Tone-melody matching in ancient Greek music (abstract)

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1. Preliminary remarks

This contribution treats an interesting aspect of textsetting in the Delphic hymns, namely the way that the poets match the pitch movements of the text and the melody. Adopting insights from previous scholarship on the Delphic hymns (§2) as well as methods that have been developed by scholars studying tone-melody matching in other traditions (§3), I explore factors that may influence how tightly the poets correlate tone and tune. I am especially interested in factors that may be active across different types of textsetting, i.e. in setting text to poetic meter and in setting text to melody.

The two Delphic hymns are paeans that were performed in 128/127 BCE at the Pythaid festival in Delphi. They celebrate the foundational myth of the Pythian sanctuary, Apollo's slaying of the serpent that had occupied the place. The meter is paeonic (⏑⏑ ⏑ ⏑⏑) except for the prayer at the end of Limenius' composition (DAGM 21.34–40), which is in Aeolic meter. Thanks to their length, their age, and the fact that they are preserved as inscriptions with musical notation, the Delphic hymns are perhaps the most interesting pieces of non-strophic vocal music in ancient Greek.

As noted above, they display a non-accidental correlation between the pitch movements of both the text and the melody to which it was sung.[1] For example, in Athenaeus' composition (DAGM 20), we find the sentence λιγὺ δὲ λωτὸς βρέμων αἰόλοις μέλεσιν ὠιδὰν κρέκει "And the aulos, braying brightly, weaves shimmering melodies into the singing." When we consider how Athenaeus set the phrase αἰόλοις μέλεσιν [ai̯.i̯ó.loi̯s. mé.le.si] to music, we see that the melody rises to a peak at the first acute-accented (=high-toned) syllable [i̯ó], then falls to the end of the first word. After that it rises to the next acute-accented syllable [mé], then falls again to the end of the second word. In the representation below, each column represents a beat/mora; each row above the text represents a half-step (=semitone) in the melody.

[1] For recent statistical corroboration that the correlation should not be attributed to chance, see Cosgrove and Meyer 2006.

Setting of αἰόλοις μέλεσιν (DAGM 20.14f.)

		D					
	Db		Db		Db		
C				C		C	
							Ab
aḭ		ḭó	loḭs		mé	le	si

The matching of tone and melody is not a property of that particular phrase, but of the Delphic hymns in their entirety, along with several other pieces of vocal music, e.g. the song of the Seikilos epitaph and the compositions of Mesomedes, a musician in Hadrian's court. I am interested in (eventually) providing a fuller description of that matching practice.

In what follows, I briefly sketch the important groundwork on tone-melody matching in ancient Greek (§2) and point to the steadily growing body of work on tone-melody matching in other musical traditions (§3), which provides impetus for a fuller description of the Greek material (§4).

2. Tone-melody matching in ancient Greek

During the last decade of the nineteenth century, there was a flurry of brilliant work on tone-melody matching in ancient Greek music. Crusius (1891: 171f., 1894a: 173) first noted that tone and melody might be correlated in the short song on the Seikilos epitaph. When he studied the far more extensive Delphic hymns (1894b: 113–123), he established two important generalizations (paraphrased as A and B below). Shortly thereafter (1896: 305), Wackernagel added a third (paraphrased as C).

A. The accented syllable of a word is sung at least as high as every other syllable of that word.
B. A circumflected syllable is usually sung to two notes with a falling interval.
C. While a grave-accented syllable is sung at least as high as every other syllable in the word, it is never sung higher than the pre-accentual syllables (if any) and the accented syllable of the following word.

Much later scholarship on tone-melody matching in ancient Greek has treated those generalizations as rules, focused on the rare violations thereof, and added some important observations. For example, it may be the case that violations of generalization A are more permissible at the beginning of a song or a melodic section, such that the melody there may rise (rather than fall) from an accented syllable to a post-accentual one (Winnington-Ingram 1955: 68). We find such a violation at the beginning of the Seikilos epitaph, where the first word ὅσον is set to a rising interval instead of the falling or level one that we would expect on the basis of A. Setting aside a few other observations of that sort, little has been added since the 1890s, as is clear from relatively recent descriptions of ancient Greek tone-melody matching (e.g. Pöhlmann 1970: 140; West 1992: 199; Probert 2003: 20, 2006: 48).

As I will argue below (§4), in order to advance our understanding of this phenomenon, we need to think about settings differently. Currently, we think about them as either following the rules (A–C) or violating them. Instead, we should recognize that among the settings that follow the rules, there are

settings where tone and melody match more strictly, and settings where they match less strictly. In fact, there is likely a spectrum of strictness of tone-melody matching. Studying how strictness varies and which rules govern that variation will reveal much more about the nature of tone-melody matching in ancient Greek music. That is the main lesson to learn from scholarship on tone-melody matching in other traditions.

3. Tone-melody matching in other traditions

From the early twentieth century on, tone-melody matching has been described and analyzed in other traditions, including Cantonese (Chan 1987), Ewe (Jones 1959, Schneider 1961), Navajo (Herzog 1934), Vietnamese (Kirby and Ladd 2016), and many others. As that field of study has developed, scholars have produced valuable insights, raised interesting questions, and improved their methods. The progress is clear from recent overviews of the field (e.g. Ladd and Kirby 2020) and exemplary studies of individual traditions (e.g. McPherson and Ryan 2018, on Tommo So).

A central insight is that musicians and their audience pay special attention to the relative pitch of adjacent syllables. Between two syllables, tone in speech may rise, fall, or stay level. When those syllables are sung, the melody may likewise rise, fall, or stay level. This permits a simple but useful three-way classification of settings as parallel, opposing, and oblique. In parallel settings, tone and melody move together: both rise, fall, or stay level. In opposing settings, they move in opposite directions: the one rises and the other falls. In addition to parallel and opposing transitions, there are two types of oblique settings. In the one (type I), a rising or falling tonal transition is set to a level melodic transition. In the other (type II), a level tonal transition is set to a rising or falling melodic one. This is summarized in the table below.

	Rising melody	Falling melody	Level melody
Rising tone	**Parallel setting**	*Opposing setting	*Oblique setting* (I)
Falling tone	*Opposing setting	**Parallel setting**	*Oblique setting* (I)
Level tone	*Oblique setting* (II)	*Oblique setting* (II)	**Parallel setting**

A fair amount of recent scholarship has adopted this perspective and focused on transitions in a variety of linguistically and musically unrelated traditions. The main finding is that the avoidance of opposing settings is a widespread, if not ubiquitous, principle of tone-melody matching. In other words, if there is a rise in linguistic pitch from one syllable to the next, the corresponding melody should not fall, and *vice versa*. As expected, opposing settings are avoided in the Delphic hymns as well.

While opposing settings are generally avoided, traditions seem to differ with respect to how they treat oblique settings (cf. Ladd and Kirby 2020: 686 *et passim*). In some traditions, oblique settings occupy a middle ground between parallel ones and opposing ones. There, singers prefer parallel settings, tolerate oblique ones, and avoid opposing ones. As argued below (§4), the poets of the Delphic hymns operate with a three-way distinction of that sort. In other traditions, singers seem to treat oblique and parallel settings as similarly felicitous.

In the more sophisticated scholarship, the close study of transitions has led to some very interesting results. For example, in the aforementioned study of folk songs in Tommo So (a Dogon language of

Mali), McPherson and Ryan (2018) find that the strictness of tone-melody matching varies depending on a number of factors. These include sensitivities (1) to the difference between formulaic and improvised text; (2) to phrasing, such that matching is stricter within words and phrases than across words and phrases; and (3) to the distinction between lexical and grammatical tone. Perhaps their most interesting finding is that tone-melody matching is governed by principles that are familiar from meter. For instance, they show that matching in Tommo So tends to become stricter towards the end of lines (i.e. metrical constituents), as does the realization of the meters of Finnish, ancient Greek, Latin, Vedic, etc.[2] In metrics, the governing principle is often referred to as "final strictness" or the "Strict End Hypothesis."

4. A fresh look at tone-melody matching in the Delphic hymns

The scholarship briefly described in §3 provides an impetus to take a fresh look at tone-melody matching in the Delphic hymns and related songs. Because it has been clear since the 1890s that the Greek poets avoid opposing settings quite strictly, the main insight to take away from that scholarship has to do with parallel and oblique settings. Specifically, in traditions that treat them differently, studying how they pattern in the song can reveal the rules that govern the tone-melody matching process.

Promisingly, a pilot study suggests that the poets of the Delphic hymns prefer parallel settings to oblique ones (cf. Gunkel 2023: 239–244). The data consist of all three-syllable words with an acute accent on the middle syllable, e.g. μεγάλου, δειράδα, αἰόλον, ἐφέπων. We can be quite certain that linguistic pitch rose from the first syllable to the acute-accented syllable, then fell from the acute-accented syllable to the final one. The rise and fall constitute two tonal transitions. In fully parallel settings such as that of δειράδα below, the melody likewise rises from the first to the second syllable (transition 1), then falls from the second syllable to the third (transition 2).

Parallel-parallel setting: δειράδα (DAGM 21.23)

		F	
E			
			D
de:		rá	da

There are nine logically possible ways to set such words to music. We only find three of them: rising-falling (as δειράδα above), rising-level (as αἰόλον below), and level-rising (as ἐφέπων below). In other

[2] For a parallel from Greek meter, consider the iambic trimeter of tragedy, where we consistently find more canonical iambic realizations of the meter towards the end of the line. For instance, resolution of the fifth princeps (i.e. realizing the fifth – with a non-canonical ⏑⏑) occurs less often than resolution of the principitia earlier in the line (cf. West 1982: 81). On final strictness more generally, see Hayes 1983; Ryan 2019: 139, 147; and Arrazola 2021 with references.

words, all of the settings are either fully parallel, or they involve one parallel transition and one oblique one. There are no opposing settings in these data.

Parallel-oblique setting: αἰόλον (DAGM 20.23)

		Ab	Ab
F			
a͡i		i͡ó	lon

Oblique-parallel setting: ἐφέπων (DAGM 20.8)

C	C		
		G	
e	p^hé	po:n	

The poets set each of the two transitions 73% parallel and 27% oblique. That indicates that they treat oblique settings as distinct from both parallel and opposing ones.

There are also indications that the strictness of matching varies in a non-random, and thus rule-governed, way. For instance, in the second musical section of Athenaeus' paean (DAGM 20.9–16, on which see Hagel 2002), the settings become increasingly parallel. They are roughly 25% oblique in the first half of that section (which ends with νέων μῆρα ταύρων), and roughly 5% oblique in the second half (which ends ἀναμέλπεται). The difference is statistically significant and should thus not be attributed to chance. Whether that difference should be attributed to "final strictness" remains to be seen. What seems clear from those pilot studies is that tone-melody matching in the Delphic hymns warrants further study. This presentation offers some further, initial exploration of that type.

Abbreviations

DAGM = Pöhlmann, Egert, and Martin L. West. 2001. *Documents of Ancient Greek Music*. Oxford: Clarendon.

Works cited

Arrazola, Varun D. C. 2021. "Deviants are detected faster at the end of verse-like sound sequences." *Frontiers in Psychology* 12:614872.

Chan, Marjorie K. M. 1987. "Tone and melody interaction in Cantonese and Mandarin songs." *UCLA Working Papers in Phonetics* 68: 132–169.

Cho, Sunghye. 2017. “Text alignment in Japanese children’s song.” *University of Pennsylvania Working Papers in Linguistics* 23. Available online at https://repository.upenn.edu/entities/publication/bffa2d22-4b30-40af-8cb1-fa864212a13e

Cosgrove, Charles H., and Mary C. Meyer. “Melody and word accent relationships in ancient Greek musical documents: The pitch height rule.” *The Journal of Hellenic Studies* 126: 66–81.

Crusius, Otto. 1891. “Ein Liederfragment auf einer antiken Statuenbasis.” *Philologus* 50 (= N. S. 4): 163–172; 576.

———. 1894a. “Zu neuentdeckten antiken Musikresten.” *Philologus* 52 (= N. S. 6): 160–200.

———. 1894b. *Die Delphischen Hymnen: Untersuchungen über Texte und Melodien*. (Ergänzungsheft zum *Philologus*, 53). Göttingen: Dieterich.

Devine, A. M., and Laurence D. Stephens. 1994. *The Prosody of Greek Speech*. Oxford: Oxford University Press.

Gunkel, Dieter. 2014a. “Accentuation.” In *Encyclopedia of Ancient Greek Language and Linguistics*. Vol. 1, A–F, ed. Georgios K. Giannakis et al., 7–12. Leiden: Brill.

———. 2014b. “Law of Limitation.” In *Encyclopedia of Ancient Greek Language and Linguistics*. Vol. 2, G–O, ed. Georgios K. Giannakis et al., 323–325. Leiden: Brill.

———. 2014c. “Sotera Rule.” In *Encyclopedia of Ancient Greek Language and Linguistics*. Vol. 3, P–Z, Index, ed. Georgios K. Giannakis et al., 296–297. Leiden: Brill.

———. 2014d. “Wheeler’s Law.” In *Encyclopedia of Ancient Greek Language and Linguistics*. Vol. 3, P–Z, Index, ed. Georgios K. Giannakis et al., 515–516. Leiden: Brill.

———. 2023. “Musical evidence for low boundary tones in ancient Greek.” *Greek and Roman Musical Studies* 11.2: 231–284.

Hagel, Stefan. 2002. “Musik zwischen Apollon und Dionysos – der delphische Paian des Athēnaios.” In *Studien zur Musikarchäologie* 3, ed. Ellen Hickmann, Anne Draffkorn Kilmer, and Ricardo Eichmann, 403–411. Rahden: Leidorf.

Hayes, Bruce. 1983. “A grid-based theory of English meter.” *Linguistic Inquiry* 14.3: 357–393.

Herzog, George. 1934. “Speech-melody and primitive music.” *The Musical Quarterly* 20.4: 452–466.

Jones, A. M. 1959. *Studies in African Music*. Vol. 1. Oxford: Oxford University Press.

Kirby, James, and D. Robert Ladd. 2016. “Tone-melody correspondence in Vietnamese popular song.” *Proceedings of the 5th International Symposium on Tonal Aspects of Languages*: 48–51.

———. 2021. “Tone-melody matching in tone-language singing.” In *The Oxford Handbook of Language Prosody*, ed. Carlos Gussenhoven and Aoju Chen, 676–688. Oxford: Oxford University Press.

McPherson, Laura, and Kevin M. Ryan. 2018. “Tone-Tune Association in Tommo So (Dogon) Folk Songs.” *Language* 94.1: 119–156.

Pöhlmann, Egert. 1970. *Denkmäler altgriechischer Musik*. Nürnberg: H. Carl.

Pöhlmann, Egert, and Martin L. West. 2001. *Documents of Ancient Greek Music*. Oxford: Clarendon.

Probert, Philomen. 2003. *A New Short Guide to the Accentuation of Ancient Greek*. Bristol: Bristol Classical Press.

———. 2006. *Ancient Greek Accentuation: Synchronic Patterns, Frequency Effects, and Prehistory*. Oxford: Oxford University Press.

Ryan, Kevin M. 2019. *Prosodic Weight: Categories and Continua*. Oxford: Oxford University Press.

Sandell, Ryan P. and Dieter Gunkel. Under revision. "On the representation and realization of the ancient Greek acute: Evidence from tone-tune mappings in ancient Greek music." *Journal of Greek Linguistics*.

Schneider, Marius. 1943. "Phonetische und metrische Korrelationen bei gesprochenen und gesungenen Ewe-Texten." *Archiv für vergleichende Phonetik* 7: 1–15.

Wackernagel, Jakob. 1896. "Das Zeugniss der delphischen Hymnen über den griechischen Accent." *Rheinisches Museum für Philologie*, N. S. 51: 304–305.

West, M. L. 1982. *Greek Metre*. Oxford: Clarendon.

———. 1992. *Ancient Greek Music*. Oxford: Clarendon.

Winnington-Ingram, R. P. 1955. "Fragments of unknown Greek tragic texts with musical notation: II The music." *Symbolae Osloenses* 31: 29–87.