

Synchronic and Diachronic Derivation of Greek *n*- and *nt*-stem Nominative Singular Formations*

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1. Introduction

1.1. *Status quaestionis*

Ancient Greek nouns, adjectives, and participles whose stems end in /-n/ or /-nt/ have the peculiarity that in the nominative singular masculine (sometimes feminine) their surface forms terminate in either [-s] or [-n], without apparent regularity in the distribution of these terminations. For example:

- | | | | |
|-----|-------------------|----|----------------------------------|
| (1) | <i>nt</i> -stems: | a. | /lipónt-s/ → λιπών ‘having left’ |
| | | b. | /didónt-s/ → διδούς ‘giving’ |
| (2) | <i>n</i> -stems: | a. | /paiǎn-s/ → παιᾶν ‘physician’ |
| | | b. | /mélan-s/ → μέλας ‘dark’ |

We may generalize that stems whose underlying representation (UR) is /-V-n(t)-s/ will have a surface representation (SR) in either [-V̄n] or [-V̄s].¹ Among the *nt*-stems, both the [-s] and the [-n] endings are productive in attested Greek: compare aorist participles in -ᾶς and -εις beside present and aorist participles in -ων. The co-occurrence of [-s] and [-n] is not limited to any one period or dialect of Greek (cf. Chantraine 1961:68–9). Where we do find distribution by dialect, it is not necessarily regular: compare Ionic μέις ~ Attic μήν ‘month’, but Attic ὀδούς ~ Ionic ὀδών ‘tooth’ (cf. Buck and Petersen 1949:457–8).²

Previous accounts have noted the [-s] ~ [-n] discrepancy, but, being principally concerned with diachrony, give little or no indication as to what mechanism

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1 I understand /-s/ to be present in both derivations as the morphemic realization of nom. sg. masc.(-fem.), based on stems whose final consonant is [–CORONAL], such as κλώψ [kló:p-s] ‘thief’ and φύλαξ [pʰýlak-s] ‘guard’, or a plain (oral) dental stop, such as παῖς [pái-s], gen. sg. παιδός ‘child’.

2 I will not be concerned here with the precise vocalic outcomes preceding the final consonant.

may govern it, nor the conditions under which the discrepancy could have arisen prehistorically. They have not been concerned with how both $[-\tilde{V}n]$ and $[-\tilde{V}s]$ could be derived from underlying sequences of the shape $/-\tilde{V}n(t)s/$ within a single (synchronic) grammar, nor why the diachronic outcomes of thematic forms should have $[-n]$ regularly, while the athematic forms regularly yield $[-s]$. For instance, it is enough for Chantraine (1961:68, cf. also 280–2) to note:

Une partie de ces formes est caractérisée au nominatif masculin-féminin par l's du nominatif [...] Dans certains types de flexion en **-nt*, le grec se sépare des autres langues indo-européennes par la constitution d'un nominatif *-ων* caractérisé non par la consonne *s*, mais par le vocalisme long [...] Il s'agit, semble-t-il, d'une forme analogue du type *ἄκμων, εὐδαίμων*, etc.

Like Chantraine, Rix (1992:150) suggests that the $[-n]$ here may be based on analogy with the *n*-stems in $[-\tilde{o}n]$: “*φέρων* mit *-ōn* (nach *-n*-Stämmen wie *τέκτων*?) für idg. *-ont-s*.” Yet this only defers the question of how the $[-n]$ forms arose, the answer to which cannot be that they simply lacked $/-s/$ altogether, seeing as the *n*-stems also attest SRs in $[-s]$ (as in (2b) above). Sihler (1995:616), on the other hand, views **-ōn* as original ($< **-onts$), following Szemerényi (cf. 1996:117) and (apparently) Chantraine 1933:268, with “recomposition” of **-onts* elsewhere in the Indo-European daughter languages. Further, Sihler (1995:617) claims that $/-nts/$ must be recomposed in stems ending in a short vowel (e.g., *τιθεῖς* ‘placing’ $< *tit^héns < *tit^hé-nt-s \leftarrow *tit^h-at-s \leftarrow *d^hed^h_1-nt-s$). Yet it is not clear why a speaker should “recompose” here (and among the “alpha-thematic” participles in *-ās* $< *-nt-s$, cf. §3.2 below) but not in the thematic forms (i.e., **-ōn* $> /-o-nt-s/$). A more straightforward synchronic treatment will be to set up $/-o-n(t)s/ \rightarrow [-\tilde{o}n]$, whether inherited or “recomposed,” rather than an underlying $/-\tilde{o}n/$, which, uniquely among consonant stems, would lack the nom. sg. marker $/-s/$ in its derivation.

1.2. Proposal

I propose a synchronic analysis that sets up $/-s/$ underlyingly for *all* nominative singulars of non-neuter consonant stems in Greek, from which both the *-s* and the *-n* SRs can be readily derived. This allows us to avoid having to speak of “recomposition” or claim that Greek has “Neuerung bei den Stämmen auf *-ont-*” (Rix 1992:150). Greek is thus revealed not to have diverged significantly from the other IE languages in this respect, nor to have innovated, at least in terms of its URs. In addition, we need not have recourse to analogy with the *n*-stems in $[-\tilde{o}n]$, but may derive the *nt*-stem outputs in $[-\tilde{o}n]$ (morpho)phonologically. We

may similarly treat the *n*-stems as containing (or *retaining*) an underlying nom. sg. morpheme /-s/ as well, which appears on the surface in forms like ῥίς (< */r^hín-s/) ‘nose’ and μείς (< */men-s/) ‘month’ but not, e.g., in παῖς ‘physician’ (← /paiân-s/), and may thereby understand how *n*-stems could come to end in [-s] beginning in the prehistory of Greek.

As there appear to be no strictly *phonological* generalizations that can account for the discrepancy between UR /V-nt-s/ and SR [-V̄-s] ~ [-V̄-n], I propose to analyze the derivation of these forms as *morphophonological*, taking morpheme boundaries and lexical indexation to be the deciding factor in determining the divergent phonetic realizations of the underlying final cluster /-nts/. In particular, I argue that it is the presence or absence of the theme vowel /-o-/ that determines the SR for *nt*-stems, which will have [-n] where the theme vowel is present (or *perceived* to be present, cf. (24) in §3.1 below) in the derivation, but [-s] where it is not. Again, crucial is the fact that both types are productive in the attested language.

Following Pater (2000, 2007, 2010), who argues for lexical indexation in Optimality Theory (OT) as a means of handling variant outputs, I suggest that the theme vowel /-o-/ in Ancient Greek is lexically indexed with a particular constraint ranking (§2.1 below), which yields the SR [-n]. In the absence of this morpheme, the default constraint ranking of the grammar will yield the SR [-s]. This will be seen to account for all the relevant data (§3.1).³ I then offer a historical account (§3.2) of how such indexation might have arisen, conditioned in origin by a purely phonological distribution.

The *n*-stems, on the other hand, are never lexically indexed, but rely crucially on a different constraint, ANCHOR-R(STEM), introduced in §2.2. A synchronic analysis of these stems is presented at §4.1, with a diachronic treatment at §4.2. I then offer a brief summary and conclusion in §5.

3 Stems lacking this theme vowel /-o-/ will be referred to throughout as “non-thematic” (e.g., λῶσῶς ‘having released’, sometimes called “alpha-thematic”), which is meant to be broader than (and include) the more restricted designation of the term “athematic” (e.g., θεῖς ‘having placed’). Thus the true athematics and the “alpha-thematics” are captured under a single term, which is desirable, as their relevant surface behaviors are identical to one another and distinct from the thematic class.

2. Synchronic analysis in OT

2.1. Introduction of constraints relevant to the *nt*-stems

Let us consider the derivation of the participial forms λῦσᾶς ‘having released’ and λῦων ‘releasing’. Greek does not permit $C_{[+CORONAL]} + [-s]$ sequences at the right edge of a word. Hence fully faithful candidates like $^*[l\acute{y}s\acute{a}nts]$ and $^*[l\acute{y}\acute{o}nts]$ can never surface. The undominated markedness constraint $^*C_{[+COR]}s\#$ in (3) disallows these sequences, driving deletion of the segments $/-t-/$, $/-n-/$, or $/-s/$.⁴

- (3) $^*C_{[+COR]}s\#$
Assign one violation mark (*) for each instance of $[-s]$ following a $[+CORONAL]$ consonant word finally.

A few further high-ranking constraints are in fact required to derive the attested SRs. These include a markedness constraint, $^*C_{[-cont, -son]\#}$, that forbids SRs terminating in a plain dental $[-t]$ (of the type $^*[l\acute{y}sa(n)t]$, cf. $/m\acute{e}lit/ \rightarrow \mu\acute{\epsilon}λι$ ‘honey’), and a faithfulness constraint, DEP_V-IO , that penalizes epenthesis as a means of consonant cluster resolution (of the type $^*[l\acute{y}s\acute{a}netes]$).

- (4) λῦσᾶς ‘having released’

	$/l\acute{y}-sa-nt-s/$	DEP_V-IO	$^*C_{[-cont, -son]\#}$	$^*C_{[+COR]}s\#$
a.	$l\acute{y}san(t)s$			*!
b.	$l\acute{y}s\acute{a}s$			
c.	$l\acute{y}sa(n)t$		*!	
d.	$l\acute{y}s\acute{a}netes$	*!*		

As these three constraints are not dominated by any of those introduced below (nor by one another), they are never critical to the decision between the $[-s]$ and $[-n]$ terminations in particular, and will therefore be omitted in all the tableaux to follow.

Among non-thematic *nt*-stems (like λῦσᾶς), the preservation of $/-s/$ rather than $/-n/$ is driven by the faithfulness constraint $ANCHOR-R(WORD)$ (5), which prefers surface forms in $[-s]$ to those in $[-n]$, since the former is located at the right edge of the word in the input ($/-s/$). Among thematic *nt*-stems (like λῦων), preservation of $/-n-/$ rather than $/-s/$ is motivated by the faithfulness constraint $CONTIGUITY-IO$ (abbreviated $CONTIG-IO$, (6)), which militates against

4 This generalization also captures (as is desirable) the treatment of plain dental stems in $/-d-/$, e.g., $/p\acute{\alpha}id-s/ \rightarrow \pi\acute{\alpha}ις$ ‘child’.

ANCHOR-R(WORD), preferring a nom. sg. ending in [-n] rather than [-s], since in the UR /-n-/ is adjacent to the rest of the stem, while /-s/ can only surface if the segments /-t-/ and /-n-/ are deleted.

- (5) ANCHOR-R(WORD)
Assign a violation (*) if the segment in the input at the right edge of the word does not correspond to the segment standing at the right edge of the word in the output (cf. Kager 1999:137–8, 251–2).
- (6) CONTIG-IO
Segments that are (non-)adjacent in the input must be (non-)adjacent in the output. Assign one mark (*) for each violation (cf. Kenstowicz 1994:167, McCarthy and Prince 1995:123).⁵

- (7) λύσας ‘having released’

	/l̥ý-sa-nt-s/	ANCHOR-R(WORD)	CONTIG-IO
a.	☞ l̥ýsās		*
b.	☹ l̥ýsan	*!	

- (8) λύων ‘releasing’

	/l̥ý-o-nt-s/	ANCHOR-R(WORD)	CONTIG-IO
a.	☞ l̥ýōs		*
b.	☹ l̥ýōn	*!	

Thus we have an apparent contradiction in ranking: CONTIG-IO must be ranked higher than ANCHOR-R(WORD) among the thematic *nt*-stems (in order for [-n] to be preferred), but must be ranked lower elsewhere (for [-s] to surface). I take ANCHOR-R(WORD) to be critically ranked above CONTIG-IO, as this generalizes most broadly over stem types (i.e., all but the thematic class), yielding correct outputs, whereas the reverse ranking would only produce correct outputs for the thematic class. Thus the default ranking yields SRs in [-s] among the

5 As the order of both vowels and consonants is relevant to the present analysis, the more restricted definition of CONTIGUITY found in Zukoff 2012:12–3, in which violations are limited to consonants that surface in the output, is not appropriate here; rather, I follow the broader definition of Zukoff 2014:270, which applies to all segments. Further, violations are assigned based on “each sequence of segments that stands in a different contiguity relationship” (Zukoff 2012:13), rather than each segment individually. Thus, for example, /l̥ý-sa-nt-s/ → [l̥ýsās] receives a single violation for the sequence [-ās] not present in the UR, rather than one violation for [-ā] as it relates to [-s] and one violation for [-s] as it relates to [-ā].

non-thematic stems; yet the SRs in [-n] of the thematic stems require that CONTIG-IO be critically ranked above ANCHOR-R(WORD). This requirement may be achieved by lexical indexation of CONTIG-IO to the theme vowel /-o-/, such that the ranking CONTIG-IO $\gg$ ANCHOR-R(WORD) “overrides” the default ranking of the grammar exclusively among thematic stems.

Lexically indexed constraints are one way to handle paradoxes of constraint ranking, and are compelling when they are systematically associated with certain morphological categories.⁶ While it may be unusual to have a lexically indexed constraint operating on a productive morpheme (rather than an archaism), there are several strong motivations for adopting this analysis. Recall that both participle types—those with and those without the thematic morpheme—are productive. Positing lexical indexation for either stem type, then, will require a productive class to be associated with a lexically indexed constraint. Since we have a ranking paradox involving two equally productive classes, the more straightforward of the two alternatives should be taken as the correct analysis. In this case, the learner could readily generalize about the phonological behavior associated with a single morpheme, namely the presence or absence of the theme vowel /-o-/ (as, e.g., in λῷον ‘releasing’). The alternative analysis, with outputs in [-n] being general and outputs in [-s] being derived by a lexical indexation, would require the learner to associate the indexed constraint with every stem type that ends in [-s], both productive (of the type λυθεῖς ‘having been released’, λύσας ‘having released’, etc.) and non-productive (of the type ὀδούς ‘tooth’, etc.). I therefore adopt the former approach, and take the lexically indexed constraint, CONTIG_{ThemeV}-IO, to be ranked above ANCHOR-R(WORD), activated only when the theme vowel /-o-/ is present in the derivation. Thus the constraint CONTIG-IO is allowed to be critically ranked, as it were, both above and below ANCHOR-R(WORD), depending on whether the theme vowel /-o-/ is present. This correctly derives outputs in [-n] to thematic stems, while defaulting to outputs in [-s] wherever the theme vowel is absent from the derivation.

(9) CONTIG_{ThemeV}-IO

For a stem that has the index *lex*, segments that are (non-)adjacent in the input must be (non-)adjacent in the output. Assign one mark (*) for each violation (cf. Pater 2007:8, Zukoff 2017:487–92).

6 See, e.g., Fukazawa 1999:221–75; Itô and Mester 1999:62–6, 76–88, 2001:5, 12–3, 23–4; Kraska-Szlenk 1997, 1999; Pater 2000, 2007, 2010; Zukoff 2017:487–92.

Where present in the UR, the lexically indexed thematic morpheme /-o-/ will be marked with a subscript “*lex*,” as in (10).

- (10) Thematic, lexical indexation: λῦ̇ων ‘releasing’

	/l̥ẏ-o/lex-nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	l̥ẏōs	*!		*
b.	λῦ̇ων		*	

- (11) Non-thematic ranking: λῦ̇σ̄ᾱς ‘having released’

	/l̥ẏ-sa-nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	λῦ̇σ̄ᾱς			*
b.	λῦ̇σ̄αν		*!	

Whereas CONTIG-IO assigns a single violation for a change in contiguity, regardless of how many segments have been added or deleted, the faithfulness constraint MAX-IO assigns violations based on each addition or deletion in the output.

- (12) MAX-IO

Assign one violation mark (*) for each segment of the input that is not present in the output.

MAX-IO fails to decide between the [-n] and [-s] terminations, because deletion of /-t-/ plus either /-n-/ or /-s/ will always incur exactly two violations (one violation in the case of the *n*-stems, cf. §2.2 below). Thus CONTIG-IO and ANCHOR-R(WORD) decide between these alternatives, with CONTIG-IO preferring [-n] and ANCHOR-R(WORD) preferring [-s]. The interaction of these three constraints is shown explicitly in the tableaux at §3.2 (28)–(33) and §4.2 (40)–(42) below. However, since MAX-IO is irrelevant except in the diachronic analyses offered at §§3.2 and 4.2 below, it will be excluded from all tableaux to follow, except where relevant.

2.2. Introduction of constraints relevant to the *n*-stems

For the *n*-stems which, being non-thematic, are accordingly never indexed to the constraint CONTIG_{ThemeV}-IO, we will need an additional faithfulness constraint, ANCHOR-R(STEM), in order to derive the correct SRs in [- $\bar{V}$ n]. This is ranked above ANCHOR-R(WORD) and is formally defined as follows:

- (13) ANCHOR-R(STEM)
Assign a violation (*) if the segment in the input at the right edge of the stem does not correspond to the segment standing at the right edge of the stem in the output (cf. Kager 1999:137–8, 251–2).

In effect, ANCHOR-R(STEM) prefers $[-\bar{V}n]$ from $/-\bar{V}n-s/$ (and disprefers $[-\bar{V}s]$). The subclass in $/-on-/$ (nom. sg. SR $-\omega n$ $[-\bar{o}n]$) is the only productive type in attested Greek (Buck and Petersen 1949:247), derived as in (14).

- (14) Regular (productive) *n*-stem noun: ἀρηγών ‘helper’

	$/ar\bar{e}g\text{-}\acute{o}n-s/$	ANCHOR-R(STEM)	ANCHOR-R(WORD)	CONTIG-IO
a.	$ar\bar{e}g\acute{o}s$	*!		*
b.	$ar\bar{e}g\acute{o}n$		*	

Contrast this derivation with (15), which shows the non-application of ANCHOR-R(STEM) to the (otherwise identical) *nt*-stems, thereby yielding SRs in $[-s]$ rather than $[-n]$ among the non-thematic forms.

- (15) *nt*-stems: $\lambda\acute{\upsilon}\sigma\acute{\alpha}\varsigma$ ‘having released’

	$/l\acute{y}\text{-}sa\text{-}nt-s/$	ANCHOR-R(STEM)	ANCHOR-R(WORD)	CONTIG-IO
a.	$l\acute{y}s\acute{\alpha}s$	*		*
b.	$l\acute{y}s\acute{\alpha}n$	*	*!	

As ANCHOR-R(STEM) is not satisfied by either $[-\bar{V}s]$ or $[-\bar{V}n]$ from $/-V\text{-}nt-s/$ (i.e., both candidates will always violate ANCHOR-R(STEM) exactly once), ANCHOR-R(STEM) will in general not be considered with regard to the *nt*-stems in the analysis to follow, but only for the *n*-stems.

There remain some exceptional archaisms in $[-s]$ among the *n*-stems, such as $\rho\acute{\iota}\varsigma$ $/r^h\acute{i}n-s/$ ‘nose’ (cf. Chantraine 1961:81). However, these are relatively rare and are only attested outside the regular and productive *on*-stems (with nom. sg. invariably in $[-\bar{o}n]$), namely to stems in $/-an-/$, $/-en-/$, $/-in-/$, and $/-yn-/$. Of these, the stems in $/-in-/$ furnish the majority of examples of nom. sg. in $[-s]$, with 13 attested forms in $[-\acute{i}s]$ (Buck and Petersen 1949:250–1), all but one of which have later variants in $[-\acute{i}n]$, such as $\rho\acute{\iota}v$ ‘nose’ (Luc.+). Likewise, $\mu\acute{\epsilon}\acute{\iota}\varsigma$ ‘month’ has in Attic the nom. sg. $\mu\acute{\eta}v$. Among stems in $/-an-/$, only the two adjectives $\mu\acute{\epsilon}\lambda\acute{\alpha}\varsigma$ ‘dark’ (Hom.+) and $\tau\acute{\alpha}\lambda\acute{\alpha}\varsigma$ ‘wretched’ have terminations in $[-s]$. Of the 168 forms attested for the non-productive classes of *n*-stems, just 19 show a nom. sg. in $[-s]$ (Buck and Petersen 1949:248–51), of which all but 4 (i.e., $\mu\acute{\epsilon}\lambda\acute{\alpha}\varsigma$ ‘dark’, $\tau\acute{\alpha}\lambda\acute{\alpha}\varsigma$ ‘wretched’, $\epsilon\acute{\iota}\varsigma$ ‘one’, and $\acute{\iota}\varsigma$ ‘strength’) attest later variants in $[-n]$ (or, in the case of $\delta\rho\kappa\acute{\omega}\varsigma$ ‘(kind of) tunny’, thematized to a second declension form, nom. sg.

ὄρκυν-ος; see §4.1 (36)–(39) below). In effect, this handful of archaisms can be dealt with synchronically as simple lexicalizations, memorized as such by the learner. When they eventually fail to be learned, they fall necessarily into the regular pattern with [-n]. For the diachronic development of such forms, however, see §4.2 below.

2.3. Summary of synchronic analysis

We thus have two distinct synchronic treatments for the stems in question: On the one hand, the *n*-stems regularly surface with nom. sg. [- $\bar{V}$ n], with a handful of exceptional archaisms in [- $\bar{V}$ s]; on the other hand, the *nt*-stems regularly surface as [- $\bar{V}$ s], except where the theme vowel /-o-/ is present in the derivation, which, being indexed to CONTIG_{ThemeV-IO}, instead yield [-ōn]. In sum, the overall constraint ranking proposed here is as follows:

- (16) {DEP_{V-IO}, *C_[-cont, -son]#, *C_[+COR]S#, CONTIG_{ThemeV-IO}} $\gg$ {MAX-IO, ANCHOR-R(STEM)} $\gg$ ANCHOR-R(WORD) $\gg$ CONTIG-IO.

3. The *nt*-stems

3.1. Synchronic analysis of *nt*-stems

Among the *nt*-stems, the non-thematic classes (i.e., those lacking the theme vowel /-o-/) are invariant in having SRs in [-s], as we should expect.

- (17) Stems in /-ant-/⁷ (cf. Buck and Petersen 1949:456–7):

- (17.1) **-ᾱς, -α-ντος**: Productive “s-aorist” active participles, such as λῶσᾱς ‘having released’, etc.

- (17.1a) “Asigmatic” participles: ᾄρᾱς ‘having lifted’, κλίνᾱς ‘having leaned’, etc.

- (17.2) **-ᾱς, -αντος**:

- (17.2a) Athematic participles: ἰστᾱς⁸ ‘setting up’,⁹ βᾱς ‘having stepped’, φᾱς ‘saying’, etc.

7 In what follows the gen. sg. is given after the nom. sg. wherever it provides relevant information about the segmentation of a stem, and in all headings for stem classes.

8 Sihler’s (1995:617) “recomposition” of /-nts/, in order to avoid forms like *ἰστάτ- (similarly τιθέ- ‘place’ and διδό- ‘give’), is not required by the present analysis (though it is also not incompatible with it). See there for an evaluation of the various alternative analyses for the development of the sequence *-CH η - into Greek.

(17.2b) Participial isolates: ἀδάμας ‘indomitable’ (cf. δάμνω ‘subdue’), πολὺ-τλάς ‘much-enduring’ (cf. τλάω ‘suffer’), etc.

(17.2c) Items without clear verbal connection, e.g. ἐλέφας ‘ivory, elephant’ (perhaps analogous to ἀδάμας due to its hardness, according to Buck and Petersen 1949:456), ἱμάς ‘leather strap’, πελεκᾶς ‘woodpecker’, πᾶς ‘all’, etc.

(18) Non-thematic: γίγας ‘giant’

	/gíga-nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	γίγας			*
b.	γίγαν		*!	

(19) Stems in /-ent-/ (cf. Buck and Petersen 1949:460–3):

(19.1) **-εῖς, -έντος**: Productive aorist passive participles, such as γραφεῖς ‘having been written’, λυθείς ‘having been released’, etc.

(19.2) **-εις, -εντος** (cf. Chantraine 1933:270): Possessive adjectives (< PGk. *-fent- < PIE *-ment-, cf. PIIr. *-mant-, Ved. -vant-), such as ἀστερόεις ‘starry’; πτερόεις ‘winged’, etc.

(19.3) A few athematic forms: τιθείς, τιθέ-ντος ‘placing’, etc.

(20) Non-thematic: λυθείς ‘having been released’

	/lyt ^h é-nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	λυθῆς			*
b.	λυθέν		*!	

(21) Stems in /-unt-/: Athematic participles, such as δεικνύς ‘showing’, ὀλλύς ‘destroying’, etc.

On the other hand, stems that can be analyzed as containing the theme vowel /-o-/ show the ending in [-n]. Apparently aberrant forms can be understood to contain an unsegmented vowel /o/ (i.e., as part of the lexical stem itself) but lack the independent thematic morpheme /-o-/, as in διδούς, διδό-ντος ‘giving’.

(22) Stems in /-ont-/ (cf. Buck and Petersen 1949:457–9):

(22.1) **-ων, -ο-ντος**: Thematic stems, productive active participles, such as φέρων ‘bearing’, λιπών ‘having left’, etc.

9 But cf. Weiss 2011:405–6: ἵστημι ‘stand’ was apparently thematic in origin, to judge by Ved. *tī-ṣṭh-a-ti* ‘stands’, Latin *si-st-i-t* ‘id.’ < **sti-sth₂-e-ti*.

- (22.1a) Substantivized participial isolates, such as γέρων ‘old man’ (cf. Skt. *jár-a-nt-*, $\sqrt{j}$ ‘waste away’); *nomina agentis*, such as κρείων ‘ruler’ (cf. Sihler 1995:614; differently on κρείων van Beek 2014); other isolated participles, such as ἐκών ‘willingly’; etc.
- (22.2) **-ων, -ο(-)ντος**: A few “pseudo-thematic” forms, mostly from old *n*-stems,¹⁰ namely λέ(φ)ων ‘lion’¹¹ (cf. fem. λεάινα and Latin *leō*, gen. sg. *-ōnis* ‘lion’), ἄκων ‘javelin’ (cf. fem. ἄκαινα ‘thorn, goad’), θεράπων ‘attendant’ (cf. fem. θεράπαινα), δράκων ‘dragon’ (cf. fem. δράκαινα).
- (22.3) **-ους, -οντος**: A few non-thematic forms (cf. Buck and Petersen 1949:457–8), namely ὀδούς, ὀδόντ-ος ‘tooth’; διδούς, διδό-ντος ‘giving’; and γνούς, γνό-ντος ‘having learned’.
- (23) Thematic: λιπών ‘having left’

	/lip-ó _{lex} -nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	lipṓs	*!		*
b.	lipōn		*	

Stems terminating in [-ōn] that do not contain an (historically) original theme vowel /-o-/ , but a different stem vowel /o/, such as λέων (← /léont-s/) ‘lion’, can be understood as having been reanalyzed with the theme vowel /-o-/ instead, and are accordingly resegmented in their UR (i.e., /léon-s/ > /léont-s/ > /lé-o-nt-s/ → λέων¹²):

- (24) “Pseudo-thematic:” λέων ‘lion’

	/lé-o _{lex} -nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	léōs	*!		*
b.	léōn		*	

10 On the inclusion of these forms in an otherwise entirely participial class, Buck and Petersen (1949:457–9) observe that “even for these, at least for the two last, association with verbs (cf. θεραπεύω [‘attend’] and δέркоμαι [‘have sight, be alive’]), and consequently participles, may have been the inducing factor.”

11 Already an *n*-stem in Myc. *re-wo-te-jo* ‘decorated with lions’, spelling instr. pl. [lɛwontej-(j)ojɛs] (Weiss 2011:480, *Docs*²:580) to adj. λεφόντειος (*Docs*²:82, Chantraine 1961:68).

12 Cf. κύων ‘dog’ < ** $\hat{k}(u)\mu$ -ón-s (Rix 1992:145), with similar segmentation of a nominal root, given elsewhere (e.g., Watkins 2011:47–8) with monomorphemic stem * $\hat{k}(u)\mu$ ón-.

This may seem remarkable, but such forms have already made the unexpected leap from a nominal class in /-n-/ (PGk. */léon-s/) to an otherwise entirely participial class in /-nt-/ (cf. nn.10 and 11 above). Moreover, according to Buck and Petersen (1949:457), “variation between declension in -v- and -vτ- occurs in both directions, particularly in proper names, where both suffixes were common.” Thus we find the *n*-stem Λέωνος (gen. sg.) attested as a proper name (IG 12.9.1048). Given the association of active participles in -ων, -ο-ντος with the theme vowel /-o-/, a non-thematic outcome of the type ἰλέους, λέοντ-ος seems reasonably to have been avoided in order to maintain formal consistency with the parallel SRs of the thematic class. A nom. sg. -ων, then, would have been reinforced both by the participial *ont*-stems and by the semantically and formally associated *on*-stems (e.g., ἀρηγών, -όνος ‘helper’ beside ἀρήγων, -ο-ντος ‘helping’).

A few other items remain transparently non-thematic, yet still contain an /o/ vowel in their lexical stem. These surface with final [-s], as expected.

(22.3a) ὀδοῦς, ὀδόντ-ος ‘tooth’ (cf. Buck and Petersen 1949:458)

(22.3b) διδοῦς, διδό-ντος ‘giving’

(22.3c) γνούς, γνό-ντος ‘having learned’

‘Tooth’ seems to have originated as a regular (non-thematic) participle in /-ónt-s/: **h₁d-ónt-s*, **h₁d-nt-* (Rix 1992:150, Lowe 2015:312)—an archaism perhaps preserved for a time in Ionic ὀδών (Hdt., Hipp.; Hdn., Hsch.), ὀδόντος. This has, however, generalized the *o*-grade of the nom. sg. throughout its paradigm, likely by association with the thematic class, and so may be synchronically analyzed as containing the thematic morpheme /-o-/.

(25) ὀδών ‘tooth’ (Ionic)

/od-ó _{lex} -nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a. odós	*!		*
b.  odón		*	

Chantraine (1933:268) notes that “[l]e plus archaïque de ces mots est le nom de « la dent » ὀδών,” taking it to be an old participial form to **h₁ed-* ‘eat’. The old participial analysis /od-ó(-)nt-/ seems to have given way to reanalysis as a monomorphemic noun stem /odónt-/. The nom. sg. morpheme /-s/ is affixed directly to this stem, thus yielding ὀδοῦς in Attic (Arist., LXX).

(26) ὀδοῦς ‘tooth’ (Attic)

	/odónt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	ὀδός			*
b.	ὀδόν		*!	

In the case of διδοῦς /didó-nt-s/, διδό-ντος ‘giving’, avoidance of thematic reanalysis was likely driven by its close synchronic association with the other so-called “μi-verbs” (such as τιθεῖς, τιθέ-ντος ‘placing’). Accordingly, a potential reanalysis to [†]/did-ó-nt-s/ → [†]διδών (with theme vowel) was avoided.

(27) διδοῦς ‘giving’ (with non-thematic /o/)

	/didó-nt-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(WORD)	CONTIG-IO
a.	διδός			*
b.	διδόν		*!	

Similarly, in γνούς /gnó-nt-s/, γνό-ντος ‘having learned’, the stem is transparently non-thematic in the rest of its paradigm (ἔ-γνω-ν, ἔ-γνω-ς, ἔ-γνω ‘I/you/(s)he learned’, etc.), and a reinterpretation of the root to the vowel-less /gn-/ would have been duly avoided, such that a thematic reanalysis to [†]/gn-ó-nt-s/ → [†]γνών never occurs.

The μi-verbs ‘be’ and ‘go’ exhibit exceptional *regularity* in their participles by analogically conforming to the thematic type, despite being athematic elsewhere in their paradigms. Thus we find ἰών, ἰ-ό-ντος ‘going’ for what might well have turned up as something like [†]ζεῖς (or [†]εῖς, following Bozzone 2013), [†]ἴντος < */h₁i-ént-s/, */h₁i-nt-ós/ (cf. Ved. *yán*, *yatás* ‘going’) (Rix 1992:234), and (ἐ)ών, (ἐ)όντος ‘being’ < *(e)s-ó-nt- (already in Mycenaean: *i-jo-te* = ἰόντες, *a-pe-o-te* = ἀπ-εόντες, cf. Chantraine 1961:281). This too is thematization, synchronically derived with the thematic morpheme /-o-/.

3.2. Diachronic analysis of nt-stems

To see how the situation described in §3.1 might have arisen, I project back to a period when there was not yet lexical indexation with the theme vowel /-o-/. To derive the correct outputs (in [-n]) among the thematic forms at this stage, CONTIG-IO must have been ranked above ANCHOR-R(WORD), which may well have been the original situation (cf. Ved. *bháv-an* ‘becoming’, with ending in [-n]). Thus the relevant constraint ranking at this stage, which will be referred to as *T1*, was as follows: MAX-IO ≫ {CONTIG-IO, ANCHOR-R(STEM)} ≫ ANCHOR-R(WORD). At *T1*, SRs in [-n] would have incurred one fewer violation of

CONTIG-IO than would those in [-s], and thus would surface with the expected outcome.

(28) Tableau of λῥών ‘releasing’ at *TI*

	/l̥y̥-o-nt-s/	MAX-IO	CONTIG-IO	ANCHOR-R(WORD)
a.	l̥y̥ōs	**	*!	
b.	λῥōn	**		*

Further, I suppose that, at this stage, the /-n-/ of the zero-grade of the participial suffix was still present underlyingly among the athematic *s*-aorists, denoted hereafter as syllabic /-ŋ-/ (e.g., */l̥y̥-s-ŋt-s/),¹³ which would surface as the vowel [-a-] (cf. Ved. *júhv-at* [← /-ŋt-/] ‘sacrificing’). This would predate the analogical “restoration” of /-n-/ described in prior accounts.¹⁴ That is, the *s*-aorist had not yet been reanalyzed as “alpha-thematic”, with /-a-/ being interpreted as part of the *s*-aorist verbal stem (based on 1sg. act. -σ-α < *-s-ŋ, 3pl. act. -σ-αν < *-s-ŋt, 3pl. mid. -σ-αντο < *-s-ŋto, in addition to the *nt*-participles, and then generalized to the rest of the paradigm, e.g., 2sg. act. -σ-ας < *-s-s), and /-n-/ restored by analogy with the thematic forms (cf. Rix 1992:207, 216–7; Schwyzer 1939:750). Accordingly, a nom. sg. in [-ān] would have been impossible at *TI*.

(29) Tableau of λῥσᾶς ‘having released’ at *TI*

	/l̥y̥-s-ŋt-s/	MAX-IO	CONTIG-IO	ANCHOR-R(WORD)
a.	l̥y̥sās	*	*	
b.	l̥y̥sā	**!		*

Thus at this stage, stems terminating in a vowel before the suffix /-nt-/ are predicted to have [-n] in the nom. sg., while stems terminating in a consonant before /-nt-/ are predicted to have [-s]. This correctly derives, by purely phonological means, the inherited (non-thematic) forms in [-ōn] (cf. Chantraine 1933:268, Sihler 1995:616), such as ὀδών (← */od-ónt-s/), *-ατόζ/-όντος ‘tooth’, whose SR matches, e.g., Ved. *dán*, acc. sg. *dánt-am* ‘tooth’ (→ Ionic /od-ó-nt-s/ → ὀδών (cf. (25) above), Attic /odónt-s/ → ὀδοῦς (cf. (26) above).

Next, we find that, when the Greek *s*-aorists were reanalyzed as having an /-a-/ as part of their stem and analogical recomposition of the /-n-/ in their parti-

13 This notation is for the sake of clarity; of course, the true UR would simply be /-n-/.

14 E.g., Buck and Petersen 1949:456: “The α of Gr. -αντ- is the η of -ητ-, with ν restored from strong forms like φέρ-οντ-ες”; Rix 1992:234: “Beim sigmat. Aor. (Typ b) ist *-at- < *-ητ- (§ 76) nach φέρο-ντ- etc. zu -ant- umgebildet”.

cial suffix (and elsewhere: e.g., 3pl. act. -av, 3pl. mid. -avto), the correct SR [lýsās] could no longer be produced by the *T1* constraint ranking.

(30) Reanalyzed λύσας at *T1*

	/lý-sa-nt-s/	MAX-IO	CONTIG-IO	ANCHOR-R(WORD)
a. ☹	lýsās	**	*!	
b. ☹	lýsān	**		*

Learners were faced with the problem of how to generate forms like [lýsās] with the *T1* ranking. That is, learners were obligated to posit a new constraint-ranking in order to continue producing the correct SRs in [-s]. The solution (so-called “inconsistency resolution,” cf. Pater 2007:10) was to promote ANCHOR-R(WORD) above CONTIG-IO, thereby preferring outputs in [-s]. This stage will be referred to as *T2*, which had the following ranking: MAX-IO » ANCHOR-R(WORD) » {CONTIG-IO, ANCHOR-R(STEM)}. This yields the correct output for all stems of the non-thematic type.

(31) *T2* Ranking after reanalysis of *s*-Aor. λύσας

	/lý-sa-nt-s/	MAX-IO	ANCHOR-R(WORD)	CONTIG-IO
a. ☹	lýsās	**		*
b.	lýsān	**	*!	

(32) Incorrect output for λών at *T2*

	/lý-o-nt-s/	MAX-IO	ANCHOR-R(WORD)	CONTIG-IO
a. ☹	lýōs	**		*
b. ☹	lýōn	**	*!	

(33) *T2* Resolution by lexical indexation for λών

	/lý-o _{lex} -nt-s/	CONTIG _{ThemeV} -IO	MAX-IO	ANCHOR-R(WORD)	CONTIG-IO
a.	lýōs	*!	**		*
b. ☹	lýōn		**	*!	

The distinct nom. sg. in [-n] of the thematic stems could now be transparently attributed to a morphological fact: the presence of the theme vowel /-o-/. Since the forms in [-ōn] could no longer be produced by the default ranking of the grammar (32), their distinctiveness was maintained by means of lexical indexation with the thematic morpheme /-o-/ (33), whereby CONTIG_{ThemeV}-IO is critically ranked above ANCHOR-R(WORD), thus yielding the correct output for all stems of the thematic type. Just as at *T1* (cf. (30) above), learners could never have ac-

tually produced the incorrect form, but would have had to posit a new ranking in order to continue producing the correct output. Thus the introduction of $\text{CONTIG}_{\text{ThemeV-IO}}$ to the grammar also belongs properly to T_2 , which could thus correctly produce all SRs of *nt*-stems as found in attested Greek, with an overall ranking as follows: $\text{CONTIG}_{\text{ThemeV-IO}} \gg \text{MAX-IO} \gg \text{ANCHOR-R(WORD)} \gg \text{CONTIG-IO}$.

The rest of the non-thematic forms (of the type $\lambda\upsilon\theta\epsilon\acute{\iota}\varsigma$, etc.¹⁵) would likewise continue to adhere to the ranking $\text{ANCHOR-R(WORD)} \gg \text{CONTIG-IO}$ (aligning with the $\lambda\upsilon\sigma\acute{\alpha}\varsigma$ type¹⁶), and thus surface with [-s], as expected.

4. The *n*-stems

4.1. Synchronic analysis of *n*-stems

Unlike the *nt*-stems with SRs in $-\omega\nu$, the *n*-stems in $-\omega\nu$ have no corresponding outcome in [-s] (of the type $^{\dagger}\text{-}\omega\upsilon\varsigma$, $-\omega\nu\omega\varsigma$). They are invariant in surfacing with $-\omega\nu$, $-\omega\nu\omega\varsigma$ / $-\omega\nu\omega\varsigma$.

(34) Stems in /- $\acute{\omega}\nu$ -/ (cf. Buck and Petersen 1949:251–60): $-\omega\nu$, $-\omega\nu\omega\varsigma$ / $-\omega\nu\omega\varsigma$

(34.1) These are mostly verbal derivatives, semantically and formally close to (if not directly derived from) the thematic present active participles in $-\omega\nu$, $-\omega\nu\omega\varsigma$:

(34.1a) $\acute{\alpha}\rho\eta\gamma\acute{\omega}\nu$, $-\acute{\omega}\nu\omega\varsigma$ ‘helper’ (cf. $\acute{\alpha}\rho\eta\gamma\acute{\omega}\nu$, $-\omega\nu\omega\varsigma$ ‘helping’, from $\acute{\alpha}\rho\eta\gamma\epsilon\iota\nu$ ‘to help’), $\pi\rho\acute{\iota}\omega\nu$ ‘a saw’ ($\leftarrow \pi\rho\acute{\iota}\epsilon\iota\nu$ ‘to saw’, see Buck and Petersen 1949:247), $\tau\acute{\epsilon}\kappa\tau\omega\nu$ ‘carpenter’ (cf. Ved. $t\acute{a}k\varsigma\text{-}an$ ‘carpenter’ $\sim t\acute{a}k\varsigma\text{-}ant$ ‘fashioning’, to $\sqrt{tak\varsigma}$), $\epsilon\acute{\iota}\kappa\acute{\omega}\nu$ ‘likeness, image’ (cf. $\epsilon\acute{\iota}\kappa\epsilon\iota\nu$ ‘to be like’), etc.

(34.1b) $\kappa\lambda\acute{\omega}\nu$, $\kappa\lambda\omega\nu\text{-}\acute{\omega}\varsigma$ ‘twig’ (cf. $\kappa\lambda\acute{\alpha}\epsilon\iota\nu$ ‘to break’), $\acute{\alpha}\gamma\acute{\omega}\nu$ ‘assembly, contest’ (cf. $\acute{\alpha}\gamma\epsilon\iota\nu$ ‘conduct’), $\tau\rho\acute{\iota}\beta\omega\nu$ ‘threadbare cloak’ (cf. $\tau\rho\acute{\iota}\beta\epsilon\iota\nu$ ‘to rub’), etc.

(34.2) Some lack any such verbal affiliation: $\kappa\acute{\upsilon}\omega\nu$, $\kappa\upsilon\nu\text{-}\acute{\omega}\varsigma$ ‘dog’; $\chi\theta\acute{\omega}\nu$, $\chi\theta\acute{\omega}\nu\text{-}\acute{\omega}\varsigma$ ‘earth’; $\epsilon\ddot{\upsilon}\phi\rho\omega\nu$ ‘cheerful’, $\lambda\alpha\gamma\acute{\omega}\nu$ ‘flank’, $\pi\acute{\omega}\gamma\omega\nu$ ‘beard’, etc.

(34.3) Comparative adjectives: $\pi\lambda\epsilon\acute{\iota}\omega\nu$ / $\pi\lambda\acute{\epsilon}\omega\nu$ ‘more’, etc.

15 Cf. (19.1) in §3.1.

16 Cf. (17.1) in §3.1.

As Buck and Petersen observe (1949:247), by the time of the attested language, this is the only productive subclass among the *n*-stems. Accordingly, the members of the *on*-stem subclass vastly outnumber those of all the others combined (some 1,600 distinct *on*-stems are attested). Taken together, the unproductive classes account for only about 10.5% of all *n*-stems.

The *on*-stems, despite their formal similarity to the *ont*-stems (with which they also overlap semantically), are non-thematic and, accordingly, do not trigger the lexically indexed constraint CONTIG_{ThemeV}-IO. Instead, the constraint ANCHOR-R(STEM), being ranked above ANCHOR-R(WORD), generates the outputs in [-n].

(35) Regular (productive) *n*-stem noun: ἀρηγών ‘helper’

/arēg-ón-s/	CONTIG _{ThemeV} -IO	ANCHOR-R(STEM)	ANCHOR-R(WORD)	CONTIG-IO
a. arēgōs		*!		*
b.  arēgón			*	

Outside the productive class in /-on-/, the *n*-stems are somewhat more variable than their non-thematic *nt*-stem counterparts (with nom. sg. invariably in [-s]). These subclasses of *n*-stems, in /-an-/, /-en-/, /-in-/, and /-yn-/, surface in the nom. sg. sometimes with [-s] (e.g., μέλας ‘dark’), sometimes [-n] (e.g., παῖς ‘physician’), and sometimes both for a single lexical item (e.g., ῥίς ~ ῥίν ‘nose’). As mentioned above (§2.2), however, the terminations in [-s] are both in the minority and on the decline (cf. Chantraine 1961:81), with 19 attested forms in [-s] to 168 total *n*-stems attested outside of the productive *on*-class (11.3%), of which all but 4 (2.4%) attest later leveling to the regular termination in [-n] (or transferred to the second declension in the case of ὄρκυν-ος ‘(kind of) tunny’, cf. (39.2) below) (Buck and Petersen 1949:248–51). In the examples to follow (36)–(39), I include beside the heading for each subclass the number of attested forms in nom. sg. [-s] along with the total number of attested forms for that subclass, separated by a colon (e.g., 19 : 168), given as a percentage in parentheses.

(36) Stems in /-ān-/ 2 : 47 (4.3%) (cf. Buck and Petersen 1949:248–9):

(36.1) **-ān, -ānos**: παῖς ‘physician’ (Aesch.+); etc.

(36.2) **-an, -anos** (rare): ὁ ἄκαν ‘thistle’ (LXX), ὁ μυνδάν, ‘fabulous Tigris stone’ (Ps.Plut.), etc.

- (36.3) **-ᾱς, -ανος**: μέλας ‘dark’ (Hom.+), τάλᾱς ‘wretched’ (Hom.+) < *nt*-stem, gen. sg. τάλαντος (Hippon.).¹⁷
- (37) Stems in /-ēn-/ 3 : 88 (3.4%) (cf. Buck and Petersen 1949:249–50):
- (37.1) **-ην, -ηνος/-(ε)νος**: φρήν ‘midriff’ (Hom.+), ἀρήν ‘lamb’ (Hom.+), ποιμήν ‘herdsman’ (Hom.+), ἄρσην ‘male’ (Hom.+), χήν ‘wild goose’ (Hom.+), etc.
- (37.2) **-εις ~ -ην, -ηνος/-ενος**: μείς/μής (Hom.+) ~ μήν (Attic) ‘month’, κτείς (A.+) (< *nt*-stem) ~ κτήν (Jo., Alex.) ‘comb’, etc.
- (37.3) **εἷς/ῆς, ἐν-ός** ‘one’ (Hom.+): This is the only *en*-stem formant that does not have a regularized variant in [-n] (of the type ῥήν), most likely due to lexicalization, and perhaps reinforced by semantically related forms like τρεῖς ‘three’.¹⁸
- (38) Stems in /-īn-/ 13 : 27 (48.1%) (cf. Buck and Petersen 1949:250–1):
- (38.1) **-ῖς, -ῖνος**: ῖς ‘strength’ (Hom.+), etc.
- (38.2) **-ῖς ~ -ῖν, -ῖνος**: ῖς (Hom.+) ~ ῖν (Philox., 1st cent. BCE+) ‘sinew’, θῖς (Hom.+) ~ θῖν (Hdn., 2nd cent. CE+) ‘heap’, ὠδῖς (Hom.+) ~ ὠδῖν (LXX, NT) ‘pain’, ῥηγμῖς ~ ῥηγμῖν ‘surf’ (Hom.+), ῥῖς ~ ῥῖν (Hipp., Luc.+) ‘nose’ (Hom.+), πηρῖς ~ πηρῖν ‘scrotum’ (Nic.+), δελφῖς (Hom.+) ~ δελφῖν (Mosch., Manetho) ‘dolphin’, etc.
- (38.3) **-ῖν, -ῖνος** (rare): ὁ κτῖν ‘comb’ (Gloss.); στεμφῖν ‘(Egyptian) knotgrass’ (Ps.Diosc.); ῖν (or εῖν) ‘liquid measure’ (LXX+), etc.
- (39) Stems in /-ūn-/ 1 : 6 (16.7%) (cf. Buck and Petersen 1949:251):
- (39.1) **μόσσων** (Hsch.) ‘tower’ (Xen.+), etc.
- (39.2) ὄρκυς ‘(kind of) tunny’ (Anaxandr.+), acc. sg. ὄρκυν (Archestr.+, as though like ταχύν ‘swift’, πολύν ‘much’, etc.), with nom. sg. later replaced by ὄρκυν-ος (Oppian., 2nd cent. CE+).

17 That τάλᾱς is derived from an *nt*-stem may explain the persistence of its surface termination in [-s], regular among non-thematic *nt*-stems (cf. Buck and Petersen 1949:249). We may understand κτείς ‘comb’ similarly, though here the leveled variant κτήν is also attested (see (37.2) below).

18 Moreover, it is possible that the staying power of the [-s] in this form is due to its relatively recent transfer to the *n*-stem class from an original stem in /-m-/ (cf. Myc. dat. sg. *e-me*), but compare χθών ‘earth’ < ***d^héǵ^hom-s* (see Sihler 1995:217–8 for a discussion of this problem).

The forms in [-n] may be derived synchronically precisely as in (35) above; those in [-s] will have had to have been memorized as lexicalized archaisms before ultimately being leveled, for the most part, to the regular termination in [-n].¹⁹

4.2. Diachronic analysis of *n*-stems

In the first instance, the *T1* ranking, already established for the *nt*-stems in §3.2 above, will produce outputs in [-n] for all *n*-stems, as desired (cf. Ved. *rājā*, acc. sg. *rāj-ān-am* ‘king’; *balī*, m. acc. sg. *bal-in-am* ‘strong’; etc.). Here, again, the ranking is MAX-IO $\gg$ {CONTIG-IO, ANCHOR-R(STEM)} $\gg$ ANCHOR-R(WORD).

(40) *T1 n*-stems: ῥῑν ‘nose’

	/r ^h īn-s/	MAX-IO	CONTIG-IO	ANCHOR-R(STEM)	ANCHOR-R(WORD)
a.	r ^h īs	*	*!	*	
b.	ῥῑν	*			*

At *T2*, the ranking given in §3.2 above (i.e., MAX-IO $\gg$ ANCHOR-R(WORD) $\gg$ {CONTIG-IO, ANCHOR-R(STEM)}) will produce SRs in [-s], thus generating the archaisms of the attested language, such as ῥῑς ‘nose’, before leveling to [-n]. At this stage, all *n*-stems would have terminated in [-s]. Recall that the promotion of ANCHOR-R(WORD) was prompted by the reanalysis of the “alpha-thematic” aorists with participles in /-sa-nt-/ < /-s-nt-/ (§3.2).

19 The acc. pl. of the thematic (i.e., 2nd-declension) nouns in -οὐς, with SR [-ōs] (NB *not* [-ōn]) < *[-o-ns], should not be regarded as synchronically derived in most dialects, as there would be no way for a Greek learner to set up the original situation with /-n-/ based on the synchronic data available, namely athematic [-as], 1st-declension [-ās], and thematic [-ōs] (cf. Chantraine 1961:39–40). In certain dialects, the /-n-/ does indeed surface, though this is never to the exclusion of /-s/, but surfaces as [-ns]. Thus, in Gortynian Cretan we find, e.g., thematic masc. acc. pl. το-ς ἐλευθερ-ο-ς ‘the free (men)’, athematic acc. pl. πολι-ς ‘cities’, and υἱ-ς ‘sons’, and the fem. acc. pl. in -αυς. Elsewhere, the generalized thematic forms in [-ōs] should be regarded rather as an archaism with UR /-ōs/, not derivable synchronically from /-o-ns/. Such a derivation (with UR /-o-ns/) may be assumed for *T1* in the present analysis, but its details are beyond the scope of this paper. Similarly, in the *n(t)*-stem dat. pl. in /-si(n)/ can be assumed to have been derivable (at least at *T1*) but will not be explicitly treated here (cf. Chantraine 1961:68–9, 82; Smyth 1956:58, §250.b.N; Sihler 1995:217).

(41) *T2 n-stems* (post-reanalysis of *s-aor.*): ῥῑς ‘nose’

/r ^h ῑn-s/	MAX-IO	ANCHOR-R(WORD)	CONTIG-IO	ANCHOR-R(STEM)
a.  r ^h ῑs	*		*	*
b. r ^h ῑn	*	*!		

At the stage of attested Greek, referred to as *T3*, the constraint ANCHOR-R(STEM) is promoted to the stratum of MAX-IO, resulting in the overall constraint ranking given in the synchronic analysis at §2.3 above, namely: CONTIG_{ThemeV}-IO ≫ {MAX-IO, ANCHOR-R(STEM)} ≫ ANCHOR-R(WORD) ≫ CONTIG-IO. This change is prompted by two factors: 1) The *T1* outcome of the *n*-stems was [-Ṽn], so there is likely to have been some inconsistency at *T2* (i.e., archaisms in [-Ṽn]) in need of resolution; 2) the outcome of the thematic *ont*-stems is at all stages [-ōn], whose morphological and semantic relationship with the *on*-stems is very close (cf. Buck and Petersen 1949:247), as evidenced by frequent analogical exchange in either direction (e.g., */léon-s/ → /léont-s/ ‘lion’ beside the proper name Λέων-ος [gen. sg.]; cf. Buck and Petersen 1949:457), as well as semantic overlap of derivatives to the same verbal root (e.g., /arēg-o-nt-s/ ‘helping (one)’ beside /arēg-ón-s/ ‘helper’). Thus, on partial (and mutual) analogy with the thematic *ont*-stems, the *on*-stems preferred outputs in [-ōn] rather than [-ōs]. These two factors conspire to prompt the promotion of ANCHOR-R(STEM) above ANCHOR-R(WORD), whereby the *n*-stems are again left with the default output [-Ṽn] in the nom. sg. This was not, however, without some residual [-Ṽs] archaisms, such as [r^hῑs] ‘nose’ (and some 18 others), which can be understood as being lexicalized at first (i.e., memorized as exceptional), but whose exceptionality later fails to be learned, resulting in leveling to [-n] (e.g., [r^hῑn] ‘nose’) within attested Greek (i.e., within the span of *T3*).

(42) *T3 n-stems* (attested forms, with leveling of [-s] to [-n]): ῥῑν ‘nose’

	CONTIG _{ThemeV} -IO	MAX-IO	ANCHOR-R(STEM)	ANCHOR-R(WORD)	CONTIG-IO
/r ^h ῑn-s/					
a. r ^h ῑs		*	*!		*
b.  r ^h ῑn		*		*	

That we find no archaism in [-ōs] among the *on*-stems can probably again be attributed to analogy with the thematic *ont*-stems.

5. Conclusion

This analysis has sought to account for the discrepancy in Greek SRs with nom. sg. in [- $\bar{V}$ s] versus those in [- $\bar{V}$ n], having apparently identical URs. We have seen that the /-nt-/ terminations all prefer the [-s] variety, with the single exception of the thematic formations, which have [-ōn] instead. Apparent exceptions, such as ὁδοῦς, have been shown to be underlyingly non-thematic, and as such are not indexed with CONTIG_{ThemeV-IO}. The *n*-stems, on the other hand, have been shown to be completely regular (at T3) in nom. sg. [-n] or *regularizing* in [-s] → [-n].

Going forward, it would be informative to apply similar analyses to other Indo-European languages, whose synchronic situations are often quite different from that of Greek: compare, e.g., Gk. διδοῦς beside Ved. nom. masc. sg. *dádat* ‘giving’. A thorough investigation of the synchronic grammars of the attested daughter languages can thus only improve our confidence in the forms (both UR and SR) reconstructed for PIE, and strengthen our account of the similarities and differences among the daughter languages.

References

- Bozzone, Chiara. 2013. Initial “Yod” in Greek and the Etymology of Gk. ἵππος ‘horse’. In Stephanie W. Jamison, H. Craig Melchert, and Brent Vine (eds.), *Proceedings of the 24th Annual UCLA Indo-European Conference*, 1–26. Bremen: Hempen.
- Buck, Carl Darling, and Walter Petersen. 1949. *A Reverse Index of Greek Nouns and Adjectives*. Chicago: University of Chicago Press.
- Chantraine, Pierre. 1961. *Morphologie historique du grec*. Paris: Klincksieck.
- . 1933. *La formation des noms en grec ancien*. Paris: Klincksieck.
- Docs² = Michael Ventris and John Chadwick. 1973. *Documents in Mycenaean Greek*². Cambridge: Cambridge University Press.
- Fukuzawa, Haruka. 1999. Theoretical Implications of OCP Effects on Features in Optimality Theory. Ph.D. diss., University of Maryland at College Park = ROA-307. <http://dx.doi.org/doi:10.7282/T39S1PVP>.
- Itô, Junko, and Armin Mester. 1999. The Phonological Lexicon. In Natsuko Tsujimura (ed.), *The Handbook of Japanese Linguistics*, 62–100. Oxford: Blackwell.
- . 2001. Covert Generalizations in Optimality Theory: The Role of Stratal Faithfulness Constraints. *Studies in Phonetics, Phonology, and Morphology* 7.273–99.
- Kager, René. 1999. *Optimality Theory*. Cambridge: Cambridge University Press.

- Kenstowicz, Michael. 1994. Syllabification in Chukchee: A Constraints-Based Analysis. In Alice Davison, Nicole Maier, Glaucia Silva, and Wan Su Yan (eds.), *Proceedings of the Formal Linguistics Society of Mid-America IV*, 160–81. Iowa City: Department of Linguistics, University of Iowa = ROA-30, <http://dx.doi.org/doi:10.7282/T3W66J3G>.
- Kraska-Szlenk, Iwona. 1997. Exceptions in Phonological Theory. In Bernard Caron (ed.), *Proceedings of the 16th International Congress of Linguists*, paper number 0173. Oxford: Pergamon.
- . 1999. Syllable Structure Constraints in Exceptions. In John Rennison and Klaus Kühnhammer (eds.), *Phonologica 1996: Syllables!? Proceedings of the Eighth International Phonology Meeting, Vienna, 1996*, 113–31. The Hague: Thesus.
- Lowe, John J. 2015. *Participles in Rigvedic Sanskrit: The Syntax and Semantics of Adjectival Verb Forms*. Oxford: Oxford University Press.
- McCarthy, John J., and Alan Prince. 1995. Faithfulness and Reduplicative Identity. In Jill Beckman, Suzanne Urbanczyk, and Laura Walsh Dickey (eds.), *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*, 249–384. Amherst: Graduate Linguistic Student Association.
- Pater, Joe. 2000. Non-Uniformity in English Secondary Stress: The Role of Ranked and Lexically Specific Constraints. *Phonology* 17.237–74.
- . 2007. The Locus of Exceptionality: Morpheme-Specific Phonology as Constraint Indexation. In Leah Bateman, Michael O’Keefe, Ehren Reilly, and Adam Werle (eds.), *University of Massachusetts Occasional Papers in Linguistics 32: Papers in Optimality Theory III*, 259–96. Amherst: Graduate Linguistic Student Association.
- . 2010. Morpheme-Specific Phonology: Constraint Indexation and Inconsistency Resolution. In Steve Parker (ed.), *Phonological Argumentation: Essays on Evidence and Motivation*, 123–54. London: Equinox.
- Rix, Helmut. 1992. *Historische Grammatik des Griechischen: Laut- und Formenlehre*². Darmstadt: Wissenschaftliche Buchgesellschaft.
- Schwyzler, Eduard. 1939 [repr. 1953]. *Griechische Grammatik I*. Munich: Beck.
- Sihler, Andrew L. 1995. *New Comparative Grammar of Greek and Latin*. New York: Oxford University Press.
- Smyth, Herbert Weir. 1956. *Greek Grammar*. Cambridge, MA: Harvard University Press.
- Szemerényi, Oswald J. L. 1996. *Introduction to Indo-European Linguistics*. Oxford: Oxford University Press.
- van Beek, Lucien. 2014. Homeric κρείων ‘Lord’ and the Indo-European Word for ‘Head’. *Indogermanische Forschungen* 119.96–121.
- Watkins, Calvert. 2011. *American Heritage Dictionary of Indo-European Roots*³. Boston: Houghton Mifflin Harcourt.
- Weiss, Michael. 2011. *Outline of the Historical and Comparative Grammar of Latin* (2nd corrected reprint). Ann Arbor: Beech Stave.

- Zukoff, Sam. 2012. Metathesis with /r/ in Classical Armenian: An Optimality Theory Approach. In Marcus Berger (ed.), *UGA Working Papers in Linguistics* 1 (October). <http://www.lsga.com/working-papers/volume-1>.
- . 2014. On the Origins of Attic Reduplication. In Stephanie W. Jamison, H. Craig Melchert, and Brent Vine (eds.), *Proceedings of the 25th UCLA Indo-European Conference*, 257–78. Bremen: Hempen.
- . 2017. The Reduplicative System of Ancient Greek and a New Analysis of Attic Reduplication. *Linguistic Inquiry* 48.459–97.