Quantitative Metathesis in Ancient Greek

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Abstract

This paper explores apparent metathesis of vowel length in Ancient Greek. Historically this change has been considered to be true metathesis by classicists, but recent scholarship has cast suspicion on this notion, not least because metathesis of vowel length is not a known change in any other language. In this paper, I present a review of previous scholarship on Greek quantitative metathesis, in addition to a cross-linguistic survey of general metathesis, with special attention to autosegmental theory. I conclude that Greek quantitative metathesis is not true metathesis, but rather a retention and reassociation of abstract timing units through the two individual (and well-attested) processes of antevocalic shortening and compensatory lengthening.

Contents

1 Introduction

The Attic and Ionic dialects of Ancient Greek had a regular synchronic sound change in which an underlying vowel sequence of a long vowel followed by a short vowel is produced as a short and then a long (i.e. /V̄V̆/ → [V̆V̄]). In the field of Classics, this has long been known as the process of quantitative metathesis. However, this type of suprasegmental metathesis is practically unheard of outside of this specific case, causing suspicion that it may not be metathesis at all. In this paper, I attempt to determine whether quantitative metathesis is true metathesis, or whether it is some other process altogether.

I begin with an overview of Ancient Greek and quantitative metathesis. I then review metathesis cross-linguistically, particularly in the context of autosegmental theory. I then compare prior analyses of quantitative metathesis itself, bringing them together with the cross-linguistic theories to determine that quantitative metathesis is not, in fact, true metathesis.

On Transcription

I have transcribed the Greek text into English characters based mainly on the Library of Congress's Romanization standards for Ancient Greek. This means that rather than the precise phonetic values, I am transcribing the Greek letters, and vowels in particular, as approximated values based on orthography. For example, I transcribe the letter < η > as $\bar{e}$, though in different dialects at different points from Ancient to modern times its actual value has ranged from /a/ to /i/. I use the macron above the vowel ($\bar{e}$) to indicate a long vowel; vowels without a macron should be assumed short. When it is necessary to indicate that a vowel is short, I use the breve ($\breve{e}$) to indicate a non-long length, rather than the extra-short vowel it indicates in IPA. A sub-arch

cite LOC

cite (Bakker?)

(e̯) indicates a non-syllabic vowel, something like a glide. In running text, Romanized forms will be set off in italics.

I use an asterisk before a form to indicate that it is reconstructed rather than attested in actual Greek text, and a $\mathcal{X}$ to indicate that a form is unmetrical or otherwise unacceptable.

Abbreviations

GEN	genitive
Il.	Iliad
NOM	nominative
Od.	Odyssey
QM	quantitative metathesis
SG	singular

make columns

1.1 Introduction to Ancient Greek

Greek is the language primarily spoken in and around the Achaean Sea in the north Mediterranean. The Greeks of the Classical period divided themselves into three ethnic/dialect groups: Doric, Aeolic, and Ionic. Modern scholars have further defined this classification system into Arcado-Cypriot, Attic-Ionic, Aeolic, West Greek (including Doric), each with several subdialects (Colvin 2010: 203). In this paper I will be focusing on the Attic-Ionic and Homeric dialects of the Archaic period (8-5th centuries BCE) and the Classical period (5-4th centuries BCE).

Attic-Ionic, predictably, can be divided into Attic and Ionic. Attic was spoken in and around Athens on the Attic peninsula, and is the dialect from which Modern Greek is ultimately descended. Ionic was spoken on islands to the north and east of Attica,

as well as in Ionia on the central western coast of Asia Minor (Colvin 2010: 209).

There are several major features which differentiate Attic-Ionic from other dialects, the most relevant being the existence of quantitative metathesis (explained in Section 1.2). The other relevant feature is the shifting of < ᾱ > [aː] to < η > [ɛː]~[æː]. Ionic completed this shift unconditionally, while Attic kept < ᾱ > after /e/, /i/, and /r/. Attic-Ionic also lost /w/ earlier than other dialects (Colvin 2010: 209).

Homeric or Epic Greek is a composite dialect, largely made up of Aeolic and Ionic, and with features from various regions and time periods throughout. Miller (1982: 25) offers as an example the Aeolic form *Agelāos*, which does not display quantitative metathesis, a mere half dozen lines in the Odyssey from the Ionic variant *Ageleōs*, which does display quantitative metathesis. Homer's texts were written down around the 8th century BCE, but are much older. A hotly debated theory holds that the text was originally Aeolic, and was "translated" into Ionic. Regardless, the formulaic language allows scholars (e.g. Hoekstra 1965) to theorize about the relative ages of various sections, and the chronology of certain sound changes, including quantitative metathesis.

1.2 Introduction to Quantitative Metathesis

Quantitative metathesis (hereafter, QM) is a process found in the Attic and Ionic dialects of Ancient Greek (Colvin 2010: 209) in which an adjacent long and short vowel will appear to metathesize their length features. This appears to be a synchronic rule which, in example (2) below, creates an allomorphic [-ōs] ending for the underlying /-os/ (Wetzels 1986: 331).

(1) $\bar{V}\breve{V} \rightarrow \breve{V}\bar{V}$

(2) polē- 'city' + -os GEN SG → polēos → poleōs 'city (GEN SG)'

There are two major subtypes of this phonological change, which will be described in the next two subsections. The first appears in grammatically masculine "a-stem" nouns, also known as the first declension. Though this paradigm consists of mostly feminine nouns, it is only the handful of a-stem masculine nouns that undergo QM. The stems of these nouns end in -*a*-, -*ā*-, or -*ē*-. Similarly, the stems of o-stem nouns, or nouns of the second declension, end in -*o*-, and these nouns do not undergo QM. The second type of QM appears in athematic nouns, or third declension nouns, whose stems historically ended with a consonant (i.e., without a "theme vowel" such as -*a*- or -*o*-).

Would declension charts in the appendix be useful?

1.2.1 A-stem

In masculine a-stem nouns, QM appears in the genitive singular and occurs only in Ionic. (Attic instead analogized the genitive singular ending -*ou* from the "o-stem" paradigm (Thompson 2010: 195).) The theme vowel -*ā*- is immediately followed by the case-number morpheme, for example, the genitive singular -*o*. An older sound change in Ionic shifted the stem's *ā* to *ē* (Smyth 1894: 171), creating the ending -*ēo* which then underwent QM to become -*eō* (Thompson 2010: 195). Data from Smyth (1956: 15):

more: Bakker p109

(3) Atreid- + -ā- + -o → Atreidāo > *Atreidēo → Atreideō 'son of Atreus (GEN SG)'

This -*eō* ending is often pronounced as a single long syllable in poetry, a process called synizesis in classical studies (Smyth 1956: 21). However, the fact that it is written as though it were disyllabic suggests that it was pronounced this way in speech at some point, whether or not the pronunciation of the day was changed to fit the

meter. In addition, most of these forms, if pronounced disyllabically, would not be permitted in Homer's dactylic hexameter (see section 2.1) at all.

1.2.2 Athematic stems

The second type of QM appears in the noun category called "third declension" or "athematic stems". As stated above, they are known as athematic because rather than ending in a "theme vowel" such as -*ā*- or -*o*- (as in example (3) above), the stems of this type historically ended in a consonant. However, at some point Greek underwent a series of glide-deletions. When an athematic stem ended in these glides, the deletion fed into the conditions for QM, as in (4) below (Weiss 2010: 108).

add details Miller 1976

cite data

(4) a. basilēw- 'king'

b. basilēw-os 'king (GEN SG)' (etymological form)

c. basilē-os (after /w/-deletion)

d. basilē-os → basile-ōs (after QM)

e. basilē-os → basile-os (perhaps through antevocalic shortening (see Section 4))

The form in (4c) is the only one found in Homer, and the form in (4e) is the only one found in the significant Ionic text of Herodotus. The QM form does not appear in either author's work, nor, as far as I can tell after preliminary searching, do any other QM athematics. (Data from pan.) However, the a-stem QM forms are not only frequent but appear to be obligatory in both sources. In Classical Attic texts such as Plato, meanwhile, athematic QM forms such as (4d) appear to be, if not obligatory, at the very least extremely common.

check

check

figure out where athematic QMs do/don't

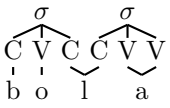
In summary, Classical Attic has athematic QM forms, but no a-stem QM forms, due to analogizing the a-stem genitive singular ending from another paradigm. Ionic of

the same period, meanwhile, seems to prefer the *-eos* athematic form and the a-stem QM form.

1.3 Introduction to Autosegmental Phonology

Autosegmental phonology is an approach to phonology in which tone, syllables, morae, and other abstract or suprasegmental features can be represented individually on separate "tiers". In this paper I mainly focus on the timing tier described in Goldsmith (1990: 48ff.), in which each segment (i.e., phone) is connected to at least one timing slot, each of which is labeled as C (consonant), V (vowel), or X (either). This allows long vowels and geminate consonants to be neatly represented by a single feature matrix which takes up two timing slots. For example, to represent the Aeolic Greek *bollā* 'council' (Wetzels 1986: 298):

(5)



Each σ on the syllable tier represents a syllable, while the segments (in this case *b, o, l,* and *a*) appear on the melodic tier. In certain analyses (e.g. Besnier 1987, Goldsmith 1990: 89), consonant and vowel segments are placed on separate melodic tiers.

Would an example be helpful? I could also reference example (7) but it's a little far away.

When demonstrating a change in association lines, a line with two hash marks through it indicates a disconnect, and a dotted line indicates a new connection being formed.

2 Greek meter and accent

2.1 Meter

Unlike modern English, which is a stress accent language, Ancient Greek was a pitch accent language. Though we of course don't know precisely what it sounded like, it was described as having a "musical character" (Probert 2003: 3). Where stress accent languages tend to base their poetic meters around stress, pitch accent languages can ignore pitch when constructing a meter. Specifically, Ancient Greek meters are quantitative, based off of a pattern of short/light and long/heavy syllables (Probert 2003: 8).

In Ancient Greek meter, a heavy syllable is one with a long vowel or a diphthong, or one with a short vowel followed by at least two consonants, even if one or more of the consonants are in the following syllable. So a heavy syllable might have the form (C)$\bar{\text{V}}$(C)(C), in addition to (C)$\breve{\text{V}}$CC, (C)$\breve{\text{V}}$C.C, or (C)$\breve{\text{V}}$.CC. A light syllable is one with a short vowel followed by one or no consonants. There are several conditions that can shorten a diphthong at the end of a word (e.g. Maas 1962: 79f.), but in general diphthongs will create a heavy syllable. A word-final short vowel elides when the following word begins in a vowel (Smyth 1956: 22).

Homer uses a style of meter called dactylic hexameter, wherein each line is split into six feet. Each foot can be filled by either a heavy and two lights (a dactyl), or two heavies (a spondee). The fifth foot is nearly always a dactyl. The sixth foot can be either a spondee or a trochee (a heavy and a light) (Raven 1962: 24f., 43).

In the examples below, — indicates a heavy syllable, and ⏑ indicates a light one. ∅ replaces an elided syllable, and | separates metrical feet.

(6) a. $\mathcal{X}$ *Pē lē i a dā o A chi lē os*
— | — ⏑ ⏑ | — ⏑ ⏑ ⏑ | — ⏑

Pēlēiadāo Achilēos

b. *Pē lē i a dā ∅ A chi lē os*
— | — ⏑ ⏑ | — ⏑ ⏑ | — ⏑
Pēlēiadā' Achilēos

c. *𝒳 Pē lē i a de ō A chi lē os*
— | — ⏑ ⏑ ⏑ | — ⏑ ⏑ | — ⏑
Pēlēiadeō Achilēos

d. *Pē lē i a deō A chi lē os*
— | — ⏑ ⏑ | — ⏑ ⏑ | — ⏑
Pēlēiade͡ō Achilēos

'Achilles son of Peleus (GEN SG)'

Of the examples above, only (6d) actually occurs in Homer (for example, Il. 1.1). (6b) is reconstructed by Hoekstra (1965: 32) as a likely older form allowed by the meter by elision of the final short /o/ in (6a), which was replaced with the QM form. I constructed (6a) and (6c) as examples, both not permitted by the meter. (6a) is an unelided form of (6b), and (6c) is the disyllabic QM form, to be compared with the monosyllabic QM form in (6d).

(6a) is unmetrical due to the three consecutive short syllables. However, the elision in (6b) allows the pre-QM form to fit in hexameter by removing one of the short syllables. (6c-6d) show why the QM *-eō* ending must be considered monosyllabic in order to create a metrical form. Pronouncing the short *e* in its own syllable creates three consecutive short syllables, which is not permitted by the meter. It must therefore be considered part of the long syllable *-deō*. Many words of this type have the same two short syllables immediately before the *-eō* ending, creating the same unmetricality if the ending is pronounced disyllabically. Most other forms have a long syllable immediately before the ending, which in the disyllabic pronunciation would create a similarly unmetrical — ⏑ — . In fact, of all instances of this ending in Homer (data

obtained via pan), only one (*boreō* 'north wind (GEN SG)', Il. 14.395, 23.692 and Od. 14.533) scans as obligatorily disyllabic. The existence of such a form, in addition to the orthography, suggests that this process is more than simple contraction, and this will be discussed further below and in Section 4.4.

2.2 Accent

Ancient Greek texts have three types of accent, of which only acute (é) and circumflex (ê) are relevant to us. Though we do not know what these accents represent phonetically, their various rules and the violations of said rules can give us other phonetic clues. In general, a word will only have one accent, and it cannot be farther left than the antepenultimate (third from right) syllable. A circumflex accent must fall on a long syllable, and cannot be farther left than the penultimate (second from right) syllable. Importantly, an acute accent cannot be placed on the antepenultimate syllable if the final syllable is long.

Due to this, the pre-QM athematic form *pólēos* ('city, GEN SG') does not violate any accent rules, but the common post-QM form *póleōs* does, with the acute falling on an antepenultimate syllable with a final long *ō*. This is in fact true of the entire paradigm (e.g. *huposkhéseōs* 'promise, GEN SG', *pelékeōs* 'axe, GEN SG') (Probert 2003: 65). One might expect, then, given this apparent violation of a standard phonetic rule and the monosyllabic a-stem forms described above, that all QM forms were pronounced monosyllabically. Then *póleōs* might be pronounced something like *pólōs*, and would not violate any accent rules.

However, another paradigm complicates the issue. The noun described above, *polis* 'city, NOM SG', belongs to a paradigm composed of nouns whose nominative singular form ends in *-is*. Another athematic paradigm is composed of nouns whose nominative

singular forms end in *-eus*, such as *basileús* 'king, NOM SG'. Probert (2003: 69f.) describes the accent rules for this paradigm as follows: "[Nouns] are accented on the same syllable as the nominative singular, counting syllables from the beginning of the word . . . . [Except in the nominative singular,] the accent is a circumflex when it falls on a long vowel or diphthong but (by necessity) an acute when it falls on a short vowel." So as *basileús* is accented on the third syllable from the left (with *eu* representing a diphthong), all declined forms of the word will take the accent on the third syllable from the left: a circumflex if the vowel is long, and an acute otherwise.

Then take the QM genitive singular *basileōs*. If the *-eōs* ending were monosyllabic, or a glide-vowel sequence (see Section 4.4), the word would be syllabified as *ba.si.leōs* or *ba.sil.e̯ōs*, the third syllable *-(l)eōs* would be long, and we would expect a form like *basileôs*. Instead, we see *basiléōs*, indicating that the *-é-* is its own short syllable. So it's likely that the *-eōs* ending is indeed disyllabic.

3 Overview of metathesis

In this section, I review several analyses of metathesis in various languages, particularly with a view towards autosegmental theory.

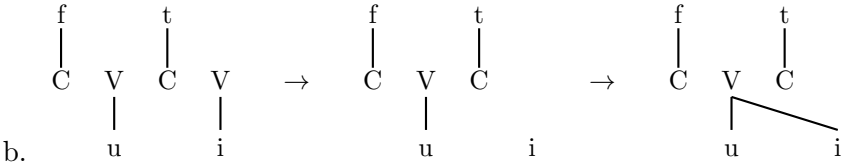
3.1 CV metathesis in Rotuman

3.1.1 As deletion and reattachment (Besnier 1987)

Besnier (1987) analyzes CV metathesis in Rotuman, an Austronesian language. This process takes the form $V_1CV_2\# \rightarrow V_1V_2C\#$, with a final output $V_3C\#$, where V_3 has a combination of features from V_1 and V_2. Since the intermediate consonant is unaffected, and has no effect on the ultimate form of V_3, Besnier's autosegmental

analysis places consonants and vowels on separate melodic tiers (1987: 213ff.).

(7) a. futi → füt 'banana'



b.

In Besnier's analysis, the final vowel timing slot is deleted, leaving a floating segment (in this case, /i/) on the vowel melodic tier. According to the rules of autosegmental analysis, a floating segment is not pronounced (Goldsmith 1990: 53), so the V_2 attaches itself to the V slot of the V_1. These then coalesce in some manner to create the output V_3, in this case *ü*.

3.1.2 As compensatory metathesis (Blevins & Garrett 1998)

Blevins & Garrett (1998: 527ff.), meanwhile, analyze the same data quite differently. They interpret it as a form of what they term "compensatory metathesis." This is a process whereby a stressed vowel will appear to attract a nearby unstressed vowel from another syllable, leaving only a reduced copy of the unstressed vowel in its original position, which is then lost entirely through regular phonetic processes. They formalize the change in Rotuman as follows (where $\acute{V}$ is a stressed vowel): $\acute{V}_1CV_2 > \acute{V}_1\breve{V}_2C\breve{V}_2 > \acute{V}_1\breve{V}_2C$.

3.2 CV metathesis in Kwara'ae

Kwara'ae, another Austronesian language, has a similar form of metathesis, where $V_1CV_2 \rightarrow V_1V_2C$ ($\rightarrow V_3C$). However, there are two key differences. The first is that rather than being limited to the rightmost edge of the word as it is in Rotuman, the domain for metathesis in Kwara'ae is the bisyllabic foot, and the only constraint on

the number of times it can apply is the number of feet in the word (Baird 2002: 2). Baird gives the following examples, in which brackets indicate a bisyllabic foot:

(8) a. [sata] → saˈt 'name'

b. go[gola] → go.goal 'octopus'

c. [maʔe][taʔe][elo] → mœʔ.tæʔ.eol 'doorway'

The other key feature of Kwara'ae metathesis is that both the metathesized and non-metathesized forms appear as surface forms in speech. The metathesized forms are known as Normal forms, and are used in everyday speech. The non-metathesized forms are known as Citation forms, and appear in the speech register used for traditional songs and clarification as well as "calling out routines (a songlike speech style)" (Heinz 2005: 3). Even in this register, speakers never utter whole sentences in Citation form, and most data is in one-word utterances. Despite this, children still acquire both forms: A derived form with a different foot structure from the underived base form will change the location of the metathesis in the Normal (metathesized) form accordingly, as in (9-10) below, indicating that morphological derivation occurs before metathesis. (NB: Although Heinz does not claim that either form is the underlying form, and lists his data in columns of Citation and Normal forms, I replicate his data (2005: 4) in Baird's Citation → Normal format for simplicity.)

(9) a. su.li → s͡uil 'bone'

b. su.li.ku → su.l͡iuk 'my bone'

(10) a. i.hu → i͡uh 'hair'

b. i.hu.la → i.hu͡ʌl 'hairy'

Heinz also lists a third, partially-metathesized allomorph, which he calls the Focus Final form, and which appears as "the last word in a focused phrase" (2005: 2).

(11) a. Citation: le.ʔa

b. Normal: le͡aʔ

c. Focus Final: le͡a.ʔa

'good'

Assuming Focus Final forms undergo the same metathesis process that Normal forms do, this would seem to imply that rather than a process of deletion and reattachment as in Besnier's Rotuman analysis, CV metathesis in Kwara'ae is a process of copying and (except in Focus Final forms) deletion. That is, $V_1CV_2 \rightarrow V_1V_2CV_2 \rightarrow V_1V_2C$. This follows from Blevins & Garrett (1998: 522), who include Kwara'ae in their description of compensatory metathesis (Section 3.1.2).

Is it worth writing up an autosegmental version of this?

3.3 Compensatory lengthening from CV metathesis in Leti

In Leti, another Austronesian language, compensatory lengthening of the first vowel in a VVC morpheme occurs when the second vowel is transposed or deleted (Hume 1998: 162). In (12a-c) below, the second vowel is metathesized, and in (12d) it becomes a secondary articulation on the following consonant.

(12) a. βuar + spou → βuːraspou 'mountain + boat = schooner mountain'

b. rain + iskɔla → raːniskɔla 'blouse + school'

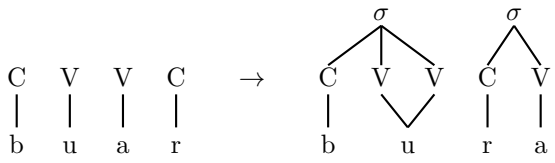
c. maun + ppuna → maːnuppuna 'bird + nest'

d. maun + oriori → maːnʷorʸori 'bird + buffalo'

Hume's analysis of this process relies on the idea that the transposition or deletion of a vowel affects only the melodic tier, and leaves the underlying moraic structure

unaltered. That is, when a V_1V_2C sequence becomes V_1CV_2, V_2's timing slot remains in V_2's original position, and reattaches to V_1 to form a long vowel. (NB: While Hume's analysis uses an underlying moraic structure, it appears in this case to serve essentially the same function as the CV timing tier, so for consistency's sake I have adapted her analysis to use a timing tier.)

(13)



Note that Hume's analysis requires the insertion of a mora or V-slot in V_2's new location.

3.4 VV metathesis

Unlike CV metathesis, regular VV metathesis is quite rare, though sporadic VV metathesis is relatively common (e.g. Portuguese /deostar/ > /doestar/ 'to insult' (Williams 1962: 111, Buckley 2011)) (Blust 2012: 208). There are a handful of examples of regular diachronic VV metathesis (e.g. Ultan 1978, Buckley 2011), but analyses of synchronic processes as VV metathesis are often abstract and can be reanalyzed (Buckley 2011).

One such regular diachronic case of VV metathesis occurred in the Austronesian language Hawu. Unlike the CV cases described above, this change is entirely historical, without "synchronic residue" (2012: 215). The change has two patterns: *uCa > əCu and *iCa > əCi. Blust notes in particular that the change did not occur from the historical forms *ua, *uCi, or *uCu. Additionally, the raising/centralization shift */a/ > /ə/ only occurred as part of this metathesis; historical forms such as *aCu and *aCi did not undergo this change.

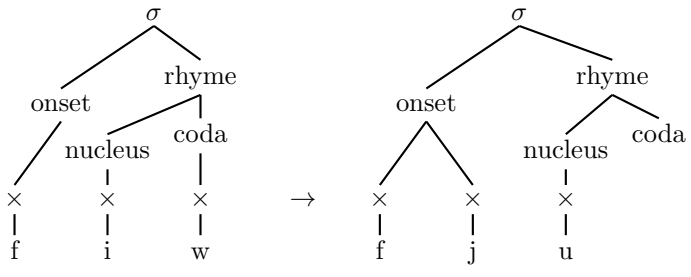
Buckley (2011) also offers a shift /eo/ > /oe/ in Portuguese, for example /deostar/

> /doestar/ ‘to insult’, but Buckley does not specify whether this is a regular or sporadic change.

3.5 Syllabic metathesis

Ultan (1978: 375) describes a phenomenon he calls syllabic metathesis, citing as an example Common Slavic metathesis of a sequence *e* + glide within a syllable, with the result /*ey/ > /*ji/ and /*ew/ > /*ju/. Buckley (2011) gives it the slightly clearer name *metathesis of syllabicity*—that is, a change in the structure of the syllable. Buckley also gives an example of modern English /iw/ > /ju/, as in *few*. However, Buckley claims this should not be considered true metathesis, as there is no transposition of segments. Instead, he analyzes this as a shift in what forms the head (or rhyme) of the syllable. That is, the nucleus (in (14) below, /i/) shifts to become part of the onset, thereby becoming a glide, while the coda (below, /w/) takes its place as the nucleus and is pronounced as a syllabic vowel. This is possible because the same set of segmental features can be pronounced either as a glide or a vowel, depending on its position in the syllable.

(14)



4 Analyses of quantitative metathesis

In this section, I review various scholars’ analyses of QM. Several of these connect QM to one of two related processes: antevocalic shortening, and compensatory lengthening.

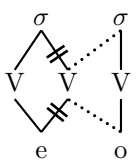
Antevocalic shortening (hereafter, AVS) is a process found throughout the Ancient Greek dialects (Miller 2014: 154), in which a sequence $\bar{V}\bar{V}$ is shortened to $\breve{V}\bar{V}$ (Smyth 1956: 17), and in some cases also includes the change $\bar{V}\breve{V} \rightarrow \breve{V}\breve{V}$. Sommerstein (1973: 70) suggests that AVS is in fact a type of QM; that is, that QM does not require the second vowel in the sequence to be initially short. Meanwhile, Miller (2014: 208) describes AVS as occurring "where QM failed to apply," while Ultan (1978: 379) describes QM as resulting *from* AVS, which I will explain in more depth below. Regardless, the two processes are clearly linked.

Compensatory lengthening (CL), meanwhile, is a well-attested process cross-linguistically. Generally, it is a process in which a segment is lost or shortened, and an adjacent segment lengthens to make up for the loss (Hayes 1995: 53). We saw this process in the analysis of CV metathesis in Leti in Section 3.3, where the transposition of a vowel left an empty V slot behind, which an adjacent vowel then lengthened to fill.

4.1 QM as timing-slot transfer

Wetzels (1986) argues that the term metathesis is "not applicable" to QM, which is instead a process of timing-slot transfer; that is, a timing slot from one segment is transferred to another (1986: 332). He offers several autosegmental analyses of QM as a timing-slot transfer, the main point of each being that in a sequence of three V timing slots, where the first two connect to a long vowel and the third connects to a short vowel, the second slot becomes detached from the first segment and is reattached to the second (Wetzels 1986: 332).

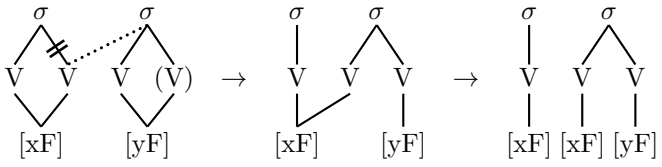
(15)



Wetzels suggests that this process can be extended to AVS, as discussed above. He previously established that when a single segment is attached to three timing slots, one is lost; that is, that a single segment can only last for up to two timing slots (1986: 330). Therefore when there are two long vowels, and the first is detached from its second timing slot, the effect of this slot reattaching to the second vowel is not felt, as the second vowel already takes two timing slots (1986: 333).

Alternatively, rather than the segment detaching from its timing slot and thereby being resyllabified, Wetzels suggests that it is at first only the timing slot that detaches from its syllable and is resyllabified. The long vowel that is uncomfortably straddled between two syllables is then split.

(16)



Afterwards, [xF] and [yF] coalesce by a separate process, which occurs widely in Ancient Greek (e.g. De Haas 1988).

The process of detachment and reattachment is similar to Besnier's analysis of Rotuman (Section 3.1). However, where the Rotuman process can still be considered metathesis, as the transposition of C and V_2, Wetzel's analyses do not fit the definition of metathesis; no segments or features have been reordered.

4.2 QM as CL/preservation of quantity

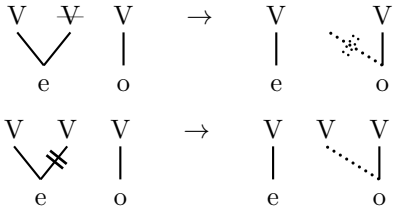
Ultan (1978: 379f.) describes QM as resulting from the regular occurrence of AVS. In this analysis, QM's function is "to preserve the overall quantity of the original vocalic sequence" (1978: 380) after the shortening rule takes place. Ultan also cites processes in Slavic and Miwok which also appear motivated by the "preservation of syllable- or

word-internal quantity" (1978: 394).

Miller (1976) also views QM as compensating for a previous application of AVS, but rather than preservation of quantity, Miller views the process as an attempt to preserve morphophonemic contrast. He compares it with the relationship between the Ancient Greek sound changes of intervocalic h-deletion (**alēthehos* → *alētheos* 'unconcealed') and h-transportation (**euhō* → *heuō* 'singe'), stating that QM and h-transportation are both "attempts to preserve, where possible, underlying elements on the surface by displacing them instead of allowing them to be lost" (Miller 1976: 139).

When viewed autosegmentally, Ultan's analysis seems to line up fairly well with Wetzel's. The process of shortening could be analyzed as the loss of a timing slot, but this leaves no motivation for the preservation of quantity, as in (17a). So rather than the loss of a V slot, I analyze AVS in this context as a disconnect between the second V slot of a long vowel and its segment, maintaining the quantity as a series of three V slots. In order to be pronounced, the disassociated V slot must be associated with a segment on the melodic tier, so it is reattached to the second segment, as in (17b).

(17)



This also seems consistent with the definition of CL as a process "in which one segment is shortened or deleted, with another becoming simultaneously longer" (Hayes 1995: 53). In this case, when the V_1 shortens, the V_2 lengthens to pick up the slack. As Ancient Greek underwent three major CL processes throughout its development from Proto-Greek (Rau 2010: 177f.), this seems a fairly likely solution. Additionally, we saw CL as a result of metathesis in Leti (Section 3.3): the initial process (metathesis) left

a vowel adjacent to an empty timing slot, which the vowel lengthened to fill. This is not an argument for QM as metathesis, however—in the case of QM, what appears to be metathesis is CL motivated by shortening.

4.3 QM as compensatory metathesis

In Section 3.1.2 I briefly explained Blevins & Garrett's (1998) definition of compensatory metathesis, where an unstressed vowel is attracted towards a stressed vowel with the eventual appearance of CV metathesis ($\acute{V}_1CV_2 > \acute{V}_1\breve{V}_2C\breve{V}_2 > \acute{V}_1\breve{V}_2C$). We can consider QM in this light, with a syllable boundary separating the two vowels rather than a consonant.

(18) $\bar{V}_1.\breve{V}_2 \rightarrow \breve{V}_1.\breve{V}_1\breve{V}_2 \rightarrow \breve{V}_1.\bar{V}_2$

This analysis requires V_1 and V_2 to coalesce into $\bar{V}_2$, and is quite similar to Wetzel's second analysis, as seen in (16) above.

The main issue with this analysis is its motivation: as Ancient Greek is a pitch accent language (see Section 2.1), there are no stressed syllables to motivate the initial attraction. Even if we consider the pitch accent an acceptable equivalent to stress, it's hardly the case that all QM forms are accented on the V_2 (e.g. Section 2.2).

4.4 QM as synizesis

Haug (2011: 703), meanwhile, says that rather than taking the orthography at "face value," QM forms should be considered to have contracted to one long monosyllable through synizesis. Taking into account the monosyllabic a-stem forms described in Section 2.1, he argues that the three obligatorily disyllabic forms in Homer are weak evidence against the hundred or so obligatorily monosyllabic forms. In addition, he

makes the point that vowel length metathesis is "unheard of" in other language data. Taken together, this evidence leads Haug to the claim that QM is instead "a formation of rising diphthongs leading directly to a long monosyllable (synizesis)." A rising diphthong is one which starts with a less prominent glide or semivowel, and ends with a more prominent full vowel. Haug does not explain precisely what he has in mind for this analysis, but it may be something like $\bar{V}\breve{V} \rightarrow \underset{\frown}{\upsilon}V \rightarrow \bar{V}$.

Miller (2014: 67) and Colvin (2010: 209) both transcribe the monosyllabic ending as a glide-vowel sequence; they reconstruct it as *[-ɛ̯ɔ̄] and *[-e̯ɔ̄] respectively. This seems to neatly account for the issue: the resulting forms are monosyllabic, satisfying the meter; the orthography is accounted for, as it is still pronounced differently than a simple *ō*; and it's easy to see how the form might have descended from, and could easily be reanalyzed back to, a $\breve{V}\bar{V}$ sequence. In Section 3.5 we saw that glide → vowel and vowel → glide shifts are not unheard of, and can be motivated by a shift in syllable structure, which an unmetrical form could certainly initiate.

4.5 QM as transposition of [+/- length] feature

Just to round out the options, I also provide an analysis based on Butskhrikidze & van de Weijer's (2003: 767) autosegmental template of standard segmental metathesis, seen below.

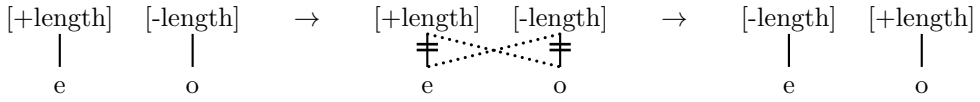
(19)

Note that this analysis generally only works for metathesis of adjacent segments, as an intervening segment would cause association lines to cross, which violates the well-formedness conditions of autosegmental theory (Goldsmith 1990: 319). The analysis could also be applied to cases of CC or VV metathesis with an intervening segment,

provided the intervening segment was of the other type and the analysis allowed for separate consonantal and vocalic melodic tiers—but as QM occurs between adjacent vowels, this is mostly irrelevant.

In order to apply this template to QM, we must conceptualize QM as the transposition of a feature [+/- length]. Since this makes the timing tier redundant, I do not include it.

(20)



There are several issues with this analysis. First, it requires four disassociation/reassociation processes, where Ultan's only requires two. (Note that Wetzel's simpler analysis also requires four, but these are spread across three tiers instead of just two.) It would also be difficult to incorporate the timing tier, as the [+/- length] feature makes it redundant.

However, it does account for Ultan's preservation of quantity—the input has one [+length] segment and one [-length] segment, and so does the output. So while it is hardly the most elegant or most likely solution, it seems a fairly valid one.

4.6 Summary

Ultimately, QM as timing-slot transfer seems to have resolved itself from two different directions: by Wetzel through the mechanisms of autosegmental theory, and myself through Ultan's analysis of QM as preservation of quantity. Taken together, the most likely explanation of QM seems to be a) timing-slot transfer and b) a type of compensatory lengthening. It also seems likely that when required by meter, QM forms were pronounced as a glide-vowel sequence, rather than merely coalescing into a single long monophthong.

Altogether, it seems most likely that rather than being a change in order of two segments or features, QM is best defined as the reassociation of three abstract timing units from VV.V to V.VV—that is, that QM is not metathesis.

In terms of motivation, there are a handful of options. The first, of course, is that the change was non-teleological; that is, that it was not motivated by anything in particular, but was merely said differently by some speakers until it became the standard pronunciation. The second option, discussed above in Section 4.3, is that the V_1 was attracted in the direction of the V_2; however this requires some phonological reason for the attraction, and I do not have enough phonological data to account for this. And the third option, discussed above in Section 4.2, is that a previous change, antevocalic shortening, prompted a compensatory lengthening process. This seems to be the most likely option, as both AVS and CL are well-documented processes elsewhere in Ancient Greek, and AVS has been linked to QM by several analyses.

5 Conclusion

In this paper, I presented a brief cross-linguistic overview of metathesis in the context of autosegmental theory, followed by a review of the existing analyses of quantitative metathesis, coming to the eventual conclusion that QM is, despite the name, not true metathesis.

In the interests of time, this paper centered specifically on autosegmental theory. The next steps would likely be to bring in analyses of metathesis based in other theories, such as optimality theory and moraic phonology. In particular, more examples of VV and syllabic metathesis could provide valuable insight.

In addition, a useful source for comparison would be cases of metathesis (or pseudo-metathesis) of features, as opposed to segments—for example, apparent metathesis of

tone or rounding, if such things exist.

A further avenue would be to look more into phonological motivation for Blevins & Garrett's compensatory metathesis—perhaps there is some sort of stress or emphasis aside from the pitch accent which could account for the attraction of V_1 towards V_2. However, this is outside of the scope of this paper, as well as my base of knowledge.

In sum, the most likely explanation of QM seems to be as pseudo-metathesis rather than true metathesis, where AVS causes a free-floating timing slot, which then reattaches to the V_2 in a process of compensatory lengthening.

Appendix A: Data ORGANIZE

Is this section useful/worth organizing?

Potentially in a table like this, with the first two columns being the stem and gloss, and the rest being different possible endings, with subcolumns for century and dialect of first attestation:

comments on organization/appearance?

Table 1: Sample Data Table

stem	gloss	-ēos		-eōs		-eos		-ios	
		century	dialect	century	dialect	century	dialect	century	dialect
Oduss-	'Odysseus'	8BCE	Hom	6-5BCE	Att	n/a	n/a	n/a	n/a
hubr-	'hubris'	n/a	n/a	7-6BCE	Att	5-4BCE	Att	8BCE	Hom

The earliest occurrences of forms such as *poleōs* and *basileōs* rest firmly in the 6th century BCE. (The latter does seem to occur earlier in a reconstructed fragment from the 7th century by a poet named Alcman, whose origins are disputed but who may have been born in Sardis in Asia Minor. His work is connected to Sparta but his dialect is described as "composite," so an Attic or Ionian feature is not out of place.

(via Wikipedia - find better source)

Data organization: form, century of first attestation and sometimes author or location; alternate forms and century/author 'gloss' (etymological info from Chantraine 1977)

- Athematics:
  - basileōs also in Eumelus (Ch 166 chypr -ēwos)
  - polis (Ch chypr ptoliwi, see Ch Morphologie s84-87) this
  - Mōuseōs 6BCE; -ēos 4CE 'Moses'
  - archiereōs 3BCE; -ēos 4CE 'high priest'
  - grammateōs 5-4BCE Aristophanes, Demosthenes; no -ēos 'scribe'
  - dunameōs 6BCE; no -ēos 'power'
  - hubreōs 7-6BCE Alcaeus, Aesch; -eos 5-4BCE Aristophanes; -ios Homer, Hesiod
  - pisteōs 6BCE, no -ēos, -eos once 6BCE and not again until CE – same author (Theognis) has poleos but many others do too 'trust'
- Herodotus uses basileos, polios
- Homer has -ēos for basileus, achilles, odusseus, naus, etc – all later -eōs
- Athematics which Homer has as -ēos & which appear later as -eōs:
  - neōs 7-6BCE 'ship' (Ch p737 nāw- nē(w)-)
  - Achilleōs 6BCE Miletus
  - Odusseōs 6-5BCE Attic
  - Alōeōs 4-3BCE?? 2BCE? (Eumelus)
  - Areōs 6-5BCE Aeschylus (Eumelus – maybe -ēos in actual Eumelus fragment?)

– aristeōs 5BC Euripides, Thucydides (name only) - Homer only has noun ‘chief’

– Enipeōs (a river) 3BCE; Hdt has -eos

– Enueōs 1BCE

– Erechtheōs 6-5BCE Aeschylus, Euripides; Hdt and others have -eos

– Eurustheōs 5BCE Thuc, Eurip; -eos in Hdt, Pindar

– Ēioneōs 6-5BCE Aesch

– Hērakleos Pindar, Aesch, Hdt, Eurip; -eōs not until 3CE

– Idomeneōs 4BCE (but -ēos in same text)

– Kapaneōs 5BCE Aesch, Eurip

– Kopreōs 1CE

– Krētheōs 4BCE

– Leonteōs 4-3BCE

– Melaneōs 6-5BCE?? fragment, might be mention in later text – next use 2CE

– Menestheōs 5-4BCE (Attic)

– Mēkisteōs Eurip

– Nēleōs Eumelus, Eurip

– Oineōs 5BCE Eurip, Soph

– Otreōs 1BCE

– Phanoteōs 5BCE Thuc, Soph == Panopeōs Plato

– Pēleōs 5BCE Aesch, Eurip; -eos Homer, Hdt, Pindar

– Pittheōs 5BCE Eurip; -eos (reconstructed) 5BCE

– Salmōneōs 5-4BCE??; -eos 2CE

  - Phoneōs 5BCE Soph

- Author, century, place:
  - Euripides=5BCE Athens
  - Herodotus=5BCE Ionia
  - Sophocles=5BCE Athens
  - Thucydides=5BCE Athens
  - Plato=5-4BCE Athens
  - Pindar=6-5BCE Boetia
  - Aeschylus=6-5BCE Athens
  - Aristophanes=5-4BCE Athens
  - Demosthenes=4BCE Athens
- Achilles with one L vs two – is /i/ long anyway? Odyss same (one S or two)
- other data (from Wetzels 1986: 332):
  - chrēomai > chreōmai 'to lack'
  - ēa > eā 'I was (Ion.)
  - despotāo > despoteō 'master' (GEN SG)
- A-stems:
  - despoteō 5BCE Hdt 'master' (Ch 266)
  - neēnieō 5BCE Hdt 'young man' (Homer has no gen form, may have used same form) (Ch 746 newo-)
  - prophēteō 5BCE Hdt 'prophet'
  - Perseō 5BCE Hdt 'Persian' (Ch 889 Pārs- or Pērs-)
  - grammatisteō 3BCE (only one use, normally -ou) 'clerk'

  - Aineiāo Homer (and once -eiō) ‘Aeneas’; Aineieō 1BCE

- look up later (transliterated for search)
  - ubrisths

Appendix B: Paradigms TODO

References

???? URL `http://www.tlg.uci.edu`. University of California, Irvine.

Baird, Paula. 2002. A Re-analysis of Metathesis in Kwara'ae. *MIT Working Papers in Linguistics* .

Besnier, Niko. 1987. An autosegmental approach to metathesis in Rotuman. *Lingua* 73(3). 201–223. doi:10.1016/0024-3841(87)90008-8. URL `http://www.sciencedirect.com/science/article/pii/0024384187900088`.

Blevins, Juliette & Andrew Garrett. 1998. The Origins of Consonant-Vowel Metathesis. *Language* 74(3). 508–556. doi:10.2307/417792. URL `http://www.jstor.org/stable/417792`.

Blust, Robert. 2012. Hawu Vowel Metathesis. *Oceanic Linguistics* 51(1). 207–233. doi:10.1353/ol.2012.0009. URL `https://muse.jhu.edu/article/480010`.

Buckley, Eugene. 2011. Metathesis. In Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume & Keren Rice (eds.), *The Blackwell companion to phonology*. Malden, MA: Blackwell Publishing. URL `http://www.companiontophonology.com`. OCLC: 719774671.

Butskhrikidze, Marika & Jeroen van de Weijer. 2003. On the formal description of metathesis: a case study of v-metathesis in Modern Geor-

gian. *Lingua* 113(8). 765–778. doi:10.1016/S0024-3841(02)00129-8. URL http://www.sciencedirect.com/science/article/pii/S0024384102001298.

Chantraine, Pierre. 1977. *Dictionnaire étymologique de la langue grecque: histoire des mots.* Paris: Klincksieck. OCLC: 256355045.

Colvin, Stephen. 2010. Greek Dialects. In Egbert J. Bakker (ed.), *A companion to the ancient Greek language*, Blackwell companions to the ancient world. Chichester, West Sussex, U.K. ; Malden, MA: Wiley-Blackwell. OCLC: ocn324777007.

De Haas, Wim. 1988. *A Formal Theory of Vowel Coalescence : A Case Study of Ancient Greek*. De Gruyter.

Goldsmith, John A. 1990. *Autosegmental and metrical phonology.* Oxford, UK ; Cambridge, Mass., USA: B. Blackwell.

Haug, Dag Trygve Truslew. 2011. Quantitative Metathesis. In Margalit Finkelberg (ed.), *The Homer encyclopedia*, vol. 2. Chichester, West Sussex ; Malden, MA: Wiley-Blackwell. OCLC: ocn643569370.

Hayes, Bruce. 1995. *Metrical stress theory: principles and case studies.* Chicago: University of Chicago Press.

Heinz, Jeffrey. 2005. *CV Metathesis in Kwara'ae.* Ph.D. thesis, University of California, Los Angeles.

Hoekstra, A. 1965. *Homeric modifications of formulaic prototypes*, Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Letterkunde ;. Noord-Hollandsche Uitg. Mij.,.

Hume, Elizabeth. 1998. Metathesis in phonological theory: The case of Leti. *Lingua* 104(3). 147–186. doi:10.1016/S0024-3841(97)00031-4. URL http://www.sciencedirect.com/science/article/pii/S0024384197000314.

Maas, Paul. 1962. *Greek metre.* Clarendon Press,.

Miller, D. Gary. 1976. Glide Deletion, Attic Reversion, and Related Problems in

Ancient Greek Phonology. *Die Sprache: Zeitschrift fur Sprachwissenschaft* 22. 137.

Miller, D. Gary. 1982. *Homer and the Ionian epic tradition*, Innsbrucker Beiträge zur Sprachwissenschaft ;. Institut für Sprachwissenschaft der Universität Innsbruck,.

Miller, D. Gary. 2014. *Ancient Greek dialects and early authors: introduction to the dialect mixture in Homer, with notes on lyric and Herodotus*. Berlin ; Boston: De Gruyter.

Probert, Philomen. 2003. *A new short guide to the accentuation of ancient Greek*, BCP advanced language series. Bristol: Bristol Classical. OCLC: ocm56040243.

Rau, Jeremy. 2010. Greek and Proto-Indo-European. In Egbert J. Bakker (ed.), *A companion to the ancient Greek language*, Blackwell companions to the ancient world. Chichester, West Sussex, U.K. ; Malden, MA: Wiley-Blackwell. OCLC: ocn324777007.

Raven, David Sebastian. 1962. *Greek metre*. Faber and Faber,.

Smyth, Herbert Weir. 1894. *Sounds and inflections of the Greek dialects*.

Smyth, Herbert Weir. 1956. *Greek grammar*. Harvard University Press.

Sommerstein, Alan H. 1973. *The sound pattern of ancient Greek*, Publications of the Philological Society ;. Basil Blackwell,.

Thompson, Rupert. 2010. Mycenaean Greek. In Egbert J. Bakker (ed.), *A companion to the ancient Greek language*, Blackwell companions to the ancient world. Chichester, West Sussex, U.K. ; Malden, MA: Wiley-Blackwell. OCLC: ocn324777007.

Ultan, Russell. 1978. A Typological View of Metathesis. In Joseph H. Greenberg, Charles A. Ferguson & Edith A. Moravcsik (eds.), *Universals of human language*, vol. 2. Stanford, Calif: Stanford University Press.

Weiss, Michael. 2010. Morphology and Word Formation. In Egbert J. Bakker (ed.), *A companion to the ancient Greek language*, Blackwell companions to the ancient

world. Chichester, West Sussex, U.K. ; Malden, MA: Wiley-Blackwell. OCLC: ocn324777007.

Wetzels, Leo. 1986. Phonological Timing in Ancient Greek. In Leo Wetzels & Engin Sezer (eds.), *Studies in compensatory lengthening* (Publications in language sciences 23). Dordrecht, Holland ; Riverton, N.J., U.S.A: Foris Publications.

Williams, Edwin Bucher. 1962. *From Latin to Portuguese: Historical Phonology and Morphology of the Portugese Language*. Univ. Pennsylvania Press. Google-Books-ID: 019fAAAAMAAJ.