

**Sound Change and Analogy: the Synchronic Reflexes of the
Second Compensatory Lengthening in Ancient Greek Dialects**

**Mudança Sonora e Analogia: o Reflexo Sincrônico do
Alongamento Compensatório Secundário em Dialectos do Grego Antigo**

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RESUMO

No grego, em variadas situações, vogais curtas tornam-se longas para compensar a perda ou a ressilabificação de uma consoante adjacente. Neste artigo, discute-se o processo conhecido na literatura helenística como ‘alongamento compensatório secundário’. Essa regra afeta seqüências *Vns* intervocálicas e de final de palavra. Discute-se o reflexo sincrônico da seqüência *Vns* em dialetos do grego antigo e mostra-se que a variação dialetal pode ser explicada parcialmente como o efeito de reestruturação lexical, ou nivelamento analógico.

PALAVRAS-CHAVE

Mudança Sonora. Analogia. Ditongo variável. Alongamento compensatório. Grego Antigo.

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ABSTRACT

In early Greek, at several occasions short vowels became long to compensate for the loss or the resyllabification of a neighbouring consonant. Here we will discuss the process that is known in the Hellenistic literature as the 'Second Compensatory Lengthening'. This rule affected intervocalic and word-final Vns sequences, in a manner that was different for the various dialects. We will discuss the synchronic reflexes of the Vns sequence in the Ancient Greek dialects and show that the dialectal variation can be explained partly as a result of differences in the nature of the consonant deletion rule, and partly as the effect of lexical restructuring-cum-rule-loss, or analogical levelling

KEY-WORDS

Sound change. Analogy. Mobile diphthong. Compensatory lengthening. Ancient Greek.

Introduction: Sound Change and Analogy

According to the Neogrammarian tradition, changes in the shape of morphemes are caused by either sound change, which is phonetically motivated, or by analogy, which is motivated by the structure of the grammar.¹ Sound change is a merely mechanical, physiologically induced, phenomenon. Therefore it is supposed to operate blindly, allowing no exceptions. Sound changes are 'laws' (German *Lautgesetz*).² The synchronic range of variation of a sound can be understood in terms of its varying degree of adaptation to or differentiation from its context, against the general background of the optimization of speech production and perception or of the sound system's structure (economy). Under the pressure of optimization, sounds are susceptible to change without regard for the meaning of the sound sequence of which they are a part. Most of the time, phonetic variation that exists in the speech of a single speaker or among the speakers of a speech community does not interfere with the set of contrastive phonetic elements of the language. As long as the variation remains within the range of a segment's phonetic space (allophony), analogy doesn't seem

¹ I wish to dedicate this paper to Luiz-Carlos Cagliari, an outstanding phonetician and a long-time friend.

² The claim that all sound changes are exceptionless is controversial (the neo-grammarians controversy), because rules may be lexically diffuse. See Hinskens, van Hout and Wetzels, 1997, for discussion.

to become operative. Sometimes, however, phonetic change affects a morpheme more drastically, either abruptly, or through the cumulating effect of a series of smaller phonetic changes, creating differences that concern its phonological constitution. As a result, a given morpheme may acquire two or more different phonological shapes. As long as the segmental relation between the different allomorphs remains transparent, i.e. when that relation remains recoverable without ambiguity by the speakers, the newly created allomorphy tends to be tenacious.³ However, when the (sound) structural relation between the different allomorphs is, or becomes, opaque, the situation changes.⁴ This is the point at which analogical forces start to operate: opaque phonological alternations in the sound shape of a word tend to be eliminated, probably for reasons that relate to word processing and word storage (cf. WETZELS, 1986a). Both from the perspective of language acquisition and from the overall simplicity of the adult grammar, the ideal situation seems to be one in which there is a single phonological sequence corresponding to each individual meaning that a language distinguishes. It is this ideal one-to-one correspondence between form and meaning that is called *Humboldt's Universal*, of which many different phrasings can be found in the literature on language change. The following one is taken from Meillet (1948, p. 12); see Humboldt (1836, p. 75) for the original phrasing: “Or, partout et toujours les langues tendent à abolir [...] l'absence d'unité, et à instaurer l'unité de forme pour l'unité du rôle grammatical et de signification”.⁵

³ This happens when a phonological rule R creates in a context C a segment S that exists as a phoneme in the language, but not in the context C. For example, in Japanese, palatal and non-palatal consonants contrast before the back vowels /a,o,u/. Before /i/ one only encounters [ʃ], before /e/ only [s] occurs. The rule that derives [ʃ] from underlying /s/ before /i/ creates a phoneme that exists lexically in Japanese, but not in the context before /i/. Rules of this type appear not to be opaque (for discussion see Wetzels 1986, p. 140). The same reasoning would apply to the alternations created by 'intrusive r' in English. This alternation is tenacious, because [r], which appears after words that end in schwa before a following vowel-initial word (*the waʃ[ə] is vs. the waʃ[ə] may*), although it is an underlying segment of English, does not lexically contrast with Ø after [ə] word-finally. On the other hand, the French word-final alternations between Ø and the so-called 'liaison consonants' are opaque, because, there are many adjectives in French that always end in vowels, which would make the deletion rule neutralizing. Notice that word-final consonants cannot be predicted in French by a rule of epenthesis, because the nature of the consonant is unpredictable: *petit ami, gros évêque, il est peti/gro*, etc. and must therefore be remembered as part of the adjective with which it appears.

⁴ See Kiparsky (1971, 1972) for the concept of opacity in phonology and extensive discussion in Wetzels (1986a).

⁵ “*Everywhere and always languages tend to abolish... the absence of unity and to install the unity of form for the unity of grammatical role and meaning* [our translation; LW]”.

The complete historical cycle of a speech sound being altered, the subsequent development of opaque alternations, and the ensuing regularization of the alternating paradigms can be illustrated with numerous examples. The following is based on a recent study by Van der Veer (2006) and involves the historical development of the lower mid vowels [ɛ, ɔ] of Late Latin,⁶ which evolve into the diphthongs [jɛ, wɔ], the so-called “mobile diphthongs”, of modern Italian.⁷

It is generally assumed that the diphthongization of the stressed lower mid vowels [ɛ, ɔ] in Tuscany was completed in the beginning of the 8th century. In contemporary Standard Italian, remnants of the diphthongization rule are still visible in the paradigms of many words, where the diphthongs [jɛ, wɔ] alternate in stressed open syllables with the corresponding unstressed mid vowels [e, o], as in the following example sets:⁸

(1)

siedo	[¹ sʲɛdo]	~	[sede ¹ ro]	sederò	‘I sit, I will sit’
vieni	[¹ vʲɛni]	~	[ve ¹ njamo]	veniamo	‘you, we come’
muovo	[¹ mʷɔvo]	~	[mo ¹ vjamo]	moviamo	‘I, we move’
suono	[¹ sʷɔno]	~	[so ¹ njamo]	soniamo	‘I, we sound’

Many non-alternating words also exist, as is shown by the verbs *spiegare* ‘to explain’ and *coprire* ‘to cover’, which are completely regular. The following forms represent the paradigms of the present indicative:

(2)

spiego	1SG	copro
spiegghi	2SG	copri
spiega	3SG	copre
spieghiamo	1PL	copriamo
spiegate	2PL	coprite
spiegono	3PL	coprono

⁶ Which derive from the Classical Latin short mid vowels [e, o].

⁷ As part of the larger phenomenon of a diphthongisation process that involved, in a differentiated way, all of the Romance languages, with the exception of Sardinian and most dialects of Portuguese.

⁸ The examples in (1) and (2) are taken from van der Veer (2006, p. 98-103).

Observe that the regularity of the paradigm of *spiegare* does not in itself demonstrate the irregular application of the diphthongization rule, at least if the synchronic derivation is considered to mimic the historical change from monophthongs to diphthongs. It only shows that the diphthongization rule is neutralizing, i.e. in Modern Italian the contrast between underlying diphthongs and mid vowels is neutralized in favour of the diphthongs in stressed open syllables. Moreover, it shows that the diphthongization rule is opaque, because the lexical source of a surface diphthong in stressed open syllables is not recoverable unambiguously: it may be a lexical diphthong, as in the case of *spiegare*, or a lexical mid vowel, as in the case of *sedere*. As a matter of fact, the diphthong that occurs in the verb *spiegare* (from Latin *explicare*) was created by an independent process of /-vocalization that affected /l/ in the tauto-syllabic clusters /pl, bl, kl, gl, fl/, as can also be seen in the evolution of Latin *plenus* > *p[je]no* 'full' (~ *p[je]nézza* 'fullness'). Further historical sources for the opacity of the diphthongization rule are the processes of [j,w] deletion after /Cr/-clusters: *tr[wɔ]va* > *tr[ɔ:]va* 'find-3s' (~ *tr[ɔ]viàmo* 'find-1PL') and the process that eliminates [w] after non-syllabic palatal segments: *[dʒwɔ:]ca* > *[dʒɔ:]ca* 'play-3s' (~ *[dʒɔ]chiàmo* 'play-1PL'), as is discussed in van der Veer (2006, p. 112). On the other hand, the paradigm of the verb *coprire* demonstrates that the original distribution of diphthongs and monophthongs is disrupted in at least some verbs of Modern Italian, showing that the diphthongization rule is no longer productive, either as a phonological or as a morphologically conditioned process. As was explained above, alternations caused by opaque rules are the domain of Humboldt's universal. The effect of this principle is indeed visible in the verb *coprire*, which was irregular at an early state of the language and subsequently was regularized by the generalization of the unstressed allomorph.⁹ Usually paradigm regularization happened (and still happens) in favour of the forms containing the diphthong (*vietare* 'to forbid', *chiedere* 'to ask', *muovere* 'to move'¹⁰), which are the ones used in the relatively unmarked present indicative singular, or which occur in the morphological base of derived words: *lieto* 'glad' → *lietezza* 'happiness'; *piede* 'foot' → *piadino* 'little

⁹ In early Italian texts one encounters the mobile diphthongs in stressed open syllables: *cuopro*, *cuopri*, *cuopre* (see van der VEER, 2006, p. 103).

¹⁰ Next to *movere* (cf. van der VEER, 2006, p. 31).

foot', etc. The fact that inflectional paradigms are among the ones that are most sensitive to the forces of regularization is certainly related to the phenomenon of morphological productivity. As was observed by Wetzels (1984, p. 595): "[...] the probability of appearance of innovations will be a function of the degree to which productivity of the word formation processes is involved in the actual derivations of words in a given language".¹¹ The correctness of this prediction is strikingly confirmed by the facts of Italian (cf. van der VEER, 2006, p. 31). In the case of alternations found in word pairs that are related through productive derivation, the form that is generalized is the one that occurs in the base form: *piade* → *piedino*, rather than *pede* ← *pedino*, from original *piade* ~ *pedino*. In inflectional paradigms, where the relation between the different allomorphs of a lexical morpheme is not obviously one of a 'base' form and a 'derived' form, especially when these allomorphs are the result of 'dead' rules, the direction of levelling is governed by the relative (un)markedness of the inflectional categories that the different forms represent. Unmarked forms are the ones expressing the singular third person present indicative, or the infinitive. Depending on which category wins out,¹² one expects to find paradigms here in which the innovative form is generalized, as in the case of the verb *vietare*, as well as others where the paradigmatic uniformity is re-established on the basis of the 'original' historical form, as in *coprire*.

Presumably, the process that created the Italian 'mobile diphthongs' affected at a given stage of its history all the lower mid vowels within its domain of application, and happened to create alternations in the sound shape of many Italian words. Once the diphthongization rule had become opaque, analogy became operative to eliminate the existing allomorphy and to re-establish a state of uniformity in accordance with Humboldt's universal. In the following sections, we will turn to another sound change, known from the Hellenistic philology as the 'Second Compensatory

¹¹ See also Wetzels (1986a, p. 62): «La productivité d'un processus dérivationnel est une condition nécessaire à la création de toute forme régulière».

¹² For more discussion of the factors determining the direction of levelling in inflectional paradigms, see Wetzels (1984). Sometimes, verbs are productively derived from other lexical categories, such as nouns or adjectives. In those cases, the irregularity that exists in the verb is eliminated by the consistent use of the sound structure of the (nominal or adjectival) base form. It is also through this scenario that cases of 'bi-directional levelling' may come into existence.

Lengthening', which occurred in Ancient Greek. This phonological process altered a word-internal and word-final *Vns* sequence and created synchronic alternations in the Ancient Greek dialects that were subsequently fully or partially eliminated by analogical forces.¹³

Compensatory Lengthening and the Representation of Contrastive Vowel Length

According to Whitney (1889, p. 84), Compensatory Lengthening (henceforth CL) can be defined as the "absorption by a vowel of the time of a following lost consonant". Although Whitney's early definition does not cover all of the types of compensatory (vowel) lengthening that are known from the literature (cf. DE CHENE; ANDERSON, 1979; HOCK, 1986; SEZER, 1986a; HAYES, 1989), it certainly covers most of the well-documented cases. Usually, compensatory vowel lengthening is triggered by the loss of a coda segment, and more easily so when the deleted segment is a glide or a sonorant consonant (SEZER, 1986b, p. 6; RIALLAND, 1993). This is also the case with the compensatory lengthening rule of Ancient Greek that we discuss here.

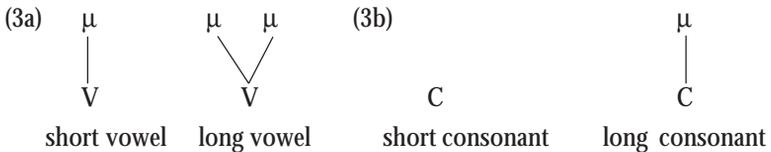
Particularly interesting in Whitney's definition of CL is the implicit claim that there is something like 'phonological time', which enjoys some degree of autonomy with regard to the featural properties of a segment and which can, within certain limits, be redistributed over the phonetic string, a phonological effect that we would now treat as an instance of the wider phenomenon of 'stability under deletion'.¹⁴ One model of phonological representation that explicitly abstracts phonological 'time' from phonological 'substance' is defended in Clements & Keyser (1983). In Clements and Keyser's 'CV-phonology' the representation of timing units (Cs and Vs) on a 'skeletal' tier, separate from their segmental properties, enables phonological rules to manipulate phonological segments independently of their timing properties, as appears to happen in the case of compensatory lengthening.

¹³ For a concise overview of the issues involved in analogy, see van de Weijer (2004).

¹⁴ Stability effects are frequently observed in tone languages, when the deletion of the tone bearing unit (TBU), usually the vowel, does not affect its tone, which is realized on another TBU, usually the one that caused the V-deletion. Other examples of stability are also found, such as nasality, or even, the aperture node, as is argued in Wetzels (1995).

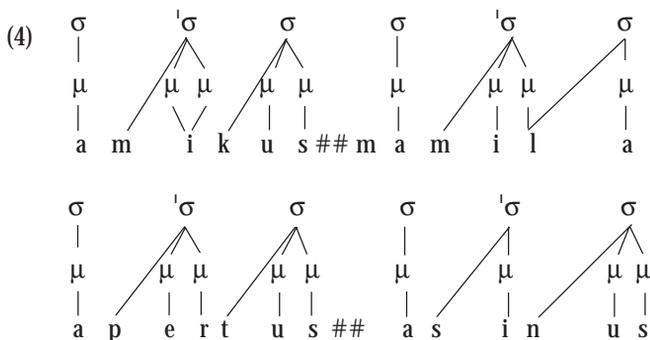
In our description of the SCL, we will adopt a more recent model, slightly different from Clements and Keyser's original proposal, which is the one proposed by Hayes (1989), in which part of the role of the timing units in Clements and Keyser's model is taken over by 'weight units' or 'moras'. Contrary to CV-phonology, in moraic theory the only segments that are eligible to receive a mora are those in the syllable rime. In both CV phonology and in moraic phonology, segmental length is represented by assuming that long segments are associated with one timing or weight unit more than short segments. Weight distinctions are thus reducible to differences in the number of weight units in the syllable (mora theory) or to the number of timing units in the syllable rime (CV-phonology). As was mentioned earlier, segments that show 'time' stability under deletion are usually coda segments. Cases of lengthening of a syllable nucleus caused by the loss of a tautosyllabic onset are very rare, if they exist at all (however, see RIALLAND, 1993). Mora theory efficiently predicts this asymmetry.

Hayes (1989) proposes that vowels are universally moraic and, in languages with a vocalic length contrast, that long vowels are represented as single segments linked to two moras, as in (3a). Consonants are not moraic underlyingly, except for geminate consonants, which are attached to a single mora in their lexical representation, as in (3b):

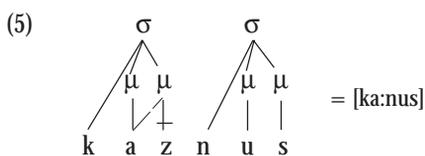


Thus, the prediction is made that long vowels count universally as heavy for the purpose of rules that discriminate between light and heavy syllables. The problem of closed syllables constituting a natural class with syllables containing a long vowel in many languages is accounted for by a mechanism that adds moras to the representation by a language-specific rule of 'Weight-by-Position' (WbP). For example, Latin is a language in which syllables containing a long vowel or a diphthong and closed syllables containing a short vowel form a natural class with regard to the stress rule, which assigns primary stress to the pre-final syllable if it contains at least

two moras, and otherwise to the antepenultimate syllable: *amí:cus* ‘friend’, *mamilla* ‘nipple’, *apértus* ‘open’, but *ásinus* ‘donkey’. The representations in (4) show that all of the words with prefinal stress contain two moras in their prefinal syllable:



As expected, Hayes' moraic theory permits the derivation of a principle of 'moraic conservation' (HAYES, 1989, p. 285), which explains compensatory phonological processes as the consequence of the preservation in the output of the number of moras that appear in the input. For example, in early Latin [z] was deleted before anterior sonorants. Its deletion caused the preceding vowel to become long, as is illustrated below for *[kaznus] → [ka:nus] 'white' (HAYES, 1989, p. 262):



In (5), [z] is dissociated from the mora-tier, as indicated by the dissociation sign (-). The segmentally unaffiliated mora is subsequently linked to the tautosyllabic vowel [a], which becomes long: [ka:nus].

The Second Compensatory Lengthening: The Ancient Greek Dialects

In the philological literature of historical Greek, Ancient Greek dialects are often classified in four major dialect groups: *Attic-Ionic*, *Aeolic*, *Arcado-*

Cypriot, and *West Greek*.¹⁵ The Attic-Ionic group comprises the dialects spoken by Athenians and the Ionians occupying islands in the Aegean and along the coast of Asia Minor (modern day Turkey), but also includes several dialects spoken on the Aegean coast of the Greek mainland. *Aeolic* was spoken in northwest Asia Minor, on the northeast Aegean islands (Lesbos) and, on the mainland, in Boeotia and Thessalia. *Arcado-Cypriot* comprises Arcadian, in the Peloponnesus, and Cypriot. *West Greek* covers northwest Greek (Aetolian, Locrian), but also Doric, which includes Laconian (the dialect of Sparta), Corinthian, Megaran, Cretan, and Rhodian. The dialects that are discussed in this paper, are indicated on the map below:



The Dialectal Reflexes of Word-Medial and Word-Final *Vns*

The Second Compensatory Lengthening (henceforth SCL), which according to Bartone&k (1966, p. 68) was completed around 900 B.C., is restricted to the secondary intervocalic cluster *-ns-* (<*nt, ntj*) and the primary word final cluster *-ns#* or *-nts#* (>*-ns#*): Attic-Ionic $\varphi\eta\nu\acute{\alpha}\nu\tau\varsigma$ ¹⁶ \rightarrow $\varphi\eta\nu\acute{\alpha}\nu\varsigma$ \rightarrow (SCL) $\varphi\eta\nu\acute{\alpha}\varsigma$ 'showing-AOR.'. The dialectal reflexes of the sequence *Vns* resulted in a wide range of variation, as the following table

¹⁵ Attic-Ionic and Arcado-Cypriot are sometimes classed together as East Greek, with Aeolic being considered as intermediate between East and West Greek.

¹⁶ The word $\varphi\eta\nu\acute{\alpha}\nu\tau\varsigma$ 'showing-aor.' is itself derived from $*\varphi\acute{\alpha}\nu\text{-}\sigma\acute{\alpha}\nu\text{-}\tau\varsigma$ which gives $*\varphi\acute{\alpha}\nu\acute{\alpha}\nu\tau\varsigma$ (> $*\varphi\eta\nu\acute{\alpha}\nu\tau\varsigma$) as a consequence of the so-called 'first compensatory lengthening', during which a sequence *VnsV* was changed into *VnnV* (Lesbian and Thessalian dialects) or into *V:sV* (other dialects). For a detailed discussion see Wetzels (1986b).

shows (the dialects in the light gray area belong to the West Greek dialect group, the ones in the dark gray area to the Aeolic dialect group):

Table (1)

Dialect	Examples			
	Word-internal	Word-final	Word-internal	Word-final
West-Argolic	VnsV	Vns	antitukhonsa	tons
Elean	V:sV	Vjs~V:s	pa:sa	tajs~ta:s
Arcadian	VnsV	Vs	poiensi	tos
Central Cretan	VnsV	Vns#~Vs#C	omosansi	tons#V~tos#C
W/E Cretan	V:sV	Vs	pa:sa	tos
Doric (Thera/Cos)	V:sV	Vs	ago:sa	tos
Cyrenean ¹⁷	VjsV	Vs	pajsa	tos
Thessalian	VnsV	Vs	pansa	tos
Lesbian	VjsV	Vjs	mojsa	pajs
Elsewhere	V:sV	V:s	Att.pa:sa	Att. to:s ¹⁸

A number of dialects do not show lengthened vowels, such as the ones that belong to the Arcado-Cypriot group, where *n* was kept in place (cf. *λόγους* ‘speech-ACC.PL.’), but also some dialects of West Greek, among which Arcadian, West Argolic, Cyrenean, and Central Cretan. In the Aeolic dialect of Thessalian, the loss of *n* in word-final *ns#* did not trigger compensatory vowel lengthening either. In the Doric dialects of Thera and Cos and in the dialects of West and East Crete, one finds the lengthened vowels inside words only. In the Attic-Ionic dialect group, compensatory lengthening affects word-internal and word-final *Vns#* alike. In the dialect of Lesbos, as in most of the Aeolic dialects, one finds the sequence *Vjs* as the synchronic reflex of *Vns*. Here, the nasal consonant was not entirely lost, but had weakened into a glide, both word-medially and word-finally, forming a genuine diphthong with the preceding vowel: *eí*, *oi*, *ai*. In Cyrene, the diphthong appears only word-internally. In the dialect of Elis, the diphthong is found only word-finally, whereas word-medially *n* was lost completely with compensatory lengthening of the preceding vowel. Leaving aside the

¹⁷ Cyrene (in present-day Libya) was founded in 630 B.C. as a colony of the island town Thera.

¹⁸ Attic-Ionic *τοῦς*, Laconian (West-Greek) *τῶς*.

exceptional dialects to which we return immediately below, the word-medial reflexes of *Vns* are for the different dialect groups as in (6), the word-final reflexes as in (7):

(6)			
*πάντ-γα	'whole-NOM.SI.FEM'	>	παντ-σα
		>	West-Greek
		>	παντ-σα
		>	Ionic Attic
		>	παντ-σα
		>	Aeolic
		>	παντ-σα
		>	Arcado-Cypriot
		>	παντ-σα

(7)			
λόγωνς	'speech-ACC.PL.'	>	λόγωνς ¹⁹
		>	West-Greek
		>	λόγους ²⁰
		>	Ionic Attic
		>	λόγοις
		>	Aeolic
		>	λόγωνς
		>	Arcado-Cypriot

We will next consider the individual dialects in table (1), more specifically, to the reflexes of *Vns#* in word-final position. With respect to word-final *-ns#*, the representation of the facts as given in table (1) is somewhat misleading, because it does not really provide an insight into the phonological evolution of the cluster in this position. For Argolic, Thessalian and Arcadian, the situation was at one point identical to that exemplified by Central Cretan, where we find an alternation between *Vns#* and *Vs#*, depending on whether the following word begins with a vowel or a consonant *tons#V ~ tos#C* 'those-ACC.PL':

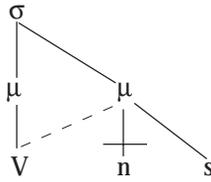
(8) Central Cretan VnsV omosansi Vns#~Vs#C tons#V~tos#C

Since word-internal *Vns* sequences remained unaffected in Central Cretan, we must assume that the rule that deleted *n* was active at word boundaries only, where it applied to nasal consonants that were part of a syllable-final cluster:

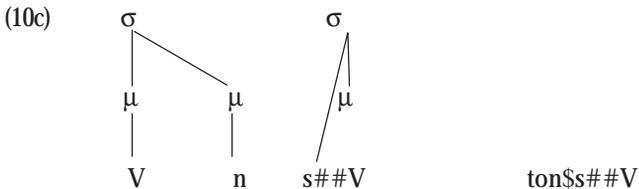
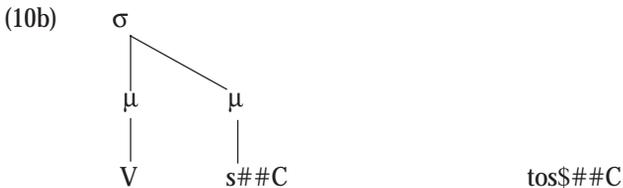
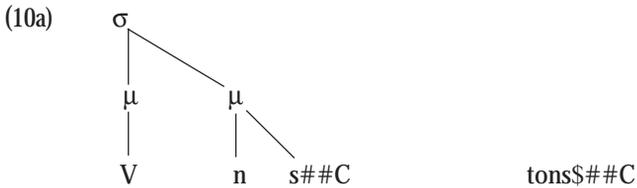
¹⁹ <w> represents phonetic [ɔ:].

²⁰ <ou> represents phonetic [o:].

(9) Cluster Simplification (without CL)



Since the rule was operative at the phrasal level, after resyllabification had taken place, it changed the input sequence (10a) into (10b), leaving (10c) unaltered (the symbol \$ used in the examples represents a syllable boundary):



Observe that rule (9) does not vacate a mora, because /n/ shares its mora with /s/. Consequently, there is no stray mora that could associate with the preceding short vowel to create a long vowel.

The situation as attested in Argolic should probably be looked upon as a result of analogical leveling, caused by the loss of rule (9) in this dialect. If this interpretation of the Argolic situation is correct, we may conclude

that in this dialect, the $\emptyset \sim n$ allomorphy displayed by words ending in *ns#* was levelled in favour of the allomorph used in front of a following vowel-initial word:

- (11) West-Argolic VnsV antitukhonsa Vns# tons#

In Thessalian and Arcadian the *n*-less allomorph was generalized, i.e. the one used in front of consonant-initial words and pre-pausally. From a diachronic point of view, the new situation can be characterized as one in which rule (9) was lost, with restructuring of its output form.

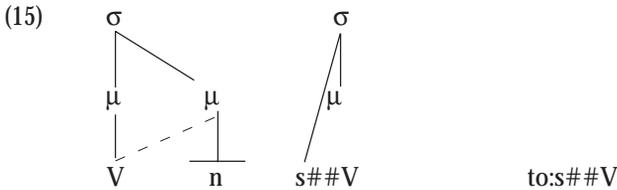
- (12) Thessalian VnsV pansa Vs# tos#
 (13) Arcadian VnsV poiensi Vs# tos#

A different kind of alternation, resulting from a different rule type, was created in W/E Cretan, Doric, and in the 'Elsewhere' group of dialects. For these dialects, we must assume a rule such as (14):

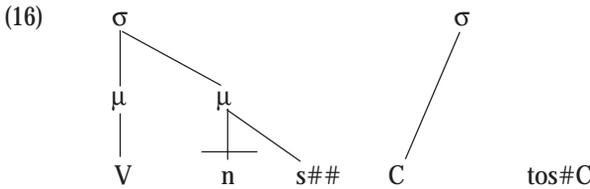
- (14)
-
- to:s##V ~ tos#C

Rule (14) represents the most common type of CL, and nicely matches Whitney's description of the phenomenon. The advantage of the descriptive model used here, where phonological weight units are given an independent status with respect to their segmental realization, is that it actually predicts that these processes should occur. Phonological rules are expected to refer to elements on the weight tier, without affecting elements on segmental tier, and vice versa. Notice that rule (14) may be looked upon as a generalized version of rule (9). It deletes /n/ from the syllable coda, whether syllable-final, as in *ton\$#V*, or as part of a tauto-syllabic cluster, as in *tons\$#C*. In the sequence *ton\$#V* (illustrated in (15)), the deletion of *n* results in a stray mora which links

to the preceding vowel. The resulting doubly linked structure corresponds with the usual representation of the long vowel:



In the sequence *tons* #C, represented in (16), no unassociated mora results from n-deletion and, therefore, no long vowel is created:



Therefore, at word boundaries, rule (14) created the alternations given in (17).

(17) $Vs\#C \quad \sim \quad V:s\#V$

Again, the various dialects generalized one alternant or the other: The dialects of W/E Cretan as well as Doric generalized the preconsonantal variant:

(18) W/E Cretan $V:sV$ $pa:sa$ $Vs\#$ $tos\#$

(19) Doric (Thera/Cos) $V:sV$ $ago:sa$ $Vs\#$ $tos\#$

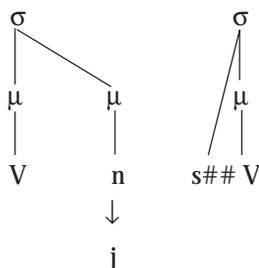
The 'Elsewhere' dialects generalized the prevocalic variant:

(20) Elsewhere $V:sV$ Att. $pa:sa$ $V:s\#$ Att. $to:s\#$

An intervocalic glide is displayed by the dialects of Elis, Cyrene and Lesbos. The simplest description which accounts for the different patterns

exhibited by the dialects in question is obtained by supposing that rule (9) was operative in Cyrenean as well and, secondly, that the rule of *n*-vocalization (21), changing syllable-final *n* into *j* before *s*, was added to the grammars of Cyrenean and Lesbian.

(21) *n*-weakening



In Cyrenean, the change $Vn\$s \rightarrow Vjs$ is attested word-medially, and in Lesbian both in word-internal and word-final position.

- (22) Cyrenean $VjsV$ *pajsa* $Vs\#$ *tos\#*
 (23) Lesbian $VjsV$ *mojsa* $Vjs\#$ *pajs\#*

We may hypothesize that, across word boundaries, rules (9) and (21) created the alternations given in (24) as an intermediate stage.

- | | | |
|----------|---------------|----------------------------|
| (24) | Word Medially | Across Word-Boundary |
| | $VnsV$ | $Vns\#V$ $Vns\#C$ |
| Cyrenean | $js(R21)$ | $Vjs(R21) \sim Vs\#C (R9)$ |
| Lesbian | $js(R21)$ | $Vjs (R21) \sim Vns\#C$ |

The allomorphy created in word final clusters has been eliminated in Cyrenean in favour of the $Vs\#$ alternant, in Lesbian by generalizing $Vjs\#$. The situation in Elean is somewhat more complex:

- (25) Elean $V:sV$ *pa:sa* $Vjs\# \sim V:s\#$ $tajs\# \sim ta:s\#$

Two variants, $V:s$ and Vjs , are attested with irregular distribution. The fate of word-internal *ns* shows that in this dialect the rule of CL (14)

was operative. Again, on the assumption that this rule applied at the phrasal level, after resyllabification of word-final *s* with a contiguous vowel, the occurrence of the *V:s* variant at word boundaries is explained. In the same environment, however, *Vj:s* is found. The hypothesis that this form represents the residue of a stage of evolution intermediate between *VnsV* and *V:sV* ($VnsV \rightarrow Vj:sV \rightarrow V:sV$), as one might think following de Chêne and Anderson (1979, p. 515),²¹ is implausible, since *Vj* does not generally become *V:* in Elean. Probably, the occurrence of *Vj:s* in this dialect represents a case of dialect mixture.

Discussion and Conclusion

In this paper, the different dialectal reflexes of the secondary word-final *Vns* sequences have been explained as (1) the result of the activity of three different phonological rules, which were active, either in isolation or in combination, in the different dialects and (2) the subsequent divergent reaction to Humboldt's universal. As was explained earlier, the latter principle becomes active once the allomorphy created by a phonological rule is no longer transparent to the speakers of the language. Lack of transparency was typical for all of the rules that affected the *Vns* sequence. As in the case of Italian diphthongization, these rules were neutralizing. The *n*-deletion rule (7) was neutralizing, since the dialects in which it was active also had lexical sequences of the type *Vs#*. This meant that, if rule (7) were to be posited as a synchronic rule in these dialects, the underlying source of a surface *Vs#* sequence could be either *Vs#* or *Vns#*. The same is true for the rule of *n*-weakening which created, in Lesbian and Cyrenean, diphthongs of a type that were lexically present in all of the Ancient Greek dialects. The situation is a little more complex as regards the outputs of rule (12). For example, by the time of the operation of the SCL, previously existing [a:] had already changed to [æ:] (which later fused with [ɛ:]) in many dialects of the Attic-Ionic area. Compare for example Attic-Ionic *σελήνη* 'moon' (from **selasna:*), with original long /a:/ and long /a:/ derived by the first

²¹ According to these authors, Compensatory Lengthening is not a unitary phonological process, but the cumulative effect of consonant weakening and monophthongization. Consequently, CL rules that occur in synchronic grammars are 'telescoping' of several diachronic changes. For a critical assessment of this hypothesis, see various articles in Wetzels and Sezer (1986a).

compensatory lengthening (cf. footnote 16), with $\pi\acute{\alpha}\sigma\alpha$, derived from *pansa* 'whole-NOM.SL.FEM' (< **pantja*) by the second compensatory lengthening. In this case, it could be argued that, at least in the Attic-Ionic area, long /a:/ was newly created by the SCL. In reality, however, things are not so clear. In particular, it seems likely that long /a:/ was also created by /a+a/ contraction. Or at least, to my knowledge, the relative chronology between the second compensatory lengthening and the contraction of identical vowels cannot be established with certainty. In any case, even if long /a:/ was first introduced by SCL in the Attic-Ionic area, the rule was rendered opaque very soon by another rule which contracted identical short vowels /a+a/ → /a:/.

With regard to the problem of opacity, the situation found in the dialect of Central Crete is particularly interesting. Bartonek (1966, p. 65, footnote 120), observes the following:

Central Crete always has *-ns* medially [...] while in terminal position we find either *-ns* or *-s* without lengthening [...]. The first terminal form was originally rightly used before a vowel while the second before a consonant, but in the time of the preserved inscriptional documents this classification was no more observed, and in many communities in Central Crete both these types were employed promiscuously; in others we find only *-ns*, while there were also such as used exclusively *-s* only [sic; LW] without any lengthening.

The word-final allomorphy that existed in the relevant words affected by *n*-deletion, *n*-weakening, or deletion-cum-compensatory lengthening did not correspond with different inflectional categories and neither were they related through productive derivational rules of morphology. It can therefore be expected that rather arbitrary factors determined the direction of levelling. As we have seen, some dialects have generalized the allomorph that was originally used before vowel-initial words, others the one that was in use before consonant-initial words. The situation found in some communities of Central Crete, where the different allomorphs were used indiscriminately, shows clearly that both forms were competing for being generalized. Such a situation can originate only when the rule that created the allomorphy was not transparent for the speakers of these communities.

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