; and a vowel of the vowel melody could not be mapped upon it. This additional vowel slot was somehow templatically 'blank' and open to be filled by the leftmost syllabifiable sonorant of the inflectable base, see Figure 30, where the /u/ of /iunéɕt/ fills the blank vowel slot V_x.

The vowel slot $\_V_2\_$ following the nasal infix was either occupied by the initial vowel of the vowel melody, which as a rule had to be the accented 'bare' vowel, or it remained (morphologically) unoccupied. In case it was occupied by the 'bare' vowel *_é_* of the respective vowel melody, the nasal infix, as a rule, was the onset of the second syllable, e.g. **iunéɕt(i)* → [ju]$_\sigma$['nɛk]$_\sigma$[ti]$_\sigma$, as illustrated by Figure 30. However, in case it was unoccupied, the nasal infix belonged to the coda of the initial syllable, e.g. **iunɕ́ɔ́-* → [jun]$_\sigma$['ɕɔ]$_\sigma$, see Figure 31.

Roots of the shape *K_K-* (with *K* = any plosive, fricative, or glottal stop; e.g. **ḫ̯_ɢ-* 'to break (up)') showed a secondary vowel [ɛ] occupying the initial vowel slot V_x. This secondary vowel did not belong to the vowel melody. It just occupied the initial vowel slot of the disyllabic nasal infix consonant frame template CV_x*~n~*$\_V_2$*C-*, e.g. **ḫ̯(ɛ)nékti* 's/he (topic) is breaking it (up)' (> Vedic *bhanákti*, etc.[66]) → [bɛ]$_\sigma$['nɛk]$_\sigma$['ti]$_\sigma$, as illustrated by the metrical analysis of the corresponding non-progressive 3sg form **ḫ̯(ɛ)néɕt* in Figure 32:

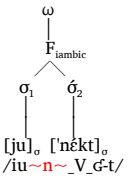

Figure 30. Syllabification of PIE nasal infixed forms I

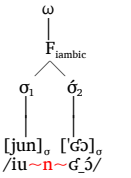

Figure 31. Syllabification of PIE nasal infixed forms II

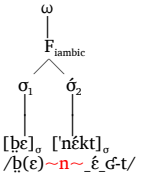

Figure 32. Syllabification of nasal infixed forms III

Nasal infixed agentive singular forms thus always had one more syllable compared to corresponding underlying non-infixed agentive singular forms. This tendency towards increasing the number of syllables compared to the underlying forms may be the reason why 2pl agentive forms and singular detransitive forms could be combined with a

[66] Cf. *LIV*, p. 66.

grade II vowel melody _é_ɛ_ or _é_ɔ_, respectively. Since the underlying 2pl agentive forms had a disyllabic metrical structure, the "derived" forms could be formed with a disyllabic-plus-one-syllable (trisyllabic) metrical structure:

(28) 2/3sg agentive direct **iéucꝛt* (monosyllabic base) → "derived" 2/3sg agentive direct **iu.néꝛt* (disyllabic) (NB. the full stop . indicates the syllable boundary here)

(29) 2pl agentive direct **iucꝛté(n)* (disyllabic base) → "derived" 2pl agentive direct **iunéꝛtɛ(n)* (trisyllabic)

Therefore, the use of the grade II vowel melody _é_ɛ_ (and detransitive _é_ɔ_) saturated the trisyllabic metrical structure (= + one more syllable) of these "derived" 2pl agentive and singular detransitive forms. The same was true for the formal relationship between the underlying singular detransitive forms and the "derived" ones, as illustrated below:

(30) 3sg detransitive intransitive **iucꝛ́ɔ́* (disyllabic base) → "derived" 3sg detransitive intransitive **iunꝛ́ɔ́* (disyllabic) ~ **iunéꝛɔ* (trisyllabic)

Vedic *punīṣé* (RV 7.85.1) (< °*-nH-sʔói*) reveals that the nasal aspect was not incompatible with the conative-desiderative suffix *-ʔs-* ~ *-s-* (see section 6.3). This combination perhaps had immediate-future time reference, as in Vedic ('I am now committing myself to purifying O') at the very beginning of a song. The nasal infix *~n~* and nasal suffix *-n_u-* also occurred in combination with the optative-irrealis mood suffix *-i_ʔ-*. Thus combined, the optative mood had incompletive-imperfective aspectual meaning:

(31) **gʰn~n~ʕ-iéʔ-m*
(get.to.)know~INCOMPLETIVE~know-OPT:AGT-1\SG
(*a*) 'I wish I would still know (it/him/her); (*b*) 'I presume that I would still know (it/him/her); (*c*) '(if x was the case ...) I presume that I would still know (it/him/her)'

Thus the nasal aspect was perhaps simply the PIE "older" eventive (actional and processual) IMPERFECTIVE.

6 Suffixation

6.1 Incompletive aspect

The suffixation of *-n_u-* principally ran in parallel with the infixation of *~n~*. As just outlined, these markers were allomorphs in complementary distribution. The PIE nasal suffix binyan is given in Figures 33 and 34. However, differently from the infix *~n~*, this suffix *-néu-* ~ *-nu-* automatically increased the number of syllables of the "derived" forms by +1 syllable. Therefore, this pattern had grade I throughout and grade II forms did not occur. This difference of the two patterns strengthens the case for a metrical explanation, as it has been provided here, simply because the difference in gradation remains inexplicable or not easy to explain otherwise.

6.2 Punctual-casual aspect

PIE had another aspect encoded by suffixation of *-sk-* to the inner aspect slot (slot *A* or 1) of the consonant frame. This suffix is reflected as *-sḱo/e-* stem suffix in the IE languages, where it often codes iterative-imperfective stems. However, it also occurs as marker of inchoative present stems and as narrative imperfect suffix. It is thus difficult to sort out its original use.

gloss	SINGULAR	PLURAL
1EXC	**iunéum*	**iunumé(s)*
1INC		**iunuué(s)*
2ITR	**iunéu*	**iunué(n)*
2DIR	**iunéut*	**iunuté(n)*
2INV	**iunéus*	**iunusé(n)*
3ITR		**iunuér*
3DIR	**iunéut*	**iunuént*
3INV	**iunéus*	**iunuérs*

Figure 33. PIE agentive forms of the nasal suffix binyan, e.g. **i_u-* 'to hold'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**iunuχá*	**iunumɔ́(s)*	**iunumɔ́(χ)*
1INC		**iunuuɔ́(s)*	**iunuuɔ́(χ)*
2ITR	**iunuχá*	**iunuχá(n)*	**iunuáχ(m)*
2DIR	**iunutχá*	**iunutχá(n)*	**iunutáχ(m)*
2INV	**iunusχá*	**iunusχá(n)*	**iunusáχ(m)*
3ITR	**iunuɔ́*	**iunurɔ́*	**iunuáχ(m)*
3DIR	**iunutɔ́*	**iununtɔ́*	**iunutáχ(m)*
3INV	**iunusɔ́*		**iunusáχ(m)*

Figure 34. Corresponding detransitive forms, e.g. **i_u-* 'to hold'

Combining all these meanings, I suggest that non-progressive *-sk-* forms conveyed a PUNCTUAL-CASUAL aspectual meaning including PUNCTUAL-INGRESSIVE (or INCEPTIVE), PUNCTUAL-ACCIDENTAL, and SPONTANEOUS or CASUAL (and perhaps also OCCASIONAL) readings. It is simply glossed PUNC here.

(32) **gʷm-sk_ɔ́*
come-PUNC_GRADEI.DETRANSITIVE.ITR.3SG
's.o. came, s.th. came about at once, suddenly, casually'

(33) **gn̥ʔ-sk_ɔ́*
generate/be.born-PUNC_GRADEI.DETRANSITIVE.ITR.3SG
's.o. was born at once, suddenly; s.o. generated s.th. or s.o. at once, suddenly, casually'

(34) **ʔr-sk_ɔ́*
hit-PUNC_GRADEI.DETRANSITIVE.ITR.3SG
(*a*) 's.o. hit s.o. at once, suddenly'
(*b*) 's.o. just kept hitting someone'
(*c*) 's.o. hit s.o. casually (iteratively on some occasions)'
(*d*) 's.o. hit s.o. occasionally'

Cf. Latin *nāscor*, *nāscitur* 'is born, comes into being, arises', and Vedic *ṛcchá-*[ti] 'hits, meets accidentally', cf. *LIV*, s.vv. In my view, non-progressive forms only occurred combined with the nondurative grade I. The pattern is given in Figure 35, where the suffix is colored red.

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ʔrskχá*	**ʔrskmɔ́(s)*	**ʔrskmɔ́(χ)*
1INC		**ʔrskuɔ́(s)*	**ʔrskuɔ́(χ)*
2ITR	**ʔrskχá*	**ʔrskχá(n)*	**ʔrskáχ(m)*
2DIR	**ʔrsktχá*	**ʔrsktχá(n)*	**ʔrsktáχ(m)*
2INV	**ʔrsksχá*	**ʔrsksχá(n)*	**ʔrsksáχ(m)*
3ITR	**ʔrskɔ́*	**ʔrskɔ́r* ~ **ʔrskrɔ́*	**ʔrskáχ(m)*

Figure 35. PIE forms of the (deponential) punctual-casual aspect, e.g. **ʔ_r-* ~ *ʔar-* 'to hit, meet with, come into contact with, fit, conjoin'

Non-progressive forms were roughly equivalent to the use of the English adverbs 'at once, suddenly, casually' and/or the English prepositional phrase 'by sudden impact', 'by accident' or the like. Due to these accidental or

casual readings, the PIE *-sk-* aspect was deponential. As mentioned above, PIE lacked 3rd person direct and inverse forms of many deponential binyanim. Recall that a 3rd person animate causer or inanimate causer or cause (in "A" relation) had to be coded by the PIE antipassive construction:

(35) a. PIE antipassive construction with inanimate A
dɔ́ru *ʔrskɔ́* *pχtér-m*
wood.ABS hit:PUNC:DTR:ITR:3SG father-ALL
'lance suddenly hit (at) (my) father'

b. PIE noncanonical antipassive with animate A
**χnér-s* *ʔrskɔ́* *pχtér-m*
man-ERG hit:PUNC:DTR:ITR:3SG father-ALL
'man suddenly hit (my) father'

Corresponding progressive forms of the *-sk-* aspect interacted with the punctual-casual basic meaning, thus often introducing an iterative and/or occasional-frequentative[67] component, depending on the underlying aspectual lexical meaning:[68]

(36) **gʰnʔ-sk_ɔ́-i*
dito-PUNC_GRADEI.DETRANSITIVE.ITR.3SG-PROGRESSIVE
(*a*) 's.o. is, was generated in a sequence of sudden moments'
(*b*) 's.o. is, was generated occasionally'

(37) **ʔr-sk_ɔ́_i*
hit-PUNC_GRADEI.DETRANSITIVE.ITR.3SG_PROGRESSIVE
's.o. is, was hitting s.o. in a sequence of sudden moments'

Corresponding progressive forms could lack the accidental component—or sporadically lost it and developed into iterative-frequentatives. Nevertheless, non-progressive forms and progressive forms were characterized by the same constructional constraints. Therefore, this binyan also lacked progressive direct and inverse transitive forms. However, progressive forms had variants with PLURATIVE grade II marking (cf. Old Latin *escit* :: Gk. *ἔσκε*):

(38) **ʔsskɔ́i* ~ **ʔéskɔi*
(*a*) 's.o. is, was just casually sitting there'
(*b*) 's.o. is, was (sitting) there (... when x happened)'
(thus also **gʰnás-sk_ɔi* > Lat. *(g)nōscit*, Greek γι-γνώσκει 'recognizes' with additional reduplication γι-, etc.)

Later 3rd person intransitive forms of this binyan were extended by neoactive 3sg endings *-t(i)* or *-e(i)* ~ *-eti* and 3pl endings *-ont(i)* ~ **-onto(i)*, as illustrated below:

(39) 3sg **ʔrskɔ́(i)* → **ʔr̥sk̂ót* ~ **ʔr̥sk̂éi* ~ **ʔr̥sk̂éti* (> Vedic *ṛcchá-*[ti], etc.), 3pl **ʔrskrɔ́* ~**ʔrskɔ́r* → replaced by neoactive **ʔr̥sk̂ónt(i)* ~ middle **ʔr̥sk̂ónto(i)* (due to the productivity of the post-PIE 3pl endings *-ont* ~ *-onto*)

Let me further suggest that similar to the "spontaneous-casual" suffix in Creek (Muskogee)[69] this suffix *perhaps* was used in the clause that specifies the cause of an event:

(40) **né* *uɛ̀id-ʔs-χ_a_i*
NEG see-CONATIVE-1SG.DETRANSITIVE _GRADEII-PRG\L
'I am not going to see (visit) him ...'
ʔs-sk_ɔ́_i
be.there-PUNC_GRADEI.DETRANSITIVE.ITR.3SG_PRG
'... just because he is casually there.'

[67] Cf. the definition of "iterative" and "frequentative" given by Bybee, Perkins & Pagliuca 1994: 317 (appendix B).
[68] But recall that many PIE verbs were aspectually polysemous.
[69] Cf. Martin 2011: 251-254

(Any uncontrollable cause can be felt as a *force majeure*. This may explain why such a reading can also be expressed by the given suffix in Creek)

Let me further suggest that the punctual suffix *-sk-* is comparable to a nominal diminutive marker because the event is coded as 'temporally small, punctual, and casual'. Note that PIE also had a nominal suffix *-s_k-*, e.g. **péiksɔk* in. 'fish (generic), loc. **piksɔ́k*, abl.-gen. **piskɔ́s* (> Proto-Germanic **fiska-* 'fish' m.), derived from **pi_k-* 'to pick out (with a stick), paint (with a stick-like object), scratch; decorate' (or its variant **pi_g-* 'paint'), cf. *LIV*, 464, 465f.

6.3 Conative mood

I suggest that the PIE modal suffix *-ʔs-* (glossed CON) and its phonologically simplified allomorphic by-form *-s-* had a CONATIVE-DESIDERATIVE-COMMISSIVE meaning and was thus roughly equivalent to the use of English 'to try to do' or 'to plan to do', 'to wish to do', 'to want to do', 'to be going to do', 'to intend to do', 'to commit oneself to doing' and similar uses. In parallel with the *-sk-* aspect, as outlined in the foregoing section, the conative mood was deponential. Again, this modal category lacked 3rd person direct and inverse transitive forms. Again, a 3rd person animate causer or inanimate causer or cause (in A relation) had to be used within the PIE antipassive construction (see examples 35ab).

The conative-commissive mood was further used to code volitional (intentional) actions with FUTURE time reference. Such a categorical polysemy is a common crosslinguistic pattern. This suffix could be combined with grade I and with grade II. It could also be combined with the reduplication templatic prefix *Ci-*. The PIE patterns are given in the Figures below. The conative suffix is colored red.

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**uid**ʔs**χá*	**uid**ʔs**mɔ́(s)*	**uid**ʔs**mɔ́(χ)*
1INC		**uid**ʔs**uɔ́(s)*	**uid**ʔs**uɔ́(χ)*
2ITR	**uid**ʔs**χá*	**uid**ʔs**χá(n)*	**uid**ʔs**áχ(m)*
2DIR	**uid**ʔs**tχá*	**uid**ʔs**tχá(n)*	**uid**ʔs**táχ(m)*
2INV	**uid**ʔs**sχá*	**uid**ʔs**sχá(n)*	**uid**ʔs**sáχ(m)*
3ITR	**uid**ʔs**ɔ́*	**uid**ʔs**ɔ́r* ~ **uid**ʔs**rɔ́*	**uid**ʔs**áχ(m)*

Figure 36. PIE forms of the conative mood (grade I), e.g. **u_id-* 'to see'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**uéid**ʔs**χa*	**uéid**ʔs**mɔ(s)*	**uéid**ʔs**mɔ(χ)*
1INC		**uéid**ʔs**uɔ(s)*	**uéid**ʔs**uɔ(χ)*
2ITR	**uéid**ʔs**χa*	**uéid**ʔs**χa(n)*	**uéid**ʔs**aχ(m)*
2DIR	**uéid**ʔs**tχa*	**uéid**ʔs**tχa(n)*	**uéid**ʔs**taχ(m)*
2INV	**uéid**ʔs**sχa*	**uéid**ʔs**sχa(n)*	**uéid**ʔs**saχ(m)*
3ITR	**uéid**ʔs**ɔ*	**uéid**ʔs**ɔr* ~ **uéid**ʔs**rɔ*	**uéid**ʔs**aχ(m)*

Figure 37. PIE forms of the conative mood (grade II), e.g. **u_id-* 'to see'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**d̰id̰**ʔs**χá*	**d̰id̰**ʔs**mɔ́(s)*	**d̰id̰**ʔs**mɔ́(χ)*
1INC		**d̰id̰**ʔs**uɔ́(s)*	**d̰id̰**ʔs**uɔ́(χ)*
2ITR	**d̰id̰**ʔs**χá*	**d̰id̰**ʔs**χá(n)*	**d̰id̰**ʔs**áχ(m)*
2DIR	**d̰id̰**ʔs**tχa*	**d̰id̰**ʔs**tχá(n)*	**d̰id̰**ʔs**táχ(m)*
2INV	**d̰id̰**ʔs**sχa*	**d̰id̰**ʔs**sχá(n)*	**d̰id̰**ʔs**sáχ(m)*
3ITR	**d̰id̰**ʔs**ɔ́*	**d̰id̰**ʔs**ɔ́r* ~ **d̰id̰**ʔs**rɔ́*	**d̰id̰**ʔs**áχ(m)*

Figure 38. PIE forms of the reduplicated conative mood, e.g. **d̰_ʔ-* 'to put, ...'

I am still wondering whether the reduplication prefix *Ci-* coded a distributive-iterative aspectual component ('to try/intend to do s.th. on several occasions, now & then, here & there, affecting a distributed plural "O") or whether it simply indicated a kind of 'diminutive-like' verbal aspect, implying that only a small part of the event, its beginning or just a plan was fulfilled. Maybe the reduplicated pattern was polysemous and both readings were possible. This mood perhaps also indicated a low affectedness of O, e.g. 'I planned to (but only partly) put it there'.

(41) **ǵʷn-ʔs_ó*
slay-CONATIVE_GRADEI.DETRANSITIVE.ITR.3SG
(*a*) 's.o. tried to slay s.o.'
(*b*) 's.o. only partly beat at/slew s.o.'

Later, 3rd person intransitive forms of this binyan were often extended by neoactive 3sg endings *-t(i)* or *-e(i)* ~ *-eti* and 3pl endings *-ont(i)* ~ **-onto(i)*. They are thus continued by IE thematic desiderative stems, subjunctive stems, or future stems (e.g. in Greek), as illustrated by the following example:

(42) 3sg **ḍʰiḍʰ??só* → **ḍʰiḍʰ??sot* ~ **ḍʰiḍʰ??sei* ~ **ḍʰiḍʰ??seti* with accent either on the ending or on the reduplication syllable (> Vedic *dítsa-*[ti], etc.), 3pl **ḍiḍ??srós* ~ **ḍiḍ??sór* → replaced by neoactive **ḍʰiḍʰ??sont(i)* ~ middle **ḍʰiḍʰ??sonto(i)*

However, Vedic 123sg mid. *stuṣé* 'I, you, s/he plan(s) to praise s.o.' (< **stu(ʔ)sχai, *stu(ʔ)sói*) is still an evident remnant of the older athematic conative protomiddle.

gloss	SINGULAR	PLURAL
1EXC	**iuiéʔm*	**iuiʔmé(s)*
1INC		**iuiʔué(s)*
2ITR	**iuiéʔ*	**iuiʔé(n)*
2DIR	**iuiéʔt*	**iuiʔté(n)*
2INV	**iuiéʔs*	**iuiʔsé(n)*
3ITR		**iuiéʔr* ~ **iuiʔér*
3DIR	**iuiéʔt*	**iuiéʔnt* ~ **iuiʔént*
3INV	**iuiéʔs*	**iuiéʔrs* ~ **iuiʔérs*

Figure 39. PIE agentive forms of the regular optative-irrealis modal binyan, e.g. **i_u-* 'to hold'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**iuiʔχá*	**iuiʔmó(s)*	**iuiʔmó(χ)*
1INC		**iuiʔuó(s)*	**iuiʔuó(χ)*
2ITR	**iuiʔχá*	**iuiʔχá(n)*	**iuiʔáχ(m)*
2DIR	**iuiʔtχá*	**iuiʔtχá(n)*	**iuiʔtáχ(m)*
2INV	**iuiʔsχá*	**iuiʔsχá(n)*	**iuiʔsáχ(m)*
3ITR	**iuiʔró*	**iuiʔró*	**iuiʔáχ(m)*
3DIR	**iuiʔtó*	**iuiʔntó*	**iuiʔtáχ(m)*
3INV	**iuiʔsó*		**iuiʔsáχ(m)*

Figure 40. Corresponding detransitive optative-irrealis forms

gloss	SINGULAR (GRADE I)	PLURAL (GRADE II)
1EXC	**uélʔiʔm*	**uélʔiʔmɛ(s)*
1INC		**uélʔiʔuɛ(s)*
2ITR	**uélʔiʔ*	**uélʔiʔɛ(n)*
2DIR	**uélʔiʔt*	**uélʔiʔtɛ(n)*
2INV	**uélʔiʔs*	**uélʔiʔsɛ(n)*
3ITR		**uélʔiʔr*
3DIR	**uélʔiʔt*	**uélʔiʔnt*
3INV	**uélʔiʔs*	**uélʔiʔrs*

Figure 41. PIE irregular optative-irrealis agentive forms, e.g. **u_lʔ-* 'to wish, want, desire; choose'

6.4 Optative mood

PIE optative-irrealis mood was coded by suffixation of a discontinuous suffix **-i_ʔ-* to the inner mood suffix slot (2 or *M*) on the skeletal consonant frame tier (see Figure 5). The regular optative binyan had grade I with the 'bare' vowel *_é_* alternating between the vowel slot of the modal suffix (V_5) and a position to its right, e.g. **ʔsiéʔm* :: **ʔsiʔmé*, etc. The pattern is given in Figure 39 and 40.

6.4.1 Suppositional and volitive-cupitive mood

The PIE optative-irrealis mood had two major uses. Firstly, it indicated speaker-oriented epistemic speculative (hypothetical) and assumptive irrealis mood, that is, the speaker's speculative (pre)supposition. Thus, it was also used in the clause encoding the supposed condition ("if-clause") of conditional constructions, as illustrated by example (43a) below. Furthermore, a weaker supposition and potential reading (roughly equivalent to the use of the English auxiliary *may/might*) was also among its uses:

(43) a. PIE irrealis conditional construction
**(ʔéi) dórus ʔ(a)riʔɔ́ χnér-m* ...
if wood.ABS hit:OPT:DTR:ITR:3SG:L man-ALL
lit. '(if/supposed) lance hit (at) man ...
nú qɛm ~ qam bʰénɔ[70]*/ʕuátχɔ*
&then under.this.condition hurt:DUR:DTR:ITR:3SG
lit. '... and then under this condition he may/shall/will (is strongly expected to) be hurt'

b. "volitive-cupitive" use of the optative
**dórus ʔ(a)riʔó χnér-m*
wood.ABS hit:OPT:DTR:ITR:3SG man-ALL
lit. 'I wish the lance would hit (at) man ...'

c. potential use of the optative
**dórus ʔ(a)riʔó χnér-m*
wood.ABS hit:OPT:DTR:ITR:3SG man-ALL
lit. 'the lance may/might (perhaps) hit (at) man ...'
nu χnér mriʔó
&then man-ALL die:OPT:DTR:ITR:3SG
'... and then the man may/might (perhaps) die'

Example (43b) illustrates the second major use of the optative-irealis: It was also used to indicate the speaker's wish or desire and had a speaker-oriented dynamic "volitive-cupitive" function.

6.4.2 Primary optatives

I suggest that PIE further had a special class of optatives, derived from verbs of wishing and desiring, e.g. **u_lʔ-* 'to wish, want, desire; choose', **u_nH-* 'to wish, love'. Such 'primary' or 'lexical optatives' differed from regular optatives by a different position of the first vowel *_é_* of the vowel melody. Primary optatives had their first 'bare' vowel in the vowel slot of the inflectable base, but not in the vowel slot of the suffix, and plural forms had grade II, as illustrated by Figure 41. It is inferential that only 1st person forms of such optatives were speaker-oriented, that is, indicated the speaker's wish or desire, whereas in other persons the optative marking was not necessarily speaker-oriented (e.g. **uélʔiʔt* '3sg (topic) wishes, wants, desires'). Thus, primary optatives were also used as variants of

[70] Cf. *LIV*, p. 74 "krank werden"; but **b_n-* 'to wound, injure, hurt, make sick' seems to be related to **ǵʷ_n-* 'to beat, kill, slay, hunt'.

former indicative forms of verbs of whishing and desiring or of verbs with a polysemy including such readings. In my view, the use of grade II in plural forms did not encode durative aspectual value in this case, but served as a marker of 1pl and 2pl forms here.[71, 72]

6.4.3 Optative mood and anterior aspect

Furthermore, PIE also had optative forms prefixed by the unaccented reduplication templatic prefix *Cɛ-* indicating anteriority (including counterfactual conditional meaning), as illustrated below:

(44) 1sg agentive anterior opt. **ḍɛḍ̯ʔiéʔm* 'I wish I had done it' or 'I would have done it ... (if x had happened)'

(45) 3sg detransitive anterior opt. **ḍɛḍ̯ʔiʔɔ́* 'it would have been done ... (if x had happened)'

Aside from the reduplication *Cɛ-*, the pattern was identical to the unmarked one, as given in Figures 39 and 40.

6.4.4 Optative mood and incompletive aspect

When combined with the incompletive aspect, the optative mood had incompletive (including counterfactual conditional) meaning ('topic would still be doing it'; cf. Vedic 3rd sg. pres. opt. act. *bhindyāt* (AV), *bhid-* 'split', etc.).

(46) 1sg **b̥r-nu-iéʔ-m* 'I wish I would still be carrying it' or 'I would still be carrying it ... (if x had happened)' (counterfactual)

Aside from the infix or suffix, the pattern was identical to the regular unmarked one, cf. Figures 39-40 again.

6.5 Person and direction marking

6.5.1 1st person marking

1st person marking was achieved by three different suffixes (*-m-*, *-u-*, *-χ-* and by *-mχ-*). PIE had a 1st person exclusive vs. inclusive distinction. Agentive-active 1sg, 1pl, 1col exclusive forms were marked by the 1st person exclusive suffix *-m-*, whereas corresponding 1pl, 1col inclusive forms were marked by the 1st (including 2nd) person inclusive suffix *-u-*. Detransitive 1sg forms were marked by the continuous detransitive suffix *-χ-*. They were formally identical to 2sg detransitive intransitive forms. PIE also had specific 1sg detransitive forms encoded by a combination of both markers *-mχ-*; see Figures 42 and 43.

gloss	SINGULAR	PLURAL
1EXC	*-m-*	*-m_*
1INC		*-u_*

Figure 42. PIE agentive-active 1st person markers

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	*-χ_* ~ *-mχ_*	*-m_*	*-m_*
1INC		*-u_*	*-u_*
2ITR	*-χ_*	*-χ_*	*-_χ-*

Figure 43. Corresponding detransitive 1st person (and 2nd person intransitive/imperative) markers

[71] From PIE to post-PIE, this pattern spread to some root aorist optatives, cf. Av. *zaēmā, varəzimācā, srəuuīmā, vainīṯ*, Vedic *dheyām, deyām*, Gk. *θεῖμεν*, etc., cf. Gotō 2013: 95 with references.

[72] PIE also had a special set of EMBEDDED DETRANSITIVE OPTATIVE forms, encoded by grade II, e.g. **bérɔiʔ*, which preceded the IE thematic optatives (e.g. Vedic *bháre-*), cf. Pooth 2016b (forthcoming).

6.5.2 Direction marking/the PIE inverse system

PIE was a language with an inflectional direct/inverse system.[73] It displayed two specifically deictic DIRECTION suffixes *-t-* and *-s-* in addition to zero. These two markers encoded the source or the goal, respectively, of the agentive causation force with regard to the topical referent. These two suffixes thus coded the respective direction of causative force and transitivity, going over from a first participant to a second participant.

Direction *towards* a nontopical 3rd person referent (with a 2nd person or topical 3rd person source) was encoded by the direct suffix *-t-* (glossed DIR). Direction starting from a 2nd person going over to a 1st person or starting from a topical 3rd person going over to a 2nd person or starting from a nontopical 3rd person going over to a topical 3rd person was marked by the INVERSE suffix *-s-* (glossed INV). As usual, PIE also had a person hierarchy or general topicality hierarchy triggering the use of the respective direct or inverse forms; see Figure 44 (where > means 'higher ranked than, higher in (general) topicality than'):

1st > 2nd > topical 3rd > other 3rd

Figure 44. The PIE person hierarchy

The direct transitive form was used when a 2nd person causer (or agent-causer) was acting upon a 3rd person patient causee. The inverse form was used when a person ranked lower on the person hierarchy was agent and causer and acting upon a higher ranked person.

(47) a. **g̈ʷén-t*
slay/hunt:NDUR:AGT:SG-DIRECT
(*a*) 'you (sg.) slew him',
(*b*) 'he (topical) slew him/them (nontopical)'

b. **g̈ʷén-s*
slay/hunt:NDUR:AGT:SG-INVERSE
(*a*) 'you (sg.) slew me',
(*b*) 'he slew me',
(*c*) 'he slew you (sg./pl.)',
(*d*) 'he (nontopical) slew him/them (topical)'

The direct and inverse forms were also used to code switched referents, perhaps even in case the less topical or "anti-topical" (or "obviative") referent was involved in an intransitive event. For saving space I leave away the gloss for the inflectable base in some of the following examples:

(48) a. **χnér-s* *méḍ̯u* *dʕ-t_ɔ́*
man-ERG honey.ABS DIRECT_NDUR:DTR:3SG
nu *páʕ-t*
&then swallow:NDUR:AGT:SG-DIR\SG
'the man$_i$ (topic) took honey & then *he*$_i$ swallowed it'

b. **χnér-s* *méḍ̯u* *dáʕ-t*
man-ERG honey.ABS NDUR:AGT.SG-DIRECT\3
nu *páʕ-s*
&then swallow:NDUR:AGT:SG-INV\3
'the man$_i$ gave honey to s.o. & then *that person*$_j$ swallowed it'

(49) a. **χnér* *g̈ʷéntχa* *gʷáʕu-m-s*
man.ABS hunt:DUR:DIR:2SG.DTR cow-ALL-PL

[73] For direct/inverse systems cf. Jacques & Antonov 2014.

mr̥sə̀
die:INVERSE:3SG:NDUR:DTR:L(CLAUSE.COMBINED[74])
'as for man$_i$, while you (higher) were hunting at cows, he$_i$ (lower) died'

b. **χnér-s* *gʷʰénɔ* *gʷʰáʕu-m*
man-ERG hunt:DUR:ITR:3SG.DTR cow-ALL
b̥uɑ́ʕə̀
flee:INVERSE:3SG:NDUR:DTR:L(CLAUSE.COMBINED)
'as for man$_i$, while he$_i$ (topical) was hunting at a cow$_j$, the cow$_j$ ("obviative") flew'

As already outlined above, the PIE inverse system also included 2/3sg, 2/3pl, 2/3col INTRANSITIVE forms lacking a direction marker (*-t-* or *-s-*). The intransitive forms were used with an intransitive meaning in case there was no transitivity or causation.

But PIE detransitive intransitive forms were generally labile and underspecified (or polysemous) for direction. The detransitive intransitive forms were thus used in the PIE antipassive construction, where transitivity direction was unmarked and underspecified on the verb form, but was otherwise syntactically indicated by a specific allative or locative goal case:

(50) a. **χnér-s* *gʷʰénɔ* *gʷʰáʕu-m-s*
man-ERG hunt:DUR:ITR:3SG:DTR cow-ALL-PL
'man hunted (for a while) at cows'

b. **gʷʰáʕuɛ* *gʷʰénɔ*
cow.ABS.PL hunt:DUR:ITR:3SG:DTR
'cows were hunted at (for a while); s.o. hunted at cows (for a while)'

c. **gʷʰáʕuɛ* *gʷʰénɔr ~ gʷʰénrɔ*
cow.ABS.PL hunt:DUR:ITR:DTR:3PL
'some people hunted cows (for a while)'

It is further possible that 3rd person inverse optative-irrealis forms were used in case the speaker's emotional wish or desire was involved, whereas direct forms were used otherwise:

(51) a. **χnér* *b̥uχ-ié?-s*
man.ABS grow-OPT:SG-INVERSE
'I wish 2/3sg would grow a man' or 'if only 2/3sg grew a man'

b. **χnér* *b̥uχié?-t*
man.ABS grow-OPT:SG-DIR\3
'(if x happened...) ... 2/3sg would turn into a man'

NB. This does not imply that a volitive-cupitive reading was impossible with optative intransitive forms. It is only suggested that the inverse form was preferred in that case.

It is finally inferential that the PIE direct vs. inverse opposition (e.g. 2/3sg direct **pré:kt* 'asked, demanded' vs. inverse **pré:ks*) collapsed by the time when the PIE antipassive construction with ergative or absolutive and allative-dative was syntactically reanalyzed as the new post-PIE unmarked transitive construction including a new-born nominative and accusative alignment. The PIE inverse forms were pleonastically extended by the former direct suffix *-t-* yielding post-PIE forms with a new sigmatic 3sg ending *-st* (e.g. **pré:kst*). Likewise, other inverse endings were pleonastically extended by ˚*t*˚ further yielding analogical endings including newer ˚*st*˚ instead of older ˚*s*˚ (2pl act. *-ste(-)*, 3sg middle *-sto*, 3du *-staχ(m)*, etc.). These were reanalyzed as new sigmatic aorist stems (**[e]prə́k-s-[t]*) only after Proto-Anatolian branched off. As outlined in a forthcoming article,[75] the development of the sigmatic aorist stem was (just) a parallel innovation of Proto-Indo-Iranian, Proto-Greek and other IE branches in areal contact.

[74] On the clause-combining or subordinating/coordinating function of L = low(ered) tone see section 10.1; cf. Pooth 2016b (forthcoming).

6.5.3 Appendix on the PIE inverse suffix

Let me now provide a reason for identifying *-s-* as inverse suffix.[76] It is internally evident that the suffix *-s-* was also used as a SOURCE marker in ergative-genitive and ablative-genitive case forms (e.g. erg.-gen. sg. **də́m-s* 'family's, of the family', etc.).[77] The *-t-* obviously had a deictic addressee-and-speaker-oriented place and goal meaning, e.g. **tɔ́d* **dɔ́m* '(to) this house (close to addressee and speaker)'. I draw the inference that *-s-* coded a direction *towards* the topical participant originating from the second and non-topical one as the SOURCE of the causation, whereas the *-t-* coded causation towards a GOAL, that is, direction from the topical participant to the non-topical one. Of course, inferences like this one must be based on possible diachronic sources of direct and inverse markers. It has been proposed by many other researchers before that word forms indicating a "cislocative" direction ('hither') towards the speaker (or towards the most topical or topical participant) are a possible source of inverse markers. To illustrate this grammaticalization path, let me just give the following quotation (example numbers are mine):

> "The term 'cislocative' is used to refer to markers expressing a motion towards the speaker, both directional ('verb hither') and associated motion ('come to verb') ones. The inverse marker in Nez Percé (Sahaptian) used in local scenarios with second person acting on first person has grammaticalized from an earlier cislocative marker, reconstructed for Proto-Sahaptian as *-im (Rude 1997, 122).
>
> [52] *héexn-e*
> see-PST
> I saw you.
>
> [53] *héxn-ím-e*
> see-CIS-PST
> You saw me. [PST = PAST, CIS = cislocative]
>
> Interestingly, this marker has also grammaticalized into the ergative case suffix which appears on the non-SAP agent in mixed scenarios in cases where one would expect inverse marking on the verb (Rude 1997, 121-2).
>
> [54] *hi-héxn-e* *háama-nm*
> 3S/A→SAP-see-PST man-ERG
> The man saw me/you. (NEZ PERCÉ)
>
> [...] In still other languages, we observe a formal similarity between some inverse or direct markers and various types of third person markers including agent, patient, or possessive affixes. The clearest case is the inverse prefix found in Sino-Tibetan (Rgyalrongic and Kiranti) languages. As first noticed by DeLancey (1981b), the Situ Rgyalrong third person possessive prefix *wə-* is formally identical to the inverse marker. This is also true of other Rgyalrong languages and of some Kiranti languages that have an inverse marker, such as Bantawa [...]. The similarity between the two sets of prefixes is striking and suggests a grammaticalization from a third person marker into an inverse marker. While the

[75] Cf. Pooth 2016+.

[76] Cf. I am indebted to Guillaume Jacques p.c. for drawing my attention to this problem and helping me to improve the argumentation.

[77] Cf. Pooth 2015b.

exact pathway remains unclear and thus requires further investigation, it is possible that non-finite verb forms carrying a third person possessive prefix were reanalyzed as finite ones. In the case of Sino-Tibetan languages, this scenario probably occurred in the ancestor of both Rgyalrongic and Kiranti languages [...].

(Jacques & Antonov 2014: 325ff.)

The mentioned bidirectional "poly-grammaticalization" in Nez Percé (from "cislocative" both to inverse and ergative marking) looks very similar to what is found in PIE, since the ergative (agent case) suffix *-s* (e.g. PIE **χnér-s* > post-PIE **χné:$^{(r)}$*) and the genitive or ablative-genitive SOURCE suffix **-s* (e.g. PIE **dḗm-s*) were formally identical to the inverse suffix *-s-*. This parallel strengthens the conclusion that *-s-* was the inverse marker and *-t-* the corresponding direct marker.

6.6 Detransitive voice suffixation

The PIE continuous detransitive suffix *-χ-* has been dealt with together with the discontinuous voice marker *ɔ* in section 4.1. This PIE detransitive suffix seems to go back to a pre-PIE impersonal or 2/3 collective marker, which is a very plausible source:

(55) **né gʰus-s_á_χ*
NEG root-INV_NDUR_IMPERSONAL\2/3COLLECTIVE
*'one does not like me/it (topical)' →
(*a*) 'they (collective) do not like me/it (topical)'
(*b*) 'you (2pl collective) do not like me'

6.7 Number marking

6.7.1 Number suffixes

Outside 3pl forms and outside forms of the progressive aspect or debitive mood, PIE number suffixation was non-obligatory and plural and collective number was coded by vowel transposition on the word form template (see section 4.3). However, in addition to transfixal number marking by vowel transposition, 1st person forms could be suffixed by a non-obligatory plural marker *-s-* or a collective-plural marker *-χ-*, and 2pl forms could be suffixed by the 2nd (and 3rd) person plural marker *-n-* (which was one of the two variants of the 3pl suffix *-r-* ~ *-n-*), see Figure 45.

gloss	PLURAL	COLLECTIVE
1EXC	**gʷnmé(s)*	**gʷnmó(χ)*
1INC	**gʷnué(s)*	**gʷnuó(χ)*
2ITR	**gʷné(n)*	**gʷnáχ*
2DIR	**gʷnté(n)*	**gʷntáχ*
2INV	**gʷnsé(n)*	**gʷnsáχ*
3ITR	**gʷnér*	**gʷnáχ*
3DIR	**gʷnént*	**gʷntáχ*
3INV	**gʷnérs*	**gʷnsáχ*

Figure 45. PIE number suffixes (colored red); note that *-χ-* is also analyzed as the 1sg and 2nd person voice suffix (colored blue) [maybe these two markers share a common origin]

In forms further suffixed by *-i* or *-u* in the word-final slot (*F*) and generally in all 3rd person forms, plural marking was obligatory. In 3pl forms, plural marking was achieved by suffixation of the plural number suffix *-r-* ~ *-n-* to the number (*N*) slot. These two variants were in complementary distribution: *-n-* was used before the direct transitive suffix *-t-*, whereas *-r-* was used otherwise.

6.7.2 Appendix: Number agreement

6.7.2.1 A and S_A number agreement

PIE obligatory verbal number agreement was foremost triggered by a given animate agent or causer in A or S_A relation or by a given speech-act-participant (1st or 2nd person) in A and S_A relation. This can be illustrated by examples (56a-d). Note that I leave away the glosses for the inflectable base and for aspect:

(56) a. **ʔiúsˢ⁷⁸* *gʷnérs*
2PL.TOP 3PL:AGENTIVE:INVERSE
'as for you$_O$ (pl), they$_A$ beat you'

b. **ʔiús* *gʷnntó*
2PL.TOP 3PL:DETRANSITIVE:DIRECT
'as for you$_O$, they$_A$ beat you for their own benefit'

c. **ʔiús* *gʷnté(n)*
2PL.TOP 2PL:AGENTIVE:DIRECT
'as for you$_A$, you beat it/them'

d. **ʔiús* *gʷné(n)*
2PL.TOP 2PL:AGENTIVE:INTRANSITIVE
'as for you$_S$, you beat s.o.'

A 1st and 2nd person non-agent in S_O relation also triggered obligatory number agreement with detransitive intransitive verb forms, as illustrated by the following examples:

(57) a. **ʔiús* *gʷnχán*
2PL.TOP 2PL.DETRANSITIVE.INTRANSITIVE
'as for you$_S$, you were beaten (by s.o.)'

b. ungrammatical
†*ʔiús* *gʷnró*
2PL.TOP 3PL:DETRANSITIVE:INTRANSITIVE

c. ungrammatical:
†*ʔiús* *gʷnó*
2PL.TOP 3SG:DETRANSITIVE:INTRANSITIVE

A topical 3rd person animate non-agent in S_O relation, however, did not trigger number agreement of agentive-active verb forms and detransitive forms of verbs belonging to the AGENTIVE-CAUSATIVE VERB CLASS (e.g. **gʷ_n-* 'to slay, kill, beat, hunt'). Instead, there was an implicit and non-topical 3rd person animate agent or causer triggering 3rd person verbal number marking:

(58) a. **χnér_ɛ* *gʷnór*[79] ~ *gʷnró*
man.ABS_PL 3PL:DETRANSITIVE:INTRANSITIVE
'as for men, some people beat them'

b. **χnér_ɛ* *gʷnó*
man.ABS_PL 3SG:DETRANSITIVE:INTRANSITIVE
'as for man, some people beat him'

c. **χnér* *gʷnór* ~ *gʷnró*
man.ABS 3PL:DETRANSITIVE:INTRANSITIVE
'as for man, some people beat him'

d. **χnér* *gʷnó*
man.ABS 3SG:DETRANSITIVE:INTRANSITIVE
'as for man, someone beat him'

[78] Phonetically */ʔiɛ́us/*, realized → ['ʔju:s]. The basic pronominal stem was */ʔi-/* 'the one I talk about; the one I talk to', to which the 2nd person suffix */-u-/* and the plural suffix */-s/* was added.

[79] PIE 3pl detransitive intransitive forms ending in *_ɔr(i)* were later reanalyzed as post-PIE 3sg forms ending in *-or(i)*, whence *-r(i)* spread as a new marker of the middle, cf. Pooth 2014: 177f.

6.7.2.2 Non-obligatory S_O number agreement

Labile 3rd person detransitive intransitive forms of LABILE verbs showed non-obligatory number agreement with a topical animate S relation, if this was S_O, that is, if it was no animate agent or causer, as in (59c):

(59) a. **χnér_ɛ* *ḫéuḍɔ*
man.ABS_PL 3SG:DETRANSITIVE:INTRANSITIVE
lit. 'as for men, it was attentive/awake' or 'as for men, there was being attentive'

b. **χnér_ɛ* *ḫéuḍɔr*
man.ABS_PL 3PL:DETRANSITIVE:INTRANSITIVE
'as for men, they were attentive'

c. **χnér_ɛ-s* *ḫéuḍɔr* *gʷʰáʕu-m-s*
man_PL-ERG 3PL:DTR:ITR cows-ALL-PL
'men made cows attentive/awoken'

The construction given in example (59a) was remodeled to a post-PIE intransitive construction with nominative subject and allomorphic 3sg and 3pl verb forms **χnéres*$_{\text{NOM.PL.MASC}}$ **bʰéudʰo* (→ **bʰéudʰe*) ~ **bʰéudʰont(o)* 'the men were awake.' I suggest that this PIE construction lacking S_O number agreement was the ultimate basis for the emergence of a transnumeral 3rd person form from PIE to Proto-Baltic via generalizing transnumerality to all 3rd person forms.

Sporadically, a lack of number agreement is found in Hittite with a 3sg intransitive middle form and nominative plural forms, e.g. KUB 8.1 iii 8-9 *ḫēwēš kīša* 'rains will occur', lit. 'rains: it occurs'.[80] I suggest that these nominative plural forms once replaced PIE absolutive plural forms in undergoer role. Similarly in Early Vedic, a "passive aorist" 3sg aor. injunctive *várti* occurs with nominative dual, plural and singular forms (lacking number agreement with the first mentioned subject *ródasī*), cf. RV 8.6.38 *ánu tvā ródasī ubhé cakráṃ ná vartˌyétaśam ánu suvānā́sa índavaḥ* "dir nach (rollen) die zwei Welten, die beiden [3du.S], wie das Rad [3sg.S] dem Etaśa nachrollt, (so auch) die ausgepressten Säfte [3pl.S]" (German translation mine).[81]

An inanimate 3rd person topic in S_O relation did not trigger obligatory number agreement, but could show non-obligatory collective number agreement, as illustrated below. This corresponds to the non-obligatory nominal number marking of PIE inanimate nouns (e.g. **dɔ́ru-* 'wood(s)'), which were transnumeral:

(60) a. **dɔ́ru(χ)* *kéiɔ*
wood.ABS(COL) 3SG.DETRANSITIVE.INTRANSITIVE
(*a*) anticausative: 'as for woods, they were lying there'
(*b*) causative: 'as for woods, they were put down by someone'

b. **dɔ́ru(χ)* *kéiaχ*
wood.ABS(COL) 3COL.DETRANSITIVE.INTRANSITIVE
(*a*) anticausative: 'as for woods, they were lying there'
(*b*) causative: 'as for woods, they were laid/put down by a group of people' (collective causer)

[80] Cf. Hoffner & Melchert 2008: 241 (§15.17).
[81] But note that the Vedic 3sg number agreement may simply be triggered by the preceding nom. sg. n. *cakrám ná varti* 'like a wheel rolls'.

6.7.2.3 Non-obligatory inanimate S_A number agreement

As a rule, PIE topical 3rd person inanimate causer (or cause) in "A" relation had to be turned into S_A of an antipassive construction. This inanimate S_A did not trigger obligatory number agreement, but could show non-obligatory collective number agreement, as illustrated by the examples below.

(61) a. **dɔ́ru(χ)* *ʔrɔ́* *χnér-m*
wood.ABS(COL) hit:NDUR:ITR:DTR:3SG man-ALL
'as for woods, it hit (at) man'

b. **dɔ́ru(χ)* *ʔráχ* *χnér-m*
wood.ABS(COL) hit:NDUR:ITR:DTR:3COL man-ALL
'as for woods, they hit (at) man'

6.7.2.4 Obligatory S_O number agreement

A topical 3rd person animate non-agent in S_O relation triggered obligatory number agreement of detransitive intransitive forms of AGENTIVE-IMPERSONAL/NATURAL FORCE [82] verbs (such as PIE **m̥_r-* 'to vanish, die'):

(62) a. **χnér_ɛ* *mrrɔ́ ~ mért*
man.ABS_PL 3PL:DTR:ITR ~ 3SG.AGT.DIR
'as for men, they died ~ it vanished them'

b. **χnér* *mrɔ́ ~ mért*
man.ABS.SG 3SG:DTR:ITR ~ 3SG:AGT.DIR
'as for man, he died ~ it vanished him'

The same was true for the anticausative reading of 3rd person detransitive intransitive forms of DEPONENT-INTRANSITIVE VERBS,[83] which were labile and had a contextual converse-causative (i.e. inagentive-stative and passive) reading (e.g. **k̥_i-* 'to lie, be put down'):

(63) a. **χnér_ɛ* *kéiɔr*
man.ABS_PL 3PL.DETRANSITIVE:INTRANSITIVE
(*a*) anticausative: 'as for men, they were lying there'
(*b*) causative: 'as for men, some people were putting them down'

b. **χnér* *kéiɔr*
man.ABS.SG dito
causative: 'as for man, some people were putting him down'

c. **χnér* *kéiɔ*
man.ABS.SG 3SG.DETRANSITIVE.INTRANSITIVE
(*a*) anticausative: 'man, he was lying down there'
(*b*) causative: 'man, someone was putting him down'

6.7.2.5 Non-agent-oriented number agreement

Furthermore, number agreement was 'patient-oriented' in 1st and 2nd person (and 3rd person) agentive-active[84] forms of INTRANSITIVE NATURAL FORCE VERBS such as **ḫuχ-* (**ḫ_uχ-* or **ḫu_χ-*) 'to grow, be, become by nature':

(64) a. **ʔóǵʷi_ɛ* *ḫúχt ~ ḫúχr*
snake.ABS_PL 3SG:AGT:DIR ~ 3PL.AGT.ITR

[82] This class of verbs only had a 3sg agentive-active form **mért(i)* (> Hittite 3sg pres. ind. act. *mērzi* 'vanishes'), whereas it had a fully inflected paradigm of the detransitive voice.
[83] This class of verbs was deponential and also lacked 3sg detransitive transitive direct and inverse forms.
[84] These forms were formally agentive-active, but the "A" relation of their agentive-active forms was restricted to a natural force role, whereas detransitive intransitive forms were labile and could be used within an antipassive construction.

lit. ‘snakes, it grew them ~ they grew’

b. *χnér ḫúχm (exceptional agt-active voice
man.ABS.SG 1SG:AGT with non-agentive meaning)
‘I became a man’

Moreover, an animate S triggered ‘non-agent-oriented’ number agreement with detransitive intransitive forms of INTRANSITIVE AGENTIVE VERBS such as *ʔ_i- ‘to go’:

(65) a. *χnér_ɛ ʔéiɔr
man.ABS_PL 3PL:DETRANSITIVE:INTRANSITIVE
‘as for men, they will go wrong’

b. *χnér ʔéiɔ
man.ABS.SG 3SG:DETRANSITIVE:INTRANSITIVE
‘as for man, he will go wrong’

6.7.2.6 Summary of section 6.7.2

To sum up, PIE obligatory number agreement was ‘agent/causer-oriented’ in agentive and detransitive forms of AGENTIVE-CAUSATIVE VERBS such as *ǵʷ_n- ‘to slay, kill, beat, hunt’, whereas it was ‘patient-oriented’ in detransitive voice forms of AGENTIVE-IMPERSONAL/NATURAL FORCE VERBS (e.g. *m_r- ‘to vanish, die’) and with anticausative detransitive intransitive forms of LABILE verbs (e.g. *ʕ_r- ‘to rise, arise, raise s.th.’) or DEPONENT-INTRANSITIVE verbs (e.g. *k_i-) in the above mentioned cases. PIE thus exhibited a split-system of obligatory number agreement, with ‘agent/causer-orientation’ versus ‘patient-orientation’ depending on the presence or absence of a topical agent or causer in interaction with the given verb class.

6.8 Word-final suffixation

6.8.1 Progressive aspect

IE comparative and internal evidence strengthens the reconstruction of a PIE PROGRESSIVE aspect category.[85] This additional aspect was encoded by the word-final suffix *-i*, which was attachable to its base in word-final position (in suffix slot *-F*), even to forms which were otherwise marked by the past tense prefix (*é-*). This is ultimately confirmed by the Old Phrygian 3sg past tense (aorist) middle form *edatoy* ‘he put it there (for his own benefit?)’ with past tense prefix *e-* and 3sg (past tense) middle ending *-toy*, continuing PIE 3sg progressive forms ending in *-toi* (which also had a past tense reading besides a present tense reading).[86]

As outlined in a forthcoming paper,[87] PIE progressive aspect forms were later semantically broadened to present tense and imperfective aspect portmanteau forms. This change triggered the subsequent genesis of the Proto-Greek and Proto-Indo-Iranian tripartite tense and aspect system.[88] This semantic diachronic path from progressive to present imperfective is very common crosslinguistically.[89]

6.8.2 Debitive-necessative mood

The PIE debitive-necessative mood encoded obligation or necessity (‘it is necessary that …’) and was also used with a hortative (or jussive) imperative-like function (‘let us …’). I am not quite sure to what extent it also encoded evidential modality, but it plausible that INDUCTIVE/DEDUCTIVE evidential modality was also among its functions.

(66) a. *ʔés-t-u
be.there:NDUR:AGT:SG-DIRECT-DEBITIVE\3
‘it is necessary that he (topic) is there/here/present; let him be here’

b. *(ʔéi) tú ḫniè́ʔt / ʕuatχiè́ʔt pχtér
if 2SG.TOP hurt:OPT:AGT:DIR:2SG:L father.ABS
lit. ‘if you (sg) wound my father …
nú =mɔi kʷi-s-χá-u
&then 1SG.LOC pay-INV-2DTR:NDUR:SG-DEB
lit. ‘… then you will have to pay (at) me at once’

c. *sáχul ʕárɔ_u (ʔɛ-)dié́ʔ
sun.ABS.SG rise:DUR:DTR:ITR:3SG_DEB (DEM-)day.INS
lit. ‘(it is cogent that) the sun must go by today’

The position of the debitive-necessative suffix *-u* was identical to the one of the progressive aspect suffix *-i*, since both were word-final suffixes (of slot *-F*).

7 Reduplication

PIE displayed a fairly high number of reduplicated aspectual binyanim which may be termed *Aktionsarten*, although using such a term for PIE cannot imply that these categories were “derivational” in the lexical sense. The PIE reduplicated patterns clearly belonged to the domain of aspectual inflection. (I call them “aspects”).

The most frequent type of reduplication was partial reduplication of the first or first + second consonant (including a sonorant and fricative) of the inflectable base or root. The reduplication syllable templatic prefix was then attached to the consonant frame and made up a “derived” reduplicated consonant frame. An overview of the PIE “derived” reduplicated consonants frames is given in Figure 46. The respective reduplicated consonant frame was further combined with the PIE transfixal inflectional aspectual grades I, II, III^{d}, IV^{d} (and perhaps also with grades V^{d} and VI^{d}). Thus, in a sense, the reduplicated binyanim were derived from the “root formations” by prefixation of the reduplication syllable templates (which is the most plausible diachronic scenario.)

If the onset of the inflectable base had a consonant cluster including a stop /p b ɓ …/ or a fricative /χ ʕ/ preceded by a sibilant /sP-/ or /sF-/, PIE showed three different types of reduplications:

(67) a. reduplication without sibilant /s/
*χnér-s ti-stáχ-t
man-ERG DSTR-stand.up:NDUR:AGT:SG-DIR\3

b. reduplication of the cluster /sP-/,/sF-/
*χnér-s sti-stáχt
man-ERG DSTR-dito

c. reduplication of /s/ only
*χnér-s si-stáχ-t
man-ERG DSTR-stand.up:NDUR:AGT:SG-DIR\3
all: ‘man stood up now & then, here & there’

As illustrated by (67a), one type of reduplication just skipped over the sibilant /s/, whereas the second consonant of that cluster underwent reduplication. In a second type of reduplication the entire cluster /sP-/, /sF-/ was

[85] Cf. Pooth 2009a.
[86] Cf. Lubotsky 1988.
[87] Cf. Pooth 2016+.
[88] Cf. Pooth 2009a, 2015a, 2016+.
[89] Cf. Bybee, Perkins & Pagliuca 1994.

reduplicated, as illustrated by (67b). In a third type it was just the sibilant that underwent reduplication, as illustrated by (67c). It can be assumed that one of these three types was the default reduplication of inflectable bases which were prefixed by the "mobile" *s-* prefix, whereas another type was the default reduplication of roots beginning with a consonant cluster including an initial sibilant, in parallel, e.g., to **si-su_p-* from **su_p-*, cf. Vedic 2sg aor. inj. act. *síṣvap*. PIE perhaps exhibited reduplication of the initial consonant of the root, but not the initial consonant of the inflectable base, thus excluding the "mobile" *s-* prefix, which did not belong to the proper root. But this difference must have been blurred by generalizing the use of the second or third type of reduplication. There have been claims that the second type (**sti-stáχ-*) preceded the other ones, but there possibly was difference between inflectable bases prefixed by "mobile" *s-* and root with sibilant onset.

redup. CF number	redup. C-chain	gloss	example	translation
1	*ḍi-ḍ_ʔ-*	DISTRIBUTIVE-p_ut-	**ḍi-ḍéʔ-t*	'3sg (topical) put it here & (put it) there'
2a	*ḍɛ-ḍ_ʔ-*	ANTERIOR/COMPLETIVE-p_ut	**ḍɛ-ḍɔ́ʔɛ*	's.o. has done s.th. and is now a doer'
2b	*ʔs-ʔ_s-*	ANTERIOR/COMPLETIVE-si_t-	**ʔs-ʔśsɛ*	's.o. sat down to settle there for a while'
3	*ḍ_-ḍ_ʔ-*	CONTINUOUS-p_ut-	**ḍé_ḍɛʔ-t*	'3sg (topical) kept on putting/doing it'
4a	*kʷéː-kʷ_k-*	INTENSIVE-se_e	**kʷéː-kʷɔk*	's.o. looked at s.th. intensively'
4b	*ǧʷén-ǧʷ_n-*	INTERNALLY.MULT/INTENSIVE-sl_ay	**ǧʷén-ǧʷɔn*	's.o. beat s.o. intensively'
5	*ǧʷéni-ǧʷ_n-*	EXTERNALLY.MULT-pu_t-	**ǧʷéni-ǧʷɔn*	's.o. beat and beat various objects'

Figure 46. PIE reduplicated consonants frames (red. CFs), e.g. **ḍ_ʔ-* 'to put, do, make; say, state', **ʔ_s-* 'to sit, sit down; be there, be real, exist', **kʷ_k-* 'to see, look at', **ǧʷ_n-* 'to slay, kill, beat, hunt'

b. (temporally) distributive reading with 3sg O
**kuśn-s* *dî-dénkt* *pχtér*
dog-ERG DSTR-bite:dito father.ABS
'dog bit father on several occasions'

c. distributive reading with 3pl O
**kuśn-s* *dî-dénkt* *χnér_ɛ*
dog-ERG DSTR-bite:dito men.ABS_PL
lit. 'dog bit several men'

(69) a. spatially/temporally distributed + transitional
**páχur* *ʕi-ʕór*
fire.ABS DSTR-rise:TRANSITIONAL:DTR:ITR:3SG
(*a*) 'fire arose here & there'
(*b*) 'fire arose now & then'

b. distributed + transitional "S"
**páχun-χ* *ʕi-ʕráχ* (~ 3sg *ʕi-ʕór*)
fire-COL\ABS DSTR-burn:TRANSITIONAL:DTR:ITR:3COL
lit. 'scattered fires, they arose' or 'scattered fires, it arose'

redup. CF/ template no.	reduplication template	gloss
1	*Ci-*	DISTRIBUTIVE
2a	*Cɛ-*	PRECEDING.EVENT/ANTERIOR
2b	*C_1C_2-*	= 2a
3	*C_-*	CONTINUATIVE/FREQUENTATIVE
4a	*Céː*	INTENSIVE/INTERNALLY.MULTIPLICATIVE
4b	*CéR-* (*CéF-*)	= 4a
5	*C_1_C_2i-*	EXTERNALLY.MULTIPLICATIVE

Figure 47. PIE verbal reduplication templates (isolation)

7.1 Distributive reduplication

The PIE distributive or distributive-iterative aspect was coded by reduplication of the initial consonant of the inflectable base or root followed by the semi-vowel *i* (*Ci-*), which was unstressed. This aspect had a general distributive reading, as illustrated by the following examples. The PIE distributive reduplication could be combined with the nondurative grade I and the transitional grade IV[d]. If combined with the latter, the resultant forms had a transitional and distributive meaning:

(68) a. (spatially) distributive reading without O
**kuśn-s* *ki-kékʷ-t*
dog-ERG DSTR-defecate:NDUR:AGT:SG-DIR\3
'dog defecated here & there'

gloss	SINGULAR	PLURAL	
1EXC	**ḍi-ḍéʔm*	**ḍi-ḍ?méː(s)*	
1INC	—	**ḍi-ḍ?uéː(s)*	[PIE collective number
2ITR	**ḍi-ḍéʔ*	**ḍi-ḍ?éː(n)*	was deponential: the
2DIR	**ḍi-ḍéʔt*	**ḍi-ḍ?téː(n)*	forms are given in
2INV	**ḍi-ḍéʔs*	**ḍi-ḍ?séː(n)*	the Figures below]
3ITR		**ḍi-ḍ?ér*	
3DIR	**ḍi-ḍéʔt*	**ḍi-ḍ?ént*	
3INV	**ḍi-ḍéʔs*	**ḍi-ḍ?érs*	

Figure 48. PIE agentive-active forms of the distributive binyan

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ḍi-ḍ?χá*	**ḍi-ḍ?mɔ́(s)*	**ḍi-ḍ?mɔ́(χ)*
1INC		**ḍi-ḍ?uɔ́(s)*	**ḍi-ḍ?uɔ́(χ)*
2ITR	**ḍi-ḍ?χá*	**ḍi-ḍ?χáː(n)*	**ḍi-ḍ?áχ(m)*
2DIR	**ḍi-ḍ?tχá*	**ḍi-ḍ?χáː(n)*	**ḍi-ḍ?áχ(m)*
2INV	**ḍi-ḍ?sχá*	**ḍi-ḍ?χáː(n)*	**ḍi-ḍ?áχ(m)*
3ITR	**ḍi-ḍ?ɔ́*	**ḍi-ḍ?ór* ~ **ḍi-ḍ?rɔ́*	**ḍi-ḍ?áχ(m)*
3DIR	**ḍi-ḍ?tɔ́*	**ḍi-ḍ?ónt* ~ **ḍi-ḍ?ntɔ́*	**ḍi-ḍ?áχ(m)*
3INV	**ḍi-ḍ?sɔ́*		**ḍi-ḍ?áχ(m)*

Figure 49. Corresponding detransitive forms of the distributive binyan

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ǧi-ǧɛ̌n?χ*	**ǧi-ǧn?mɔ́(s)*	**ǧi-ǧn?mɔ́(χ)*
1INC		**ǧi-ǧn?uɔ́(s)*	**ǧi-ǧn?uɔ́(χ)*
2ITR	**ǧi-ǧɛ̌n?χ*	**ǧi-ǧn?χáː(n)*	**ǧi-ǧn?áχ(m)*
2DIR	**ǧi-ǧɛ̌n?tχ*	**ǧi-ǧn?tχáː(n)*	**ǧi-ǧn?táχ(m)*
2INV	**ǧi-ǧɛ̌n?sχ*	**ǧi-ǧn?sáχ(n)*	**ǧi-ǧn?sáχ(m)*
3ITR	**ǧi-ǧ5n?*	**ǧi-ǧn?ór* ~**ǧi-ǧn?rɔ́*	**ǧi-ǧn?áχ(m)*

Figure 50. PIE forms of the distributive and transitional binyan

Perhaps the PIE distributive reduplication *Ci-* sporadically also occurred combined with the distributive-iterative grade VI[d], as double-marking (**gi-gɔn2é(i)*, etc.). Aside from the reduplication, the PIE two distributive aspectual binyanim patterned in parallel with the PIE first and fourth (and maybe sixth) binyan (cf. Figures 8, 9, 10, 20, 23). The PIE patterns are given in Figures 48-50.

7.2 Anterior-completive reduplication

PIE had a type of reduplication with a superordinate function termed 'anterior-completive' reduplication here (it is glossed ANT or CMPL depending on the given reading).

grade	template/ example	gloss
I	*Cɛ-CɛC-*	COMPLETIVE-RESULTATIVE
I	*Cɛ-CCɔ*	COMPLETEIVE-RESULTATIVE
II	*Cɛ-CéCɔ*	ANTERIOR + DURATIVE
III[d]	*Cɛ-CɔCɛ*	ANTERIOR + STATIVE-HABITUAL
IV[d]	*Cɛ-CɔC*	REITERATIVE
V[d]	*Cɛ-Cɔ:C*	ANTERIOR + INCHOATIVE-STATIVE
VI[d]		

Figure 51. PIE aspects with anterior-completive reduplication

Its superordinate polysemy included the following subordinate readings: (*a*) It indicated that the given event or state was connected or related to a prior event (anterior aspect) or was an accomplished state resulting from a prior event (resultative aspect); (*b*) it referred to the given event or state seen from its starting point to its end (deliminative aspect). (*c*) It also indicated that the event was completely finished (completed), or (*d*) that the given action was done completely, or (*e*) that the event was just about to be finished; (*f*) it also indicated a complete affectedness of O.

Inflectable bases (incl. roots) with an initial glottal stop followed by a stop (*_P-*) in syllable onset showed irregular reduplication of both segments, as illustrated below:

(70) a. reduplication of **2_ǵ-* (*2_P-*)
**χnér* *2ǵɛ-2ǵɔrɛ*
man.ABS ANT-wake.up:GRADEIII:DTR:ITR:3SG
'man has just awoken & is awoken'

b. reduplication of **2_s-*
**χnér-s* *2ɛ-2ɔ́sɛ ~ 2s-2ɔ́sɛ*
man-ERG ANT-sit.down:dito
'man has sat/settled down & is now settled down'

Inflectable bases (incl. roots) with an initial glottal stop followed by a sibilant (e.g. **2_s-* 'to sit, sit down, be there, exist') *sporadically* showed a reduplication of both segments. The sibilant was syllabified in the syllable nucleus of the reduplication syllable, as illustrated by example (70b) and reflected by Hittite *ašāš-[ḫi]* 'to settle down' (**'to sit down & be there for a longer period'). Most verbs, however, showed regular reduplication of the initial consonant of the inflectable base/root.

7.2.1 Completive-resultative aspect

The completive-resultative aspect (glossed CMPL) was coded by combining 'anterior-completive' reduplication with grade I. The PIE pattern is given in Figures 52 and 53. 3pl forms exceptionally had their 'bare' vowel in the vowel slot of the inflectable base (incl. root), but PIE probably also had regular variants:

gloss	SINGULAR	PLURAL
1EXC	**ĝɛ-ĝɛ́um*	**ĝɛ-ĝumé(s)*
1INC	—	**ĝɛ-ĝuué(s)*
2ITR	**ĝɛ-ĝɛ́u*	**ĝɛ-ĝué(n)*
2DIR	**ĝɛ-ĝɛ́ut*	**ĝɛ-ĝuté(n)*
2INV	**ĝɛ-ĝɛ́us*	**ĝɛ-ĝusé(n)*
3ITR		**ĝɛ-ĝɛ́ur ~ *ĝɛ-ĝué́r*
3DIR	**ĝɛ-ĝɛ́ut*	**ĝɛ-ĝɛ́unt ~ *ĝɛ-ĝué́nt*
3INV	**ĝɛ-ĝɛ́us*	**ĝɛ-ĝɛ́urs ~ *ĝɛ-ĝué́rs*

Figure 52. PIE agentive-active forms of the completive-resultative aspect, e.g. **ĝ_u-* 'to pour, pour out'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ĝɛ-ĝuχá*	**ĝɛ-ĝumɔ́(s)*	**ĝɛ-ĝumɔ́(χ)*
1INC		**ĝɛ-ĝuuɔ́(s)*	**ĝɛ-ĝuuɔ́(χ)*
2ITR	**ĝɛ-ĝuχá*	**ĝɛ-ĝuχá(n)*	**ĝɛ-ĝuáχ(m)*
2DIR	**ĝɛ-ĝutχá*	**ĝɛ-ĝutχá(n)*	**ĝɛ-ĝutáχ(m)*
2INV	**ĝɛ-ĝusχá*	**ĝɛ-ĝusχá(n)*	**ĝɛ-ĝusáχ(m)*
3ITR	**ĝɛ-ĝuɔ́*	**ĝɛ-ĝurɔ́*	**ĝɛ-ĝuáχ(m)*
3DIR	**ĝɛ-ĝutɔ́*	**ĝɛ-ĝuntɔ́*	**ĝɛ-ĝutáχ(m)*
3INV	**ĝɛ-ĝusɔ́*		**ĝɛ-ĝusáχ(m)*

Figure 53. Corresponding detransitive forms

This pattern, including corresponding progressive forms, is continued by the Vedic *juhómi* (*ájuhavur*) 'to pour' present type, e.g. PIE 3pl completive inverse **ĝɛ-ĝɛ́urs* 'they (nontopical) poured it (topical) out (completely)', cf. Vedic 3pl past imperfective (= "imperfect") ind. act. *ájuhavur* with irregular guṇa grade of the root.

Progressive detransitive forms, which had a RESULTATIVE aspectual meaning, are continued as IE perfect middle forms (see example 71c)

(71) a. completive:
**kuɔ́n-s* *ulkʷɔ́s* *ĝʷɛ-ĝʷén-t*
dog-ERG dangerous CMPL-kill:GRADEI:AGT:SG-DIR\3
(*a*) 'dangerous dog completely killed it'
(*b*) 'dangerous dog finished killing it'

b. completive-resultative/resultative:
**péku* *dɛ-dnk_ɔ́*
domestic.animal.ABS CMPL-bite-GRADEI:DTR:ITR:3SG
'domestic animal/sheep was (completely) bitten'

c. **péku* *ĝʷɛ-ĝʷnɔ́-i* (cf. Vedic *jajñé*)
dito CMPL-slay-PROGRESSIVE
'the sheep is (now) (completely) slain'

d. completive meaning and antipassive construction:
**kuɔ́n-s* *ulkʷɔ́s* *dɛdnkɔ́* *péku-m*
dog-ERG dito dito dito-ALL
'dangerous dog completely bit (at) a/the sheep'

Again, non-progressive 3sg detransitive intransitive forms were pleonastically extended by neoactive endings 3sg *-t ~ -e ~ -et*, 3pl *-ont ~ -onto*. They are thus continued as reduplicated thematic *-o/e-* aorist stems in the IE languages, as illustrated by the most prominent example below:

(72) 3sg **ĝʷeĝʷnɔ → *gʷʰegʷʰnót ~ *gʷʰegʷʰné(t)* :: **gʷʰegʷʰnó/é-* (> Greek *-πεφνο/ε-*, etc.)

Thus despite all previous claims the Vedic and Greek reduplicated aorist was not at all a PIE category and the

same holds true for the Vedic and Greek perfect middle and active (see section 7.2.3 and cf. Pooth 2016+).

7.2.2 Anterior aspect

PIE anterior aspect (glossed ANT here) was a more general anterior category. Aside from its general anterior meaning it also had IE-subjunctive-like and IE-pluperfect-like readings. It was formed by combining 'anterior-completive' reduplication with grade II. It was deponential and lacked 3rd person transitive forms. The pattern is given below:

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ɯɛ-uértχa*	**ɯɛ-uértmɔ(s)*	**ɯɛ-uértmɔ(χ)*
1INC		**ɯɛ-uértɯɔ(s)*	**ɯɛ-uértɯɔ(χ)*
2ITR	**ɯɛ-uértχa*	**ɯɛ-uértχa(n)*	**ɯɛ-uértaχ(m)*
2DIR	**ɯɛ-uérttχa*	**ɯɛ-uérttχa(n)*	**ɯɛ-uérttaχ(m)*
2INV	**ɯɛ-uértsχa*	**ɯɛ-uértsχa(n)*	**ɯɛ-uértsaχ(m)*
3ITR	**ɯɛ-uértɔ*	**ɯɛ-uértɔr* ~ **ɯɛ-uértrɔ*	**ɯɛ-uértaχ(m)*

Figure 54. PIE anterior aspect forms, e.g. **u̯rt-* 'to turn (around), roll'

Again, 3sg detransitive intransitive forms were pleonastically extended by post-PIE neoactive endings 3sg *-t* ~ *-e* ~ *-et*, 3pl *-ont* ~ *-onto*. They are still continued as "old anteriors" in Early Vedic, as demonstrated in a forthcoming paper.[90] They are thus continued (*a*) as Vedic reduplicated thematic aorist stems with guṇa of the root, (*b*) as Vedic thematic pluperfects (*ápīpayat* type), (*c*) as Vedic perfect subjunctive stems with guṇa-root and (*d*) as Early Vedic irregular reduplicated thematic imperatives (e.g. *pīpáyata*):

(73) 3sg **ueuértɔ* → **u̯eu̯értot* ~ **u̯eu̯értet* :: T*u̯eu̯érto/e-* (cf. Vedic *vavártat* ~ *vavártati*, etc.)

(74) "non-tensed" anterior:
**kuɔ́n-s* *ulkʷɔ́s* *ǵʷɛ-ǵʷénɔ*
dog-ERG dangerous ANT-kill:GRADEII:DTR:ITR:3SG
péku-m
domestic.animal/sheep-ALL
(*a*) anterior reading with present relevance: 'dangerous dog has (just) killed (a/the) sheep (and this has high relevance for now)' (roughly equivalent to the use of the English present perfect)
(*b*) anterior reading with future relevance: 'dangerous dog will have killed (a/the) sheep (in the future)'
(*c*) pluperfect-like anterior reading: 'dangerous dog had (just) killed (a/the) sheep ... (when x happened)' (roughly equivalent to the English past perfect)

7.2.3 Anterior-stative-habitual aspect

The PIE anterior-stative-habitual aspect was deponential and lacked 3rd person transitive forms. It was formed by combining 'anterior-completive' reduplication with the stative-habitual grade III, see Figure 55:

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ɯɛ-uɔ́rtχa*	**ɯɛ-uɛrtmɔ́(s)*	**ɯɛ-uɛrtmɔ́(χ)*
1INC		**ɯɛ-uɛrtuɔ́(s)*	**ɯɛ-uɛrtuɔ́(χ)*
2ITR	**ɯɛ-uɔ́rtχa*	**ɯɛ-uɛrtχá(n)*	**ɯɛ-uɛrtáχ(m)*
2DIR	**ɯɛ-uɔ́rttχa*	**ɯɛ-uɛrttχá(n)*	**ɯɛ-uɛrttáχ(m)*
2INV	**ɯɛ-uɔ́rtsχa*	**ɯɛ-uɛrtsχá(n)*	**ɯɛ-uɛrtsáχ(m)*
3ITR	**ɯɛ-uɔ́rtɛ*	**ɯɛ-uɛrtɔ́r*	**ɯɛ-uɛrtáχ(m)*

Figure 55. PIE anterior-stative-habitual aspect

[90] Cf. Pooth 2016+.

The anterior-stative-habitual aspect was later used as a "new anterior". Originally it had a more general stative-habitual meaning. But it also had a continuative-aspect-like reading ('is (still) a doer of s.th.'), see example (75a):

(75) a. **kuɔ́n-s* *ulkʷɔ́s* *ǵʷɛ-ǵʷɔ́nɛ*
dog-ERG dangerous ANT-kill:STAT:DTR:ITR:3SG
péku-m
domestic.animal/sheep-ALL
(*a*) 'dangerous dog has (always) killed (a/the) sheep/is a killer of (a/the) sheep'
(*b*) 'dangerous dog has (always) killed (a/the) sheep and is (still) (always) killing (a/the) sheep'
(*c*) "new anterior" reading with present relevance: 'dangerous dog has (just) killed (a/the) sheep and is still killing it now'

b. **kuɔ́n* *ulkʷɔ́* *ǵʷɛ-ǵʷɔ́nɛ*
dog.ABS dangerous ANT-kill:STAT:DTR:ITR:3SG
'dangerous dog has (always) been killed'

This aspect later merged with the non-progressive forms of the continuative-frequentative aspect (see section 7.3) yielding a mixed anterior-continuative 'pre-IE-perfect' aspect. Within the course of this merger, plural forms received zero grade of the root and 3pl forms received new endings (**u̯eu̯rt-ŕ̥(s)* ~ **u̯eu̯rt-ér* ~ **u̯eu̯rt-ér*) in parallel with the non-reduplicated **u̯óide* (**u̯id-ŕ̥(s)*, etc.) type. Despite all previous claims, the "perfect active" category is not straightforwardly inherited as such from PIE.

7.2.4 Reiterative aspect

The PIE reiterative aspect (glossed REIT here) was formed by combining 'anterior-completive' reduplication with the transitional grade IVd. It was deponential. The pattern is given below:

gloss	SINGULAR	PLURAL		COLLECTIVE
1EXC	**ɯɛ-uértχ*	**ɯɛ-urtmɔ́(s)*		**ɯɛ-urtmɔ́(χ)*
1INC		**ɯɛ-urtuɔ́(s)*		**ɯɛ-urtuɔ́(χ)*
2ITR	**ɯɛ-uértχ*	**ɯɛ-urtχá(n)*		**ɯɛ-urtáχ(m)*
2DIR	**ɯɛ-uérttχ*	**ɯɛ-urttχá(n)*		**ɯɛ-urttáχ(m)*
2INV	**ɯɛ-uértsχ*	**ɯɛ-urtsχá(n)*		**ɯɛ-urtsáχ(m)*
3ITR	**ɯɛ-uɔ́rt*	**ɯɛ-urtɔ́r*	~ **ɯɛ-urtrɔ́*	**ɯɛ-urtáχ(m)*
3DIR	**ɯɛ-uɔ́rtt*	**ɯɛ-urtɔ́nt*	~ **ɯɛ-urtntɔ́*	**ɯɛ-urttáχ(m)*
3INV	**ɯɛ-uɔ́rts*			**ɯɛ-urtsáχ(m)*

Figure 56. PIE anterior aspect forms, e.g. **u̯rt-* 'to turn (around), roll', blue-shaded forms were identical to detransitive completive-resultative forms, see Figure 49; red-colored forms perhaps did not exist (?)

(76) a. either a transitive construction was possible ...
**kuɔ́n-s* *ulkʷɔ́s* *dɛ-dɔ́nk-t*
dog-ERG dangerous REIT-bite:GRADEVI-DIR
péku
domestic.animal/sheep.ABS

b. ... or an antipassive construction was obligatory:
**kuɔ́n-s* *ulkʷɔ́s* *dɛ-dɔ́nk*
dog-ERG dangerous REIT-bite:GRADEVI:ITR
péku-m
domestic.animal/sheep-ALL
a and b: 'dangerous dog bit sheep again'

c. intransitive construction with S_A
**kuɔ́n-s* *ulkʷɔ́s* *ɯɛ-uɔ́rt-i*
dog-ERG dangerous REIT-turn:GRADEVI-PRG
'dangerous dog is returning'

As just mentioned, I am not sure whether this pattern could be used within a transitive ergative-absolutive construction and thus included 3rd person transitive forms. (Or did forms of the completive binyan (e.g. **dɛ-dɛ́nk-t*) also encode a reiterative reading, which was used in case there was an agent or causer role?)

The PIE reiterative aspect is directly reflected by the formally and functionally archaic reduplicated 3sg aor. ind. mid. *ávavarti* (RV 2.38.6a).[91]

7.3 Continuative-frequentative reduplication

The PIE continuative-frequentative aspect (glossed CONT) was formally exceptional: the reduplication templatic prefix *C_V_-* included an empty vowel slot *_V_* which was filled by the first vowel of the vowel melody of grade II. This aspect was thus coded by reduplication of the initial consonant of the inflectable base (incl. root), combined with grade II. Since 3pl forms of grade II had an exceptional monovocalic vowel melody (*_V_*), the 3pl agentive-active forms of this binyan only had a single 'bare' vowel in the vowel slot of the reduplication prefix. The pattern is given in Figures 57 and 58 (3pl forms are pink):

gloss	SINGULAR	PLURAL
1EXC	**ḏé-ḏɛʔm*	**ḏé-ḏʔmɛ(s)*
1INC		**ḏé-ḏʔuɛ(s)*
2ITR	**ḏé-ḏɛʔ*	**ḏé-ḏʔɛ(n)*
2DIR	**ḏé-ḏɛʔt*	**ḏé-ḏʔtɛ(n)*
2INV	**ḏé-ḏɛʔs*	**ḏé-ḏʔsɛ(n)*
3ITR		**ḏé-ḏʔr*
3DIR	**ḏé-ḏɛʔt*	**ḏé-ḏʔnt*
3INV	**ḏé-ḏɛʔs*	**ḏé-ḏʔrs*

Figure 57. Agentive-active forms of the continuative-frequentative aspect

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ḏé-ḏʔχa*	**ḏé-ḏʔmɔ(s)*	**ḏé-ḏʔmɔ(χ)*
1INC		**ḏé-ḏʔuɔ(s)*	**ḏé-ḏʔuɔ(χ)*
2ITR	**ḏé-ḏʔχa*	**ḏé-ḏʔχa(n)*	**ḏé-ḏʔaχ(m)*
2DIR	**ḏé-ḏʔtχa*	**ḏé-ḏʔtχa(n)*	**ḏé-ḏʔtaχ(m)*
2INV	**ḏé-ḏʔsχa*	**ḏé-ḏʔsχa(n)*	**ḏé-ḏʔsaχ(m)*
3ITR	**ḏé-ḏʔɔ*	**ḏé-ḏʔɔr* ~ **ḏé-ḏʔrɔ*	**ḏé-ḏʔaχ(m)*
3DIR	**ḏé-ḏʔtɔ*	**ḏé-ḏʔɔnt* ~ **ḏé-ḏʔntɔ*	**ḏé-ḏʔtaχ(m)*
3INV	**ḏé-ḏʔsɔ*		**ḏé-ḏʔsaχ(m)*
3ITR.TRIT	**ḏé-ḏɔʔ*		

Figure 58. Corresponding detransitive forms (grey: specifically transitional (TRIT) 3sg intransitive form; 1st and 2nd person continuative-frequentative transitional forms were identical to the non-transitional forms)

Forms of this pattern were used with a continuative aspectual reading ('to continue doing s.th.', 'to be continuously doing s.th.'). They also had a frequentative reading ('to do s.th. frequently, often', German *(an)dauernd etwas tun*) and an incompletive reading ('to still be doing s.th.').

(77) a. **kuɔ́n-s* *ulkʷɔ́s* *dɛ́dɛnk-t-i*
dog-ERG dangerous CONT:bite:GRADEII:AGT-DIR-PRG
pékus
domestic.animal/sheep.ABS\SG
(*a*) 'dangerous dog is continuing/still biting a/the sheep'
(*b*) 'dangerous dog is continuously biting a/the sheep'
(*c*) 'dangerous dog is often/frequently biting ... dito'

b. **kuɔ́n-s* *ulkʷɔ́s* *dɛ́dɛnk-t*
dog-ERG dangerous CONT:bite:GRADEII:AGT-DIR
pékus
domestic.animal/sheep.ABS
(*a*) 'dangerous dog continued biting a/the sheep'
(*b*) 'dangerous dog continuously bit a/the sheep'
(*c*) 'dangerous dog often/frequently bit a/the sheep"
(*d*) anterior-like continuative reading: 'dangerous dog was biting a/the sheep and is now continuing biting it'

Non-progressive forms of this pattern developed an anterior-like reading, as illustrated by reading (*d*) of example (77b) above. They finally merged with the anterior-stative-habitual aspect (see section 7.2.3) yielding the IE perfect (*ᵉd^{h}ed^{h}óh$_1$e(i)*, etc.) Several corresponding progressive forms developed to "acrostatic" IE reduplicated presents. A few innovative preterit forms received analogical *o*-grade (→ **d^{h}ed^{h}oʔt* with variable accent).

7.4 Intensive reduplication

The term "intensive" reduplication is used here differently form its use in Vedic grammar. It is solely used for the two allomorphic reduplication templatic prefixes *Cé:* and *CéR-*, which were in complementary distribution: PIE inflectable bases incl. roots without sonorant in root syllable coda, e.g. **kʷ_k-* 'to see, look at; be able to see; appear, be visible', showed reduplication of the initial consonant of the inflectable base incl. root followed by a stressed long vowel, as illustrated by the following examples:

(78) **kʷ_k-* → **kʷé:-kʷɔk* (→ later pleonastically extended by neoactive endings yielding a 3sg **kʷé:k̂ok(χ)ti* :: 1sg **kʷé:kek̂χmi* ~**kʷé:k̂ok(χ)mi*, etc.)

(79) **su_p-* → **sé:-supɔ*

(80) **gʷ_n-* → **gʷén-gʷɔn*

PIE inflectable bases incl. roots with a sonorant (*m n l r i u*, cover symbol *R*) or the fricative *χ* (perhaps also *ʕ* and the glottal stop *ʔ*) in root syllable coda (e.g. **gʷ_n-*, but not **su_p-*) showed reduplication of the initial consonant, followed by a stressed short 'bare' vowel and the given sonorant *R* or fricative *χ* (etc.) of the root syllable coda, as illustrated by example (80) above. Sporadically a few exceptions to this distribution rule occurred. Perhaps both types were possible with a few verbs.

The intensive reduplication encoded an internal multiplication of parts of the event denoted by the verb (it is glossed INT(ENSIVE) here). This superordinate meaning comprises repetitive, iterative, and intensive subordinate readings. This type of reduplication could be combined at least with grade II and grade IV^{d}; see Figures 59-61. Combined with a vowel melody of grade II, the vowel of the reduplication syllable was counted as the first vowel of the vowel melody, in parallel with the continuative-frequentative aspect (see section 7.3 above). A combination with grade IV^{d} encoded a repetitive-iterative meaning and internal multiplication of more punctual events and this binyan was deponential and presumably lacked 3sg transitive forms. The pattern was structured in parallel with the reiterative binyan (see section 7.2.4 above). It is given in Figure 61:

[91] Cf. Pooth 2016+.

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**uérurtmɛ(s)*	**uérurtmɛ(s)*	
1INC		**uérurtuɛ(s)*	
2ITR	**uéruɛrt*	**uérurtɛ(n)*	
2DIR	**uéruɛrtt*	**uérurttɛ(n)*	
2INV	**uéruɛrts*	**uérurtsɛ(n)*	
3ITR		**uér-urt-r*	
3DIR	**uéruɛrtt*	**uér-urt-nt*	
3INV	**uéruɛrts*	**uér-urt-rs*	

Figure 59. PIE intensive grade II forms, e.g. **u_rt-* 'to turn around, roll', blue forms show that the structure is the one of the "Narten type"

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**déi-dikχa*	**déi-dikmɔ(s)*	**déi-dikmɔχ)*
1INC		**déi-dikuɔ(s)*	**déi-dikuɔ(χ)*
2ITR	**déi-dikχa*	**déi-dikχa(n)*	**déi-dikaχ(m)*
2DIR	**déi-diktχa*	**déi-diktχa(n)*	**déi-diktaχ(m)*
2INV	**déi-diksχa*	**déi-diksχa(n)*	**déi-diksaχ(n)*
3ITR	**déi-dikɔ*	**déi-dikɔr ~ *déi-dikrɔ*	**déi-dikaχ(m)*
3DIR	**déi-diktɔ*	**déi-dikɔnt ~ *déi-dikntɔ*	**déi-diktaχ(m)*
3INV	**déi-diksɔ*		**déi-diksaχ(n)*

Figure 60. PIE intensive grade II forms, e.g. **d_ik-* 'to show'

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**uér-uɛrtχ*	**uér-urtmɔ(s)*	**uér-urtmɔ(χ)*
1INC		**uér-urtuɔ(s)*	**uér-urtuɔ(χ)*
2ITR	**uér-uɛrtχ*	**uér-urtχa(n)*	**uér-urtaχ(m)*
2DIR	**uér-uɛrttχ*	**uér-urttχa(n)*	**uér-urttaχ(m)*
2INV	**uér-uɛrtsχ*	**uér-urtsχa(n)*	**uér-urtsaχ(m)*
3ITR	**uér-uɔrt*	**uér-urtɔr ~ *uér-urtrɔ*	**uér-urtaχ(m)*

Figure 61. PIE intensive grade IV[d] forms, e.g. **u_rt-* 'to turn (around), roll'

gloss	SINGULAR	PLURAL
1EXC	**ǵʷéni-ǵʷɛnm*	**ǵʷéni-ǵʷnmɛ(s)*
1INC		
2ITR	**ǵʷéni-ǵʷɛn*	**ǵʷéni-ǵʷnɛ(n)*
2DIR	**ǵʷéni-ǵʷɛnt*	**ǵʷéni-ǵʷntɛ(n)*
2INV	**ǵʷéni-ǵʷɛns*	**ǵʷéni-ǵʷnsɛ(n)*
3ITR		**ǵʷéni-ǵʷɛnr*
3DIR	**ǵʷéni-ǵʷɛnt*	**ǵʷéni-ǵʷɛnnt*
3INV	**ǵʷéni-ǵʷɛns*	**ǵʷéni-ǵʷɛnrs*

Figure 62. PIE agentive-active (grade II) forms of the "externally-multiplicative" aspect (glossed MULT); blue: structured in parallel with the "Narten type"

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ǵʷéni-ǵʷnχa*	**ǵʷéni-ǵʷnmɔ(s)*	**ǵʷéni-ǵʷnmɔ(χ)*
1INC		**ǵʷéni-ǵʷnuɔ(s)*	**ǵʷéni-ǵʷnuɔ(χ)*
2ITR	**ǵʷéni-ǵʷnχa*	**ǵʷéni-ǵʷnχa(n)*	**ǵʷéni-ǵʷnaχ(m)*
2DIR	**ǵʷéni-ǵʷntχa*	**ǵʷéni-ǵʷntχa(n)*	**ǵʷéni-ǵʷntaχ(m)*
2INV	**ǵʷéni-ǵʷnsχa*	**ǵʷéni-ǵʷnsχa(n)*	**ǵʷéni-ǵʷnsaχ(m)*
3ITR	**ǵʷéni-ǵʷnɔ*	**ǵʷéni-ǵʷnɔr ~ -rɔ*	**ǵʷéni-ǵʷnaχ(m)*
3DIR	**ǵʷéni-ǵʷntɔ*	**ǵʷéni-ǵʷntɔr ~ -ntɔ*	**ǵʷéni-ǵʷntaχ(m)*
3INV	**ǵʷéni-ǵʷnsɔ*		**ǵʷéni-ǵʷnsaχ(m)*

Figure 63. Corresponding detransitive (grade II) forms

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	**ǵʷóni-ǵʷɔnχ*	**ǵʷóni-ǵʷnmɔ(s)*	**ǵʷóni-ǵʷnmɔ(χ)*
1INC		**ǵʷóni-ǵʷnuɔ(s)*	**ǵʷóni-ǵʷnuɔ(χ)*
2ITR	**ǵʷóni-ǵʷɔnχ*	**ǵʷóni-ǵʷnχa(n)*	**ǵʷóni-ǵʷnaχ(m)*
2DIR	**ǵʷóni-ǵʷɔntχ*	**ǵʷóni-ǵʷntχa(n)*	**ǵʷóni-ǵʷntaχ(m)*
2INV	**ǵʷóni-ǵʷɔnsχ*	**ǵʷóni-ǵʷnsχa(n)*	**ǵʷóni-ǵʷnsaχ(m)*
3ITR	**ǵʷóni-ǵʷɔn*	**ǵʷóni-ǵʷɔnr*	**ǵʷóni-ǵʷnaχ(m)*

Figure 64. PIE "externally-multiplicative" grade VI[d] forms; 3rd person forms were used in the antipassive construction, if indicating a transitive (causative, factitive) reading; blue: structured in parallel with grade V[d]

Recall that Vedic has no evident functional (but just formal) voice distinctions in the intensive present stem, which clearly points towards a protomiddle origin of all Vedic intensive present forms. The athematic intensives belong to the intensive yod-presents. They show the same functions. Some Vedic forms are given below:

(81) ŚB 11.8,2,10 *cākaśyámāna-* = *cākaśīmi*, ..., RV 8.1.4 *ví tartūryante* = *vitártūrāṇas* = *tartarīti*, ..., RV 6.47.16 *ati-nenīyámānas* RVKh + *nenīyáte*, ..., RV *marmr̥jyáte, marmr̥jyánte* = *marmr̥jata*, etc., ŚBM *amarīmr̥śyanta*, ŚB *vāvadyate, vāvadyámāna-* = RV *vāvadīti*, RV *vevīyate* = *ní veveti*.
Other forms: ŚB *kanikradyámāṇa-*, RV 10.124,9 *ánu carcūryámāṇam*, RV 10.4.4 *rerihyáte*, RV *ūhyáte, ūhyáthe*, RV 1.80.14 *vevijyáte*, RV *coṣkūyáte*, &c.

This clear paradigmatic relationship of the given two Vedic stems strengthens the following inferences: (*a*) The PIE pattern was deponential (protomiddle tantum); (*b*) 1sg form in *-χ-* of this binyan were pleonastically extended by the active 1st ending **-m(i)* from PIE to post-PIE:

(82) 1sg **kʷéɪ-kʷɛk-χ* → **kʷéɪkʷ(e/o)k̂χm(i)* :: 3sg **kʷéɪ-kʷɔk* → **kʷéɪkʷ(e/o)k̂χt(i)*

The voiceless fricative was prone to be generalized within the paradigm, which can explain the overall (or frequent) Seṭ-effect in Vedic.

(*c*) It is further inferential that the Vedic intensive yod-presents continue corresponding progressive forms of this binyan. These were later pleonastically extended yielding IE intensive yod-presents. The development of the Vedic intensive yod-presents thus ran in parallel with the one of the non-reduplicated yod-presents, as outlined in section 4.2.7 above. PIE perhaps had allomorphic variants of grade II forms (cf. Figure 60) with another 'bare' vowel in the vowel slot of the inflectable base, e.g. 3sg intransitive **déi-dɛikɔ(i)*, **ǵʷén-ǵʷɛnɔ(i)* (**ǵ^wʰén-ǵ^wʰeno/e-*) → Vedic intensive subjunctive stem *jáṅghana- ~ jaṅghána-*. Opposed to the grade IV[d] forms, which tended to code the repetitive or iterative meaning, grade II forms tended to code a durative-imperfective intensive meaning.

7.5 Disyllabic reduplication

The term 'disyllabic reduplication' is used for the PIE disyllabic reduplication templatic prefix $C_1éC_2i$- (recall that the term "intensive" reduplication is not used for this type of reduplication here). The PIE patterns are given in Figures 62-64. The "disyllabic" type showed reduplication of the initial consonant of the root (*C_*), which was thus mapped upon consonant slot C_1, whereas it was the first consonant of the root syllable coda (*_C°*) that was mapped upon the second consonant slot C_2 followed by *i*, as illustrated by the examples below:

(83) **kʷ_k-* → **kʷéɪki-kʷ_k-*

(84) **su_p-* → **sépi-su_p-*

(85) **ǵʷ_n-* → **ǵʷéni-ǵʷ_n-*

(86) **s_nχ-* → **séni-s_nχ-*

(87) **d_ik-* → **déki-d_ik-* ~ **déiki-d_ik-*[?] (cf. (90, 91))

binyan number	aspect/mood label	grade	(1) 3SG.AGT.DIR	(2) 3SG.DTR.ITR	translation of (1)	translation of (2)
1	NONDURATIVE	I	*ḍéʔt	*ḍʔɔ́	‘did/does’	
2	DURATIVE-IMPERFECTIVE	II	*ḍéːʔt	*ḍéʔɔ	(*a*) ‘did/does for a while’ (*b*) ‘was/is doing (when …)’ (*c*) ‘will be doing (when …)’	
3	STATIVE-HABITUAL	III[d]		*ḍɔ́ʔɛ		‘always does’, ‘is a doer’
4	TRANSITIONAL	IV[d]		*ḍɔ́ʔ		‘is done’
5	INCHOATIVE-STATIVE	V[d]		*ḍɔ́ːʔ		(*a*) ‘is being done’ (*b*) ‘is on its way to be done’
6	DISTRIBUTIVE-FACTITIVE	VI[d]		*ḍɔʔé		(*a*) ‘does here & there, now & then’ (*b*) ‘makes s.th. be done’
7a	INCOMPLETIVEI	SGI/PLII	*ḍnéʔt	*ḍnʔɔ́	‘is still doing’	
7b	INCOMPLETIVEII	I	*ḍʔnéut	*ḍʔnuɔ́	dito	
8	PUNCTUAL-CASUAL	I		*ḍʔskɔ́		‘does suddenly, at once, casually’
9	CONATIVE I	I		*ḍʔʔsɔ́		‘plans to do’
10	CONATIVE II	II		*ḍéʔʔsɔ		‘is planning to do’
11	CONATIVE III	I		*ḍiḍʔʔsɔ́		‘(now & then[?]) plans to do’
12a	OPTATIVE I	I	*ḍʔiéʔt	*ḍʔiʔɔ́	‘would do’	
12b	OPTATIVE II	SGI/PLII	*uélʔiʔt	*uélʔiʔɔ		
13	INCOMPLETIVE OPTATIVE	I	*ḍnʔiéʔt	*ḍnʔiʔɔ́	‘would still be doing’	
14	ANTERIOR OPTATIVE	I	*ḍɛḍʔiéʔt	*ḍɛḍʔiʔɔ́	‘would have done’	
15	DISTRIBUTIVEII	I	*ḍiḍéʔt	*ḍiḍʔɔ́	‘does here & there, now & then’	
16	DISTRIBUTIVE TRANSITIONAL	IV[d]		*ḍiḍɔ́ʔ		‘is done here & there, now & then’
17	COMPLETIVE-RESULTATIVE	I	*ḍɛḍéʔt	*ḍɛḍʔɔ́	(*a*) ‘does completely’ (*b*) ‘completes doing’ (*c*) ‘does strongly (high affectedness of O)’	
18	ANTERIOR (“OLD ANTERIOR”[92])	II	—	*ḍɛḍéʔɔ		(*a*) ‘has done and it is relevant for now’ (*b*) ‘has done before …’ (*c*) ‘will have been done before …’
19	ANTERIOR-STATIVE-HABITUAL	III		*ḍɛḍɔ́ʔɛ		‘has done and is thus a doer’
20	REITERATIVE-REVERSATIVE	IV		*ḍɛḍɔ́ʔ		‘does again, re-does it’
21	CONTINUATIVE-FREQUENTATIVE	II	*ḍéḍɛʔt	*ḍéḍʔɔ	‘continues doing’	
22	CONT TRANSITIONAL	IV[d]		*ḍéḍɔʔ		‘is continuously done’
23	INTENSIVE	II	*ḍéːḍɛʔt	*ḍéːḍʔɔ	‘does intensively/repeatedly’	
24	INTENSIVE TRANSITIONAL	IV[d]		*ḍéːḍɔʔ		‘is done intensively/repeatedly’
25	MULTIPLICATIVE	II	*ḍéʔiḍɛʔt	*ḍéʔiḍʔɔ	‘does intensively/repeatedly here & there, now & then’	
26	MULTIPLICATIVE TRANSITIONAL	IV[d]		*ḍéʔḍɔʔ		‘is done intensively/repeatedly here & there, now & then’

Figure 65. Overview of the PIE aspect and mood categories—recall that many of these categories could additionally be combined with the progressive aspect suffix *-i* or debitive mood suffix *-u* [red: different verb: a “primary optative”]

In parallel to the usual reduplication rules with regard to the sibilant, the “mobile” *s-* could be left out (see section 7, example (67)):

(88) **s-q_nd-* → **qéni-sq_nd-* (cf. Vedic *caniśad-at-*)

This type of reduplication encoded external multiplication (repetition) of the event denoted by the verb in its entirety: see example (89a). The disyllabic reduplication could be combined with the plurative grade II. The ‘bare’ vowel of the reduplication syllable was counted as the first vowel of the vowel melody.

(89) a. **kuɔ́n-s ulkʷɔ́s pékuˌɛ*
dog-ERG dangerous sheep.ABS_PL
**ǧʷéni-ǧʷɛn-t*
MULT-slay:GRADEII:AGT:SG-dir\3
‘dangerous dog killed multiple sheep’

b. **ʔékuɛs *ḍéǧɔm*
horse.ERG_PL ground.ABS
**ǧʷén-ǧʷn̥_ɛ_n-t*
INT-beat_GRADEII:AGT_3PL-DIR
German “die Pferde zertrampelten den Boden”

c. **ʔékuɛs *ḍǧóm*
horse.ERG_PL ground.LOC
**ǧʷén-ǧʷn̥_ɔ_r*
INT-beat_GRADEII:DTR_3PL.ITR
German “die Pferde trampelten auf den/dem Boden”

Additionally, disyllabic reduplication could be combined with grade VI[d] (see Figure 64). Again, the vowel of the reduplication template was taken for the first vowel of the vowel melody of grade VI[d] (*ˌɔ́ɔˌ* ~ *ˌɔ́ɛˌ*). But the use of grade VI[d] did not necessarily indicate a stative-inchoative durative meaning here. Grade VI[d] simply coded detransitive and plurative-multiplicative meaning.

PIE perhaps sporadically showed full disyllabic reduplication of the entire inflectable base (see example 87):

(90) **suˌp-* → **suépi-suˌp-* (? … seems to be plausible)

(91) **sˌnχ-* → **sénχi-sˌnχ-* (dito)

7.6 Summary: the PIE aspect system

To sum up: PIE had an elaborate aspect system which was very different from the typologically average “tripartite”[93] aspect system of Greek and Vedic. The PIE aspect system

[92] Cf. Bybee, Perkins & Pagliuca 1994.
[93] Tripartite = imperfective vs. perfective stem (± anterior) and present vs. past tense distinction of imperfectives: cf. ibid.

showed tremendous complexity in the functional interaction of vowel melody patterns (transfixal gradation), suffixation on the consonant frame tier, and reduplication. Similar, e.g., to the complex aspect system of Athabascan languages, it often served functions accomplished in other languages by the lexicon. An overview of all reconstructable PIE aspectual binyan is given in Figure 65.

8 Prefixation

8.1 Past tense

PIE was a "non-tensed" language.[94] Past tense was optionally specified by the so-called "augment", that is, a vocalic prefix *é-* (glossed PAST). It was probably mainly used in narration or similar typically past-tensed contexts. Although its nature was vocalic it did not belong to the vowel melody. It always attracted the word form stress accent (which may be a remnant of its origin as a particle). Verb forms without past tense prefix were non-tensed, that is, underspecified as for tense distinctions. They could thus be used with present or past (and some even in future) time reference. As mentioned earlier, differently from its use in Vedic and Greek the "augment" could also be attached to progressive aspect forms:

(92) a. **é-ʔɛːs-t* *ʕréːɡ*
PAST-be/sit.DUR.AGT-DIR ruler.ABS\SG
lit. '(once upon a time) there was (sat) a ruler/chief'

b. **ʔéːs-t* *ʕréːɡ*
be/sit.DUR.AGT-DIR ruler.ABS\SG
'a ruler is, was (sitting) there.'

c. **é-ɖɛʔ-t_ɔ_i* *ʕréːɡ-s*
PAST-put:DUR-DIR_DTR_PRG ruler-ERG\SG
(*a*) 'the ruler was putting it there for his own benefit'
(*b*) 'the ruler was putting his x (possessed) there'

d. **é-ʔɛːs-t-i* *ʕréːɡ-s*
PAST-be/sit.DUR.AGT-DIR-PRG ruler-ERG\SG
'a ruler was sitting there'

8.2 Derivational prefixation

The so-called "mobile" *s-* prefix can be analyzed as a derivational prefix because it belonged to the consonant frame of the inflectable base. But it may also be described as having a status in between derivation and inflection, depending on the final definition of the respective underlying PIE verbal lexical semantics with regard to aspect. I will thus also deal with it here, even if it may not belong to PIE inflection in the strict sense. I suggest that its superordinate function was to indicate an increase in semantic transitivity (more towards its prototype). Therefore, it is glossed TR for (SEMANTICALLY) TRANSITIVIZING here. In my analysis, it was opposed to a group of DETRANSITIVE "root enlargement" suffixes *-χ-* (*-ɖ-*[?], ...) encoding a decrease of semantic transitivity (including indirect causation).

8.2.1 Terminative, telic, punctual, perfective

The first subfunction of the PIE transitivizing prefix *s-* was to indicate a terminative, telic, punctual, perfective (also including ingressive) aspectual meaning including a canonical perfective aspectual reading. Alongside ingressive-punctual and terminative or telic readings, the prefix *s-* perhaps also had a deliminative reading encoding an event that was seen in its totality or its boundaries. In this case, its status is close to a simple inflectional prefix, since it was perhaps attached to many roots to indicate a perfective meaning regardless from the underlying lexical aspectual semantics, which was often "polyactional".[95]

s- prefixed cons. frame	meaning (cf. *LIV* s.vv.)	(possible) base	meaning
**s-t_nχ-*	G. "erdonnern"	**t_nχ-*	'thunder'
**s-p_lH-*	G. "erzählen, verkünden"		
**s-pr_nd-*	G. "aufspringen"	**pr_nd-*	'id', cf. *LIV*, p. 583
**s-pr_nḍ-*	G. "sich spannend aufspringen"	**pr_nḍ-*	G. "(sich) spannen"
**s-k_r-*	G. "springen, hüpfen"	**k_r-*	G. "(sich) schwingen"
**s-q_l-*	G. "schuldig schlagen"	**q_l-*	'be guilty, indebted'
**s-q_l-ʔ-*	'dry up'		
[1] **s-q_n-d-*	'go up, jump up, spring, begin'	**q_n-*	G. "entspringen, ...", cf. *LIV*, p. 351
[2] **s-q_n-d-*	G. "erglänzen"	**q_n-d-*	*LIV* "sich auszeichnen"
**s-q_r-b-*	'shrink'	**q_r-b-*	
**s-qr-_i-*	'run crooked, circle'	**qr_i-*	
**s-qr-_i-t-*	'run crooked, circle'		
**s-qr_n-gʷ-*	'bend, bow, shrink'	**qr_n-gʷ-*	
**s-l_u-ɢ/q-*	'swallow (at once?)'	**l_u-ɢ/q-*	'eat', G. "schluchzen"
**s-u_id-*	G. "erglänzen"	**u_id-*	'see, appear, find, know'
**s-u_nḍ-*	'dry up, fade, whither'	**u_nḍ-*	'vanish, fade'

Figure 66. Inflectional bases marked by *s-* indicating more terminative, telic, punctual meaning (cf. *LIV* s.vv.); G. = German; blue = possible base

The prefix *s-* was thus roughly equivalent to the use of the German prefixes *er-*, *ent-*, *ver-*, etc. or English 'totally, entirely, completely' and *up* in *he eats up*. Possible minimal pairs are given in the Figure above. The difference between **suénḍɔ* 's.th. dried up, faded, withered (it is dry, faded, withered)' versus **uénḍɔ* 's.o./s.th. dried, faded, vanished' may be reflected by the paradigmatic difference between the prefixed OCS aor. *pri-svęde* 'it dried up, faded, withered' and Church Slavonic *ǫždǫ*, inf. *ǫditi* 'to smoke-dry' (cf. *LIV* s.v.), which is used in other stems.

8.2.2 Increase of control and thoroughness

The second subfunction was to indicate an increase of agentive control and thoroughness of the action, as done by an intentional agent. This PIE opposition is reflected in Vedic, where *spaś-* has a more 'thoroughgoing' meaning 'to observe, notice, examine, inspect, look out, watch out, take care of' indicating an increase of intention and control (3sg aor. ind. mid. *áspaṣṭa* 22 perf. *paspaśé*, causative-iterative pres. 2sg imp. mid. *spāśayasva*), whereas *paś-* often lacks this nuance and has a more general meaning 'to look at, view' (pres. IV *páśyati*), cf. RV 1.22.19ab *víṣṇoḥ kármāṇi paśyata yáto vratā́ni paspaśé* 'look at Viṣṇu's deeds, by which he observes (sc. controls) the sacred rules!' It is quite safe to assume that the Vedic situation continues the original PIE distinction, as illustrated below.

(93) PIE 3sg agentive direct **pékt* 'he looked at it' → **s-pékt* 'he looked at it more thoroughly, he watched it, he observed it, he looked at it with more control'

[94] Cf. Stassen 1997.

[95] = aspectually polysemous, cf. Sasse 1991a, 1991b.

8.2.3 Strongly-affected and transformed patient

The prefix *s-* further indicated the introduction of a strongly affected patient and an effect-causing agent to the underlying lexical semantics. This third subfunction differs from the function of a canonical causative marker, since its functional focus is on the introduction of an affected patient, but not on the introduction of an external causer. However, with several verbs, *s-* also had a more canonical causative function: see section 8.2.4. Thus, by prefixation of *s-* an external effective causer role was be added to the semantics of the underlying base deriving a meaning with a strong affection or transformation of O. This semantic role-change can be illustrated by the minimal pair below. These two inflectable bases may well be etymologically related, even if a connection of 'to yawn' and 'to split' feels a bit unusual from a common IE point of view. An overview of more possible instance is given in Figure 67 below.

(94) a. **gʷén ğáχt*
woman.ABS gap-DIR
'woman had to yawn, yawned', lit. 'it gapped, yawned woman'

b. **pχtér-s s-ğáχ-t* (*LIV* **sk̂ʰeh₂(i̯)-*, p. 547)
woman.ABS TR-gap-DIR
'father cut/tore/split it up (made a hole in between two parts, German "schlitzen")', lit. 'gapped it up'

s- prefixed cons. frame	meaning	(possible) base	(possible) meaning
**s-t_iɢ-*	'prick, sting'	**t_iɢ-*	'be sharp'
**s-t_rk*	G. "beschmutzen"	**t_rk-*	'be filthy'[97]
**s-t_rğ-*	G. "zerschmettern"	**t_rğ-*	(cf. *LIV*, p. 598)
**s-t_u-*		**t_u-*	
**s-t_u-p-*	'push, beat'	**t_u-p-*	'push, beat'
**s-t_u-ɗ-*	'id.'	**t_u-ɗ-*	'id.'
**s-t_u-ɢ-*	'id.'	**t_u-ɢ-*	'id.'
**s-p_l-t-*	'split'	**p_l-t-*	'id.'
**s-p_l-H-*	'break up, split'	**p_l-H-*	'plough'
**s-ğ_χ-*	'split, tear apart, cut'	**ğ_χ-*	'yawn, gap'
**s-ğ_i-ɗ-*	'split, tear apart'	**ğ_i-*	'gap'
**s-ğ_i-ʔ-*	'split, tear apart'	**ğ_i(-ʔ)-*	'gap'
**s-q_p-*	G. "hacken, hauen"		
**s-qaḇ-*	'scratch, cut, carve'		
**s-q_r-*	'scratch, cut'	**q_r-*	'id.'
**s-q_r-p-*	'pick, pluck, cut'	**q_r-p-*	'id.'
**s-q_r-ḇ-* ~ **s-qr_ḇ-*	'bite, gnaw off, cut'	**q_r-ḇ-*	'sharp'
**s-q_r-t-*	'cut apart'	**q_r-t-*	'id.'
**s-q_r-ḏ-*	'id.'		
**s-q_r-H-*	'split, separate'	**q_r-H-*	'id.'
**s-q_r-s-*	'scratch', G. "Wolle krempeln"		
**s-qr-_i-ḇ-*	'scratch'		
**s-q_ɗ-χ-*	'split, strew'		
**s-q_l-*	'split'		
**s-q_l-H-*	'id.'		
**s-q_u-*		**q_u-*	
**s-q_u-ḇ-*	'push'		
**s-q_u-t-*	'scratch, cut'		
**s-q_u-ɗ-*	'push'	**q_u-ɗ-*	'id.'
**s-qu-_ʔ-t-*	G. "durchschütteln"	**qu_ʔ-t*	'id.'
**s-q_u-χ-*	'push, poke, pick'		
**s-i_u-H-*	'sow, connect by perforation'	**i_u(-H)*	'connect'

Figure 67. Inflectional bases marked by *s-* indicating STRONGLY-AFFECTED-PATIENT meaning (cf. *LIV* s.vv.); G. = German translation; blue = root reconstructable via internal reconstruction grounded on the given enlarged inflectable bases

But note that the prefix was not necessarily valency-changing in the canonical sense. I suggest that verbs with highly patient-affecting meaning could additionally be prefixed by *s-* with no severe change of meaning.

8.2.4 Causative

The prefix *s-* also had a canonical causative function. By prefixation of *s-* an external causer role was implemented in the core case frame (ergative and absolutive), whereas the underlying absolutive was taken out of the core: [96]

(95) a. **gʷén-s χnér néuḇ-t* [97]
woman-ERG man.ABS marry:NONDUR:AGT:SG-DIR\3
'woman married (a) man'

b. **pχtér-s gʷén s-néuḇt χnér-m*
father-ERG woman.ABS TR-dito man-ALL
'father made woman married to (a) man'

s- prefixed cons. frame	causative	base	basic meaning
**s-r_G-*	"färben, röten"	**r_G-*	"sich färben, sich röten"
**s-p_n-ɗ-*	"spannen (tr.)"	**p_n-ɗ-*	"hängen (itr.)"
**s-p_n-ʔ-*	'id.'	**p_n-ʔ-*	"in der Luft hängen"
**s-n_uḇ-*	"verkuppeln"	**n_uḇ-*	"einen Mann heiraten"
**s-q_ɗχ-*	'smash', G. "zerstreuen"	**q_ɗχ-*	'burst'
**s-q_lʔ-*	'dry (tr.)'	**q_lʔ-*	'dry (itr.), be dry'
**s-q_r-ɓ-* ~ **s-qr_ɓ-*	"schrumpfen (tr.)"	**q_r-ɓ-*	"schrumpfen (itr.), dürr sein"

Figure 68. Inflectional bases marked by *s-* indicating CAUSATIVE FUNCTION; German translations ("...") according to the *LIV* s.vv.; *G* = *g* or *ɢ*

The Greek middle *(σ)κίδναμαι* 'I disperse', German "ich zertreue mich" sometimes lacks the *σ°* onset, whereas its corresponding transitive active *σκίδνημι* 'scatter', German "etwas zerstreuen" never does. The intransitive comparandum, Lithuanian *kedù* (inf. *kedéti*) 'to burst', also lacks the sibilant. The comparative evidence thus strengthens the analysis of *s-* as presented here. PIE **s-q_ɗχ-* obviously had a highly transitive meaning 'to smash, strew into pieces', whereas **q_ɗχ-* was labile and had a meaning 'to strew (out)' (and 'to be strewn out') with a lower degree of transitivity besides intransitive 'to burst'.

8.2.5 Applicative(-like)

Since a superordinate semantically transitivizing function includes an applicative(-like) subfunction, it is inferential that the introduction of an external role to the core, mainly the implementation of a goal, theme, or path, was also encoded by the prefix *s-* (roughly equivalent to the German goal-implementing prefix *be-*, *zu-*, *durch-*).

(96) a. **gʷén-s náχ-t*
woman-ERG move.in.water:NDUR:AGT:SG-DIR\3
'woman swam' or 'bathed, was, moved in water'

b. **gʷén-s s-náχt*
woman-ERG TR(PATH.APPL)-dito
'woman swam through it (e.g. a river)'

c. **gʷén-s s-náχt*
woman-ERG TR(CAUSATIVE)-dito

[96] This conforms to the definiton given by Dixon 2012, chapter 24.
[97] PIE **n_u-ḇ-* may be derived from **n_u-* 'to nod, nod at s.o.; wave; be inclined to s.o., trust, believe, think', cf. *LIV*, p. 455f.

'woman moistened/washed it (e.g. the cup)'
lit. 'made it bath in water'?

(97) a. **gʷén mr̥ḱ*[98]
woman.ABS remember_NDUR.DTR.ITR.3SG
'woman remembered (s.th.)'

b. **gʷén-s s-mr̥ḱ χnér-m*
woman-ERG TR-dito man-ALL
German "die Frau bedachte den Mann mit etwas"

c. **gʷén s-mr̥ḱ*
woman-ERG TR-dito
German "die Frau wurde (von j.) mit etwas bedacht"

As illustrated by examples (97b) and (97c), a peripheral goal or theme role was implemented in the core case frame. Since a river (water) cannot be transformed or highly affected, 'swim through' in (96b) is rather path-implementing applicative-like, whereas (96c) is another instance of the affected-patient reading.

s- prefixed cons. frame	goal/theme-implementing applicative meaning	(possible) base/root	basic meaning
**s-t_g̈ʷ-*	G. "bekränzen, umkränzen, umschließen"	**t_g̈ʷ-*	G. "kränzen"
**s-t_ɑ̈-*	G. "bedecken"	**t_ɑ̈-*	G. "decken"
**s-m_r-*	G. "sich an jemand erinnern"	**m_r-*	G. "sich erinnern"

Figure 69. Inflectional bases marked by *s-* indicating GOAL-IMPLEMENTING APPLICATIVE FUNCTION; G. = German translation (cf. *LIV* s.vv.)

Although it is not easy to judge from the given IE evidence, which is often blurred by later post-PIE specifications with regard to transitivity and intransitivity,[99] the overall evidence seems to be quite impressive. Therefore, the PIE "mobile" *s-* prefix was not just a "meaningless" segment, randomly attachable to any root. Its function may be hidden, but it is still identifiable as a polysemous SEMANTIC TRANSITIVIZER. It is inferential that the *s-* prefix was productive in PIE, but was lexicalized and/or lost all its functions in the post-PIE period.

9 Denominal verb inflection

PIE denominal verbs were deponential and lacked 3rd person transitive forms. 3rd person animate causers or an inanimate causer or cause had to be used within the PIE antipassive construction, as outlined above. Recall that denominal deponency is a common crosslinguistic pattern (e.g. cf. Old Irish denominatives).

9.1 Regular denominatives

I suggest that PIE denominal verbs were derived from nominal stems by suffixation of the denominative template *-_V_i_V_* (or *-_i_*) to the given nominal stem. The combination of the respective nominal stem *x* and this templatic suffix *x-_V_i_V_-* served as the denominative inflectable base. This denominative inflectable base could further be combined with the given most basic aspectual categories, as outlined above. At least the detransitive vowel melodies of grade I, II, III[d], and IV[d] could be mapped upon the two vowel slots of the denominative templatic suffix *-_V_i_V_*. The accent was shifted to one of the vowels of the vowel melody:

(98) **χuɕśén-* (classified nominal stem, relational[100]) m. 'someone's young bull' → discontinuous denominal verb base **χuɕśɛn_V_i_V_-* → 3sg detransitive intransitive **χuɕśɛniś(i)* 's.o. does the young bull'

(99) **χuɕśén-_i_-* → 3sg grade I **χuɕśɛniś* 'did/does the young bull' (nondurative or neuter)

(100) **χuɕśén-_i_-* → 3sg grade II **χuɕśɛnéiɔ* 'was/is doing the young bull' (durative-imperfective)

(101) **χuɕśén-_i_-* → 3sg grade III **χuɕśɛnóiɛ* 'always acts like a young bull, is a young bull' (stative-habitual)

(102) **χuɕśén-_i_-* → 3sg grade II **χuɕśɛnói* 'turned into a young bull' (transitional)

All kinds of nominal stems and even the completely vowel-less consonant frame could serve as the basis for denominal derivation:

(103) **ʔr_ʔ-_i_-* oar.CONSONANT_FRAME-_DENOMINAL_ → 3sg grade I **ʔrʔiś* 'rows', cf. *LIV*, p. 251

(104) **ʔrśʔ-_i_-* oar.CORE.CASE.STEM-_DENOMINAL_ → 3sg grade I **ʔrɔʔiś* 'rows'

The derivational base of the denominatives given in the examples above was the PIE nominal stem **ʔrśʔ-* in. 'oar', consonant frame **ʔ(a)r_ʔ-* (also being the consonant frame of **ʔárʔm-* an. 'arm'). This was more probably not a proper verbal inflectable base or root, but a nominal stem *pace LIV*, p. 251. In general, the inflection of denominal verbs was identical to the detransitive deponential inflection. Note that this type of denominal verb derivation was also possible from root nouns and root adjectives:

(105) **ʔrɔud_i_* → **ʔrɔud_i_* → **ʔrɔudʰiś* (grade I) 'makes red', **ʔrɔudʰéiɔ* (grade II) 'is making red', **ʔrɔudʰóiɛ* (grade III[d]) 'is red', **ʔrɔudʰói* (grade IV[d]) 'turns red'

Moreover, it was perhaps even possible to derive such denominatives from nominal finite case forms, especially from the sociative-associative and comitative-instrumental consonant frame. Perhaps PIE comitative-instrumentals could be used in predicative function, e.g. **χnér ʔruḍʰéʔ* 'man (is) with reddishness, is red', as suggested by Jasanoff (2003) and illustrated below:

(106) **ʔruḍʰéʔ* 'with reddishness' or consonant frame **ʔr_uḍ_ʔ* → denominative inflectable base **ʔruḍ(ɛ)ʔ_i_* → **ʔruḍɛʔiś* ~**ʔruḍʔiś* 'is or makes s.th. be with reddishness, is with reddishness, etc.' (this stem then conflated with the new perfect-like stem in *-eː-*)

9.2 Stative-factitive denominatives

Another type of PIE denominative verb derivation was achieved by means of suffixation of another templatic suffix, one that included the detransitive suffix (*-χ-*), to the respective nominal stem: *-_V_χ_V_-*, e.g. **néu-* 'new, young'

[98] PIE **m_r-* 'remember' and **m_r-* 'vanish, die' seem to be related. Maybe PIE **mar-* ~ **m_r-* had a meaning 'vanish and come again', cf. **móri*, abl. *máriɔs* in. 'ocean, sea: it always goes away (vanishes) and comes again'.

[99] Cf. Pooth 2012, 2014+, chapter 7.

[100] Cf. Pooth 2015a, 2015b.

(*n_u) → *nɛu-_χ_- ‘it is new, young’. These denominatives had a stative and a factitive-causative meaning. They were combined with the detransitive vowel melody of grade II, but the 3pl form had an exceptional “agentive-active” vowel melody of the “Narten type” and the 3sg form presumably could lack the ɔ. PIE maybe had more such denominative templates: perhaps -*n_χ*- was also used this way. The pattern of the PIE stative-factitive demoninatives is given in Figure 70.

gloss	SINGULAR	PLURAL	COLLECTIVE
1EXC	*nɛuáχχa	*nɛuáχmɔ(s)	*nɛuáχmɔ(χ)
1INC		*nɛuáχuɔ(s)	*nɛuáχuɔ(χ)
2ITR	*nɛuáχχa	*nɛuáχχa(n)	*nɛuáχaχ(m)
2DIR	*nɛuáχtχa	*nɛuáχtχa(n)	*nɛuáχtaχa(m)
2INV	*nɛuáχsχa	*nɛuáχsχa(n)	*nɛuáχsaχa(m)
3ITR	*nɛuáχ(ɔ)	*nɛuáχr	*nɛuáχaχ(m)

Figure 70. PIE denominative stative-inchoative-factitives

10 Verbal tonal distinctions

As suggested elsewhere, PIE had a combinatory grammatical stress (intensity) and tone (pitch) accent system. Stressed syllables either had a high tone (H) or a low(ered) tone (L). The low(ered) tone of stressed syllables was the marked value, whereas the high tone was the unmarked value. Each orthotonic (accented) word form only had a single stressed syllable: a single syllable was thus pronounced with more intensity and one of the two tones H or L. Clitics (by definition) are prosodic hosts and thus lacked any accent (any stress), e.g. PIE *mé: =mɛ ǵʷéns ‘do not kill me’, where the second word form is a pronominal object clitic. Unstressed syllables had a default low (or maybe mid) tone. A stressed and high-pitched syllable is indicated by the acute accent (◌́), e.g. PIE *ǵʷént ‘topical referent slew nontopical referent; you slew him’. A stressed and low-pitched syllable is indicated by the gravis accent (◌̀). In terms of Ratcliff (1992) Proto-Indo-European was a “type B” tonal language. It was characterized by a minimum of tonal distinctions (H vs. L tone of stressed syllables). These tonal distinctions were involved in marking grammatical structures. They did not code lexical distinctions as it is usually the case in classical tone languages like Mandarin Chinese.

10.1 Subordinate verb forms

The PIE low(ered) tone stress (L) accent coded the finite verb form of the main clause in clause chaining and subordination including relativization.[101] Recall that Vedic usually lacks any accent in such cases, cf. e.g. Early Vedic *kartana* ‘you (pl.) make it’ (which is the verb form of the main clause) as opposed to *ānaśúḥ* ‘they have reached’ (of the relative clause) in RV 10.53.10 *vidvā́ṃsas padā́ gúhyāni kartana* (verb form of the main clause) *yéna* (relativizer) *devā́sos amr̥tatvám ānaśúḥ* (verb form of the relative clause) ‘as knowing ones you make the secret feet (metres) by whom (singular) the gods have reached to immortality’. The PIE low tone was thus lost from PIE to Vedic, but the original PIE grammatical distinction is still alive in Early Vedic.

[101] Cf. Pooth 2015a.

To subordinate events with identical person referent, that is, to encode “same subject” clause linking, regular finite verb forms were replaced by participles. In these constructions the contextual background encoded by the participle form received a high pitch accent (H), whereas the verb form coding the main clause predicate (optionally?) received a low tone accent (L).[102] To link events expressed by two verb forms including non-identical person referents, that is, to encode “different subject” clause linking, PIE made use of coordinated finite verb forms. In such chained events including a “different subject” or DIFFERENT TOPIC the direct or inverse forms had to be used to code switched referents (even in case the second event was semantically intransitive, as illustrated in section 6.5.2). In coordinated constructions the verb form encoding the ‘superordinate’ or ‘backgrounded’ and ‘subordinated predicate’ received a high tone accent (L), whereas the verb form encoding the ‘main predicate’ received a low tone accent:

(107) a. *uéidɯɔtɛs uɔ́:kʷ ʕr-nu-t_è_n
knowing.ERG.PL speech.ABS raise-ICPL-DIR_2DIR-PL.L
ʔiɔ́ʔ dɛiuɔ́:s
RELATIVIZER.COMITATIVE skyish.ERG.PL
n-mértu-m χa-χnɛkɔ́r
im-mortality-ALL ANT-reach:DTR:ITR:3PL
‘as knowing ones you are raising the speech by whom the sky-ish ones have reached to immortality’

b. *uéidɯɔtɛs ʕrnutè:n
dito dito
ʔiɔ́ʔ uɛkʷɔ́ʔ dɛiuɔ́:s
dito speech.COMITATIVE dito
nmértum χaχnɛkɔ́r
dito dito
‘as knowing ones you are raising it (“zero anaphor”), (and) by this speech (relativized participant) the sky-ish ones have reached to immortality’

10.2 Imperatives?

The PIE low tone further coded vocative case forms in the system of nominal inflection.[103] Recall that Vedic vocatives also often lack any accent. (I suggest that in the post-PIE period the stress accent was shifted from its original PIE position to the word initial syllable in clause initial position, but not in “Wackernagel position”, where vocatives lost their stress accent.) Since verbal imperative forms are functionally comparable to vocative case forms because both address a 2nd person speech-act-participant, I finally assume that PIE low tone stress accent (L) also coded imperative verb forms, which were derived from 2nd person forms, e.g. 2sg imp *klnéu → *klnèu (besides *klnù) lit. ‘(still) be listening!’, etc.

Acknowledgements

I wish to say thank you to all the ones who participated in the academia.edu session on a preceding version of this article: Mention their names.

To Sasha and Lenja with gratitude

[102] Cf. Pooth 2015a.
[103] Cf. Pooth 2015a.

References and further reading

1. Akmajian, A. & S. Anderson 1970: "On the use of the person in Navajo, or Navajo made harder", *International Journal of American Linguistics* 36 (1), 1-8.
2. Aldridge, E. 2011 (manuscript): "Antipassive in Austronesian Alignment Change", cf. http://faculty.washington.edu/eca1/pdf/Alignment.pdf
3. Anthony, D.W. 2007: *The horse, the wheel and language. How bronze-age riders from the Eurasian Steppes shaped the modern world.* Princeton & Oxford
4. Bauer, B.L.M. 2009: "Residues as an aid in Internal Reconstruction", *Internal Reconstruction in Indo-European. Methods, Results, and Problems.* Ed. by J. E. Rasmussen & T. Olander. Copenhagen, 17-31.
5. Bauer, L. 2004: *A Glossary of Morphology*. Edinburgh.
7. Beekes, R.S.P. 2011: *Comparative Indo-European Linguistics.* Second edition. Revised and corrected by Michiel de Vaan. Amsterdam & Philadelphia.
6. Behrens, L. 2002: "Structuring of word meanings II: Aspects of Polysemy", *Lexicology: An international handbook on the nature and structure of words and vocabularies. Handbücher zur Sprach- und Kommunikationswissenschaft (HSK) 21.1.* Ed. by A.D. Cruse, F. Hundsnurscher, M. Job, P.R. Lutzeier. Berlin & New York, 319-337.
7. Behrens, L. & H.-J. Sasse 1997: *Lexical Typology: A Programmatic Sketch.* Arbeitspapier Nr. 30 (Neue Folge). Institut für Sprachwissenschaft. Universität zu Köln.
8. Benjamin, G. 2011: "Deponent Verbs and Middle-Voice Nouns in Temiar", *Austroasiatic Studies: papers from ICAAL4. Mon-Khmer Studies Journal* Special no. 2. Ed. by S. Srichampa & P. Sidwell. Dallas, Salaya & Canberra, 11-37.
9. Besnier, N. 1987: "An autosegmental approach to metathesis in Rotuman", *Lingua* 73, 201-223.
10. Brugmann, K. 1916: *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen.* 2nd ed. Strassburg.
11. Bybee J., R. Perkins & W. Pagliuca 1994: *The Evolution of Grammar. Tense, Aspect, and Modality in the Languages of the World.* Chicago University Press.
12. Clackson, J. 2007: *Indo-European Linguistics: an Introduction.* Cambridge.
13. Dahl, E. 2010: *Time, Tense and Aspect in Early Vedic Grammar.* Leiden & Boston.
14. Dahl, Ö. 1985: *Tense and aspect systems.* Oxford.
15. Dahlstrom, A. 1986: *Plains Cree Morphosyntax.* Ph.D. dissertation. University of California, Berkeley.
16. DeLancey, S. 1981: "The category of direction in Tibeto-Burman", *Linguistics of the Tibeto- Burman Area* 6 (1), 83-101.
17. Dixon, R. M. W. 1977: *A Grammar of Yidiɲ.* Cambridge.
18. Dixon, R.M.W. 1979: *Ergativity.* Cambridge.
19. Dixon R.M.W. 2010, 2012: *Basic Linguistic Theory.* Vol. I & II 2010, Vol. III 2012. Oxford.
20. Donohue, M. & S. Wichmann 2008 (eds.): *The Typology of Semantic Alignment.* Oxford.
21 Drinka, B. 1995: *The sigmatic aorist in Indo-European. Evidence for the Space-Time-Hypothesis.* Washington D.C.
22. Edwards, O. 2014 (presentation): "The structure of metathesis in Amarasi", talk given on 2014-12-18 at the University of Cologne, Institut für Linguistik, Allgemeine Sprachwissenschaft.
23. *EIC* = Mallory, J.P. & D.Q. Adams (eds.) 1997: *Encyclopedia of Indo-European Culture.* London & Chicago.
24. Eichner, H. 1973: "Die Etymologie von heth. *mehur*", *Münchener Studien zur Sprachwissenschaft* 31, 53-107.
25. Eichner, H. 1975: Die Vorgeschichte des hethitischen Verbalsystems. In: *Flexion und Wortbildung.* Akten der V. Fachtagung der Indogermanischen Gesellschaft. Regensburg, 9.-14. September 1975. Ed. by H. Rix. Wiesbaden, 70-103.
26. Eichner, H. 1985: "Das Problem des Ansatzes eines urindogermanischen Numerus 'Kollektiv' ('Komprehensiv')", in: *Grammatische Kategorien, Funktion und Geschichte.* Akten der VII. Fachtagung der Indogermanischen Gesellschaft, Berlin 20.-25. Februar 1983. Ed. by B. Schlerath & V. Rittner. Wiesbaden, 134-169.
27. Fortson, B.W. IV 2009: *Indo-European Language and Culture: An Introduction.* 2nd edition. Malden, Oxford & Carlton.
28. Fox, A. 1995: *Linguistic Reconstruction. An Introduction to Theory and Method.* Oxford.
29. Gotō, T. 2013: *Old Indo-Aryan Morphology and its Proto-Indo-Iranian Background* in co-operation with J.S. Klein and V. Sadovski. Vienna.
30. Harðarson, J.A. 1993: *Studien zum urindogermanischen Wurzelaorist.* Innsbruck.
31. Haspelmath, M. & A.D. Slims 2010: *Understanding Morphology.* Second Edition. London.
32. Heine, B. & T. Kuteva 2002: *World Lexicon of Grammaticalization.* Cambridge.
33. Hoffmann, K. 1970: "Das Kategoriensystem des indogermanischen Verbums", *Münchener Studien zur Sprachwissenschaft* 28, 19-41.
34. Hoffner, H. . Jr. & H.C. Melchert 2008: *A Grammar of the Hittite Language.* Winona Lake.
35. Jacques, G. 2010: "The inverse in Japhug Rgyalrong", *Language and Linguistics* 11 (1), 127-57.
36. Jacques, G. & A. Antonov 2014: "Direct/inverse systems", *Language and Linguistics Compass* 8/7, 301-318.
37. Jasanoff, J.H. 1979: "The position of the *ḫi*-conjugation", *Hethitisch und Indogermanisch.* Hrsg. von Ernst Neu und Wolfgang Meid. Innsbruck, 79-90.
38. Jasanoff J.H. 1998: "The thematic conjugation revisited", *Mír Curad. Studies in Honor of Calvert Watkins.* Ed. by Jay H. Jasanoff, H. Craig Melchert and Lisi Oliver. Innsbruck, 301-16.
39. Jasanoff, J.H. 2003: Hittite and the Indo-European verb. Oxford.
40. Jasanoff, J.H. 2015 (handout): "Hittite and the IE verb 100 years after Hrozný; or, What happened to the perfect in Hittite?", talk given on 22 September, 2015 at 100 Jahre Entzifferung des Hethitischen - Morphosyntaktische Kategorien in Sprachgeschichte und Forschung. Arbeitstagung der Indogermanischen Gesellschaft, Philipps-Universität Marburg, 21. bis 23. September 2015.
41. Keydana, G., P. Widmer & T. Olander (eds.) 2013: *Indo-European Accent and Ablaut.* Copenhagen.
42. Klimov, G.A. 1974: "On the character of language of active typology", *Linguistics* 131, 11–25.
43. Klingenschmitt, G. 1978: "Zum Ablaut des indogermanischen Kausativs", *Zeitschrift für Vergleichende Sprachforschung* 92, 1-13
44. Kloekhorst, A. 2008: *Etymological Dictionary of the Hittite Inherited Lexicon.* Leiden.
45. Kloekhorst, A. 2012: "Hittite "*ā/e*"-ablauting Verbs", in: *The Indo-European Verb. Proceedings of the Conference of the Society for Indo-European Studies, Los Angeles 13-16 September 2010.* Ed. by H. Craig Melchert. Wiesbaden, 151-160.
46. Kölligan, D. 2004: "Wenn zwei dasselbe tun: Iterativa und Kausativa", *Indogermanistik-Germanistik-Linguistik.* Ed. by M. Kozianka, R. Lühr & S. Zeilfelder. Hamburg, 193-248.
47. Kortlandt, F. 1981: "1st sg. middle **-H_2*", *Indogermanische Forschungen* 86, 123-136.
48. art269e (ms.): "An outline of Proto-Indo-European", *Manuscript*, www.kortlandt.nl → art269e.pdf.
49. Kroonen, G. 2013: *Etymological Dictionary of Proto-Germanic.* Leiden & Boston.
50. Kulikov, L. 2011: "Voice typology", *The Oxford Handbook of Linguistic Typology.* Ed. by. J. Song. Oxford, 368-398.
51. Kulikov, L. 2014: *The Vedic* ya*-presents. Passives and intransitivity in Old-Indo-Aryan.* Amsterdam & New York.
52. Kümmel, M.J. 1996: *Stativ und Passivaorist im Indoiranischen.* Göttingen.
53. Kümmel, M.J. 2000: *Das Perfekt im Indoiranischen.* Wiesbaden.
54. Kümmel, M.J. 2015+ (handout): "Anatolisches und indoiranisches Verbum. Erbe und Neuerung: 100 Jahre Entzifferung des Hethitischen", paper given at: *Morphosyntaktische Kategorien in Sprachgeschichte und Forschung. Arbeitstagung der Indogermanischen Gesellschaft in Marburg 21.-23. September 2015*, see https://uni-jena.academia.edu/MartinKümmel
55. Kümmel, M.J. 2012: "Typology and reconstruction. The consonants and vowels of Proto-Indo-European", in: *The Sound of Indo-European. Phonetics, Phonemics, and Morphophonemics.* Ed. by B. Nielsen Whitehead, T. Olander, B. A. Olsen & J. E. Rasmussen. Kopenhagen, 291-329.
56. Lehmann, W.P. 1974: *Proto-Indo-European Syntax.* Austin.

57. Lehmann, W.P. 1995: *Residues of pre-Indo-European Active Structure and their Implications for the Relationships among the Dialects.* Innsbruck.
58. Lehmann, W.P. 2002: *Pre-Indo-European.* Washington.
59. Letuchiy, A. 2009: "Towards a typology of labile verbs: Lability vs. derivation", *New Challenges in Typology. Transcending the Borders and Refining the Distinctions.* Ed. by A. Arkhipov & P. Epps. Berlin, 223-244.
60. *LIV* = M.J. Kümmel & H. Rix et. al. 2001: Lexikon der indogermanischen Verben. Unter der Leitung von H. Rix ..., 2. erw. und verbesserte Auflage bearb. von M. Kümmel und H. Rix. Wiesbaden.
61. Lubotsky, A. M. 1988: "The Old Phrygian Areyastis-inscription", *Kadmos* 27, 9–26.
62. Lubotsky, A. 1997: *A Ṛgvedic Word Concordance.* 2 Volumes. Cambridge, MA.
63. Martin, J. B. 2011: *A Grammar of Creek (Muskogee).* Lincoln, Nebraska & London.
64. Mayrhofer, M. 1986: *Indogermanische Grammatik I/2: Lautlehre.* Heidelberg.
65. Mayrhofer *EWAia* = M. Mayrhofer. *Etymologisches Wörterbuch des Altindoarischen.* I-III. Heidelberg.
66. McCarthy, J. 1979: *Formal Problems in Semitic Phonology and Morphology.* Doctoral dissertation, MIT. Cambridge, MA.
67. McCarthy 1981: "A Prosodic Theory of Nonconcatenative Morphology", *Linguistic Inquiry* 12, 373-418.
68. Meillet, A. 1931: "Caractère secondaire du type thématique indo-européen", *Bulletin de la Société de Linguistique de Paris* 32 (2) (numéro 96), 194-203.
69. Meillet, A. 1937: *Introduction à l'étude comparative des langues indo-européennes.* Paris.
70. Melchert, H. C. 2012 (ed.): The Indo-European Verb. Proceedings of the Conference of the Society for Indo-European Studies, Los Angeles 13-16 September 2010. Wiesbaden.
71. Neu, E. 1968: *Das hethitische Mediopasiv und seine indogermanischen Grundlagen.* Wiesbaden.
72. Newman, P. 1973: "Grades, Vowel-Tone Classes and Extensions in the Hausa Verbal System", *Studies in African Linguistics* 4 (3), 1973, 297-346.
73. *NIL* = Wodtko, D. S., B. Irslinger & C. Schneider 2008: *Nomina im indogermanischen Lexikon.* Heidelberg.
74. Pike, M. 2009: "The Indo-European long vowel preterites: new Latin evidence", *Internal Reconstruction in Indo-European.* Ed. by J. E. Rasmussen & T. Olander. Copenhagen, 205-212.
75. Pooth, R.A. 2000: "Stativ vs. Medium im Vedischen und Avestischen", *Historische Sprachforschung* 113, 88-116.
76. Pooth, R.A. 2001: "Studien zur frühurindogermanischen Morphologie I. 'Stativ', 'Medium' und 'Perfekt'", *Historische Sprachforschung* 114, 220-258.
77. Pooth, R.A. 2004a: "Ablaut und autosegmentale Morphologie: Theorie der urindogermanischen Wurzelflexion", *Indogermanistik - Germanistik - Linguistik.* Ed by. M. Kozianka, R. Lühr & S. Zeilfelder. Hamburg, 401-471.
78. Pooth, R.A. 2004b: "Zur Genese der späturidg. thematischen Konjugation aus frühuridg. Medialformen", *Indogermanische Forschungen* 109, 31-60.
79. Pooth, R.A. 2009a: "Der urindogermanische Progressiv", *Protolanguage and Prehistory. Akten der XII. Fachtagung der Indogermanischen Gesellschaft ... in Krakau.* Ed. by R. Lühr & S. Ziegler. Wiesbaden, 381-406.
80. Pooth, R.A. 2009b: "Proto-Indo-European Ablaut and Root Inflection", *Internal Reconstruction in Indo-European.* Ed. by J. E. Rasmussen & T. Olander. Copenhagen, 229-254.
81. Pooth, R.A. 2011: "Die 2. und 3. Person Dual und das Medium", *Indogermanistik und Linguistik im Dialog. Akten der XIII. Fachtagung der Indogermanischen Gesellschaft ... in Salzburg.* Ed. by T. Krisch & T. Lindner. Wiesbaden, 473-83.
82. Pooth, R.A. 2012: "Zum Aufkommen transitiver Verben in frühen Vedischen am Beispiel *[1]r̥*", in: *The Indo-European Verb. Proceedings of the Conference of the Society for Ind-European Studies, Los Angeles 13-16 September 2010.* Ed. by H. Craig Melchert. Wiesbaden, 267-84.
83. Pooth, R.A. 2014: *Die Diathesen Aktiv vs. Medium und die Verbsemantik im Vedischen der* Ṛgveda-Saṃhitā. Proefschrift. Defended 2014-10-23. Universiteit Leiden, Leiden University Repository, https://openaccess.leidenuniv.nl; for a version with a few corrigenda see https://leidenuniv.academia.edu/RolandPooth
84. Pooth, R.A. 2014-08-07 (ms.): "Ein Problem der Methode der komparativen Rekonstruktion von Morphemen, Morphemgrenzen und morphosyntaktischen Kategorien", manuscript version 2014-08-07, https://leidenuniv.academia.edu/RolandPooth
85. Pooth, R.A. 2014-10-14 (manuscript): "Voice, Transitivity Direction, Case, and Alignment in Proto-Indo-European. II. The Proto-Indo-European Voice System", mansucript version 2014-10-14, https://leidenuniv.academia.edu/RolandPooth
86. Pooth, R.A. 2014-12-05 (ms.): "More evidence for Proto-Indo-European transfixes: Two types of "lengthened grades"", ms. version 2014-12-05, https://leidenuniv.academia.edu/RolandPooth
87. Pooth, R.A. 2015a (manuscript): "A typological overview of Proto-Indo-European", manuscript version 2015-07-23 https://leidenuniv.academia.edu/RolandPooth
88. Pooth, R.A. 2015b: "Proto-Indo-European Nominal Morphology. Part 1. The Noun", *Language Arts* 1, issue version 2015-12-23, manuscript version 2015-12-23, 38 pp. plus comments and reviews, https://leidenuniv.academia.edu/RolandPooth
89. Pooth, R.A. 2016+: "Is the "*tēzzi* principle" a plausible inference", paper given at *The precursors of Proto-Indo-European: the Indo-Hittite and Indo-Uralic hypotheses*. Workshop at the Leiden University Centre for Linguistics, 9-11 July 2015; forthcoming, see https://leidenuniv.academia.edu/RolandPooth
90. Pooth, R.A. 2016b (forthcoming): "Proto-Indo-European Complementation Strategies", *Language Arts* 3, forthcoming at: https://leidenuniv.academia.edu/RolandPooth
91. Ratcliff, M. 1992: "Form and function in tone languages", *Eighteenth annual meeting of the Berkeley Linguistic Society.* Ed. by L. A. Buszard-Welcher et al. Berkeley, CA, 134-144.
92. Ringe, D. 2006: *From Proto-Indo-European to Proto-Germanic.* Oxford.
93. Rude, N. 1997: "On the history of nominal case in Sahaptian", *International Journal of American Linguistics* 63, 113-43.
94. Sasse, H.-J. 1991a: "Aspect and Aktionsart: a reconciliation", *Belgian Journal of Linguistics* 6, 31-45 [= *Perspectives on Aspect and Aktionsart.* Ed. by C. Vetters & W. Vandeweghe].
95. Sasse, H.-J. 1991b (ed.): *Aspektsysteme.* Arbeitspapier Nr. 14 (Neue Folge). Institut für Sprachwissenschaft. Universität zu Köln.
96. Stang, C.S. 1932: "Perfektum und Medium", *Norsk Tidskrift for Språgwedenskap* 6, 29-39.
97. Stang, C.S. 1942: *Das slavische und baltische Verbum.* Oslo.
98. Stassen, L. 1997: *Intransitive Predication.* Oxford.
99. Tichy, E. [1]2000, [2]2004, [3]2009: *Indogermanistisches Grundwissen für Studierende sprachwissenschaftlicher Disziplinen.* 3. überarb. Auflage. Bremen.
100. Thompson, C.L. 1996: "The Na-Dene middle voice: An impersonal source of the D-Element", *International Journal of American Linguistics* 62 (4), 351-378.
101. Thompson, L.C. & M.T. Thompson 1969: "Metathesis as a grammatical device", *International Journal of American Linguistics* 35, 213-219.
102. Tremblay, X. 1999: *Études sur les noms suffixaux athématique de l'Avesta.* Thèse doctorat. É.P.H.É. IV[e] section. Paris.
103. Tremblay, X. 2003: "Interne Derivation: „Illusion de la reconstruction" oder verbreitetes morphologisches Mittel? Am Beispiel des Awestischen", in: Tichy, E., D.S. Wodtko & B. Irslinger (eds.): *Indogermanisches Nomen. Derivation, Flexion und Ablaut. Akten der Arbeitstagung der Indogermanischen Gesellschaft, Freiburg, 19. bis 22. Sept. 2001.* Bremen, 231-259.
104. de Vaan, M. 2008: *Etymological Dictionary of Latin and the Other Italic Languages.* Leiden & Boston.
105. Watkins, C. 1962: *Indo-European Origins of the Celtic Verb I. The Sigmatic Aorist.* Dublin.
106. Watkins C. 1969: *Indogermanische Grammatik III/1. Geschichte der indogermanischen Verbalflexion.* Heidelberg.
107. Weiss, M. 2009: Outline of the Historical and Comparative Grammar of Latin. Ann Arbor & New York.

Language Arts 2 | 2016 | VERSION 2016-03-11
Author manuscript version 2016-03-11