

# Dialect Markers in the Lyric Sections of the Plays of Euripides

Grant Storey

Adviser: Christiane Fellbaum

## Abstract

*One of the many interesting features of the ancient Athenian tragic plays, including those of Euripides, is the use of predominantly Attic dialect forms within the plays' speaking sections and an influx of Doric dialect forms within their singing sections. While there have been previous analyses of these dialect features, none of them have been exhaustive in listing the forms that appear, nor have they provided any counts of the number of Doric and Attic forms present. In addition, current programs that provide dialect analyses for Ancient Greek forms are inconsistent in their labelling and do not explain the reasons for their choices. In order to improve on previous written analyses of these dialect features and existing tools, we create a new tool, called τάμνον<sup>1</sup>. τάμνον uses a rules-based approach to analyze Ancient Greek texts and provides a wealth of information about the dialects of given forms. When τάμνον is used to analyze the lyric sections of Euripides' plays, we find that it matches or improves on existing resources in a high percentage of cases and presents numeric data which is not only useful for understanding the presence and prevalence of dialect features within these sections of the plays but also suggests interesting areas of further research.*

## 1. Introduction

There is a long history of scholarly study of the plays of the Ancient Greek tragic playwright Euripides, stretching back to the Hellenistic scholars of Alexandria in the 3rd century B.C. and continuing to Princeton in the modern day. These studies cover many questions about the plays of Euripides, from his influences to the true authorship of certain plays to the pronunciation of words at the time, and they often rely on the presence or absence of so-called “Doric” dialect features as

---

<sup>1</sup>Pronounced “tamnon,” this means “the thing that divides” in Ancient Greek, as τάμνον divides words into Attic and Doric. Also, τάμνον is the Doric form of the Attic τέμνον, so the name itself is a reference to the dialects it is analyzing.

part of their argument. However, the discussion of the use and frequency of specific Doric features within the plays of Euripides often consists of generalization rather than specifics. For example, when discussing the Athenian tragic playwrights' use of Doric long  $\alpha$  instead of the Attic  $\eta$ , Carl Buck says it is “the only non-[Attic] feature which prevails with any approach to consistency (even this not complete),” with no specific numbers behind the “consistency” of various features [5].

The goal of this paper is to determine specific, numeric information on the frequency of Attic and Doric dialect features within the tragic plays of Euripides. This means that rather than saying the Doric demonstrative form  $\tau\alpha\acute{\iota}$  occurs “rarely” [35], we say that it occurs twice out of the 26 places where it could occur. In addition, we would like information on the specific dialect features of each word within the texts, so that instead of just marking a word like  $\kappa\omicron\iota\tau\alpha\varsigma$ , “of the bed,” as “Doric,” we say that it is Doric because it is “a genitive singular  $\alpha$ -stem noun using the Doric ending  $-\alpha\varsigma$ .”

As mentioned above, previous analyses of these forms exist but fail to provide complete inventories or counts of Doric forms, and because they are static texts they cannot be used to analyze any plays or poems beyond their narrow focus. Existing computational tools for analyzing the dialects of Ancient Greek words do not provide consistent labeling or reasons for the dialects chosen.

Our key idea is to create a tool that examines each token (an individual occurrence of a word) in the text, analyzes it for dialect features using a rules-based approach, and then aggregates the information from the analyses of all tokens to create a final report detailing all of the desired information, including the dialect analysis of each individual token and the frequency with which Doric dialect features of each type are used.

Using this tool with a set of rules taken from Carl Buck's *The Greek Dialects* to analyze the lyric sections of Euripides' plays, we find that this approach properly identifies the dialects of tokens within these sections to a high degree of accuracy when compared to other analyses and considered within its specific constraints. It also successfully generates reports on the frequency of the specific dialect features within the input text, providing insight into how exactly Euripides utilized these features within the lyric sections of his plays.

## **2. Background**

### **2.1. Euripides and Lyric Sections**

Euripides was a tragic playwright who was active in the Greek city-state of Athens during the second half of the 5th century B.C. Along with Aeschylus and Sophocles, he was one of the three most popular playwrights of his time, and after his death became the most popular in later antiquity. The Athenian tragic plays of this time contained three emotional levels, each with associated metrical patterns: in most dialogue the actors used a “spoken meter,” usually Iambic Trimeter; in slightly more emotional moments and introductions of important characters, the meter would switch into Anapests; finally, during points of high emotion and choral songs, the meter would be one of the many Lyric Meters [35]. See Appendix 1 for more information on these meters and examples.

### **2.2. The Doric Dialect**

Of the many dialect families of Ancient Greece, two interest us here. The first is the Attic-Ionic family, which includes the Attic dialect spoken in everyday life by the citizens of Athens, including Euripides. The second is the West Greek family, and specifically the subfamily of West Greek dialects which linguists call “Doric.” This subfamily included many specific spoken dialects, like Saronic and Argolic, but it is also the origin of Literary Doric, an artificial literary language created from the common features of the spoken Doric dialects [3]. Lyric poets in Ancient Greece before the time of Euripides had traditionally written in a form of Literary Doric, so Athenian tragic playwrights like Euripides, despite speaking Attic in everyday life, used forms from Literary Doric in the lyric sections of their plays. However, Euripides was not a native speaker of any Doric dialect and did not use every Doric feature in his writing [38, 39]. What features he did use and how often he used them is the concern of our paper. For examples of a few differences between the Attic and Doric dialects, see Figure 1 on the next page. Also note that, for the purposes of this paper, the list of “Doric” features includes both features restricted to the Doric dialect family and features that are present in all non-Attic dialects, including Doric but also Ionic, Aeolic, and others.

Attic	Doric	English
θάλαττα	θάλασσα	"the ocean"
τέχνης	τέχνας	"of skill"
ἡμεῖς	ἄμές	"we"
ὀβολός	ὀδελός	"a coin"
τέμνω	τάμνω	"I split"
δίδωσι	δίδωτι	"he gives"

Figure 1: A few examples of differences between Attic and Doric.

## 2.3. Additional Relevant Information and Terminology

### 2.3.1. Ancient Greek

1. Ancient Greek is more morphologically complex than English, so while a given English noun might have a singular and plural form, like "hand/hands," an Ancient Greek noun can be any of three genders (masculine, feminine, or neuter) and changes form not only between singular, plural, and dual ("two hands"), but also for five cases (nominative, genitive, dative, accusative, and vocative), for a total of 15 forms (expressed through different endings). Ancient Greek verbs can take even more forms. We call the formation of a specific form of a word **conjugation**.
2. When a group of nouns in Ancient Greek are all conjugated in a similar fashion, and their stems end in the same letter *L*, one way to refer to this group is "*L*-stems"; for example, the words πόλις, "city," and δύναμις, "power," both have the same set of endings in the various different cases and numbers (the singular endings are -ις, -εως, -ει, -ιν, -ι in Attic), and the nouns originally ended in the letter *iota*, so they are called "iota-stems."

### 2.3.2. Natural Language Processing

1. A **token** is an individual occurrence of a word within a text. For instance, line 16 of the *Medea*, “νῦν δ’ ἐχθρὰ πάντα, καὶ νοσεῖ τὰ φίλτατα,”<sup>2</sup> has eight tokens, the first of which is νῦν, “now.”
2. Since a single Ancient Greek lexicon entry could be conjugated into many different forms, we refer to the base dictionary entry behind a form as the **lemma**. For example, ἀγαθός, “good,” is the lemma for the forms ἀγαθοί, “good (men),” and ἀγαθῆς, “of a good (woman),” as well as any other form of the word.
3. A **parse** of a token consists of a lemma and relevant morphological information about the token. For example, given the token “ἐμή,” “mine (feminine),” one valid parse consists of the lemma ἐμός, “mine,” and the fact that ἐμή is the singular feminine nominative adjective form of ἐμός. A given token can have multiple parses; ἐμή, for example, could be one of two cases (the nominative or the vocative).

## 3. Related Work

The most targeted analyses of the Doric dialect forms in the plays of Euripides are the commentaries for each play. These commentaries often include a section in their introduction or a note giving an overview of the presence of Doric forms in the text, as well as marking specific forms that would be unusual to a reader trained in the Attic dialect [35, 12]. However, these commentaries are focused on a specific play, so at best they provide a broad overview of forms in other plays. Further, the goal of these commentaries is to help a reader understand the text and its broader connections, so they understandably do not include numeric breakdowns of the use of Doric forms in all plays.

Analyses of Doric dialect forms throughout the Athenian tragic plays do exist, and they provide information on the many specific types of dialect markers that appear [4, 37]. Nevertheless, they are lacking in a few areas. First, they give a detailed look at the types of Doric dialect forms that appear, but do not give a list of every one of these forms that is present or provide numeric breakdowns of how frequently the forms occur. Second, they are limited to the texts available to the authors at the

---

<sup>2</sup>“And now everything is hateful, and the things that were dearest make her sick”

time, so they are not useful in examining future discoveries, except on a comparative basis. Third, they are not in English, which presents a barrier to scholars who do not know German or Latin.

The only major tool for analyzing Ancient Greek forms and potentially determining their dialect is the Perseus Project's Morpheus [6]. This tool has many important features, especially its morphological parsing of Ancient Greek tokens, but in terms of analyzing the dialect of given tokens it suffers from some serious limitations. Its dialect marking is rather inconsistent: it generally marks non-Attic forms with the appropriate dialect and provides no dialect for canonically Attic forms, but in a few cases - where the form only shows peculiarities in Attic - it marks the general form with no dialect and the Attic form as "Attic." In some cases, it gives no dialect marking to universal forms, but for other forms it marks them as part of every dialect. Morpheus also provides no reasons for a given dialect choice, leaving it up to the user to determine why a form might be considered "Doric" or "Poetic."

#### **4. Approach**

Our key to improving on the previous work is to build a computational tool specifically designed to analyze the dialect features of Ancient Greek forms and combine the analysis information from all of the forms in the input text to present data on the overall frequency of Doric forms within the text and the frequency of specific Doric features. The first benefit of this tool is that it allows users to easily generate concise or exhaustive reports on Doric features within a given text by simply running a few commands instead of examining all of the data by hand. The second benefit is that this tool is very flexible, so it can be run not only on the lyric sections of the tragic plays of Euripides currently available to us, but also on fragments of plays that are discovered in the future, the iambic and anapestic sections of his known plays, the plays of the other Attic tragedians, or even the works of earlier lyric authors like the poet Pindar.

The second key idea for this approach is to use a rules-based method for characterizing the dialect of a specific token. Although there are often benefits to a probabilistic model for classification, in this specific application there are variety of reasons that a rules-based method is more appropriate.

The first big issue with a probabilistic method is training data: while there are a reasonable number of Attic texts, there is a comparatively small corpus of texts written in any dialect that could be termed “Doric.” Most of these texts are in some form or another of an artificial literary language (there were different types of “Literary Doric”), and the only things written in a Doric dialect that was actually spoken are quote fragments and inscriptions [2]. It would be quite difficult to come up with a reliable classifier given such a small corpus, and the program’s definition of “Doric” would be based on the choice of authors used. On the other hand, a rules-based approach does not require a large Doric corpus, and Carl Buck’s book *The Greek Dialects* [5] includes a list of features of West Greek (which the reader may recall from above is the parent family of the subfamily linguists call “Doric”). So there is a solid list of rules, making a rules-based approach appealing.

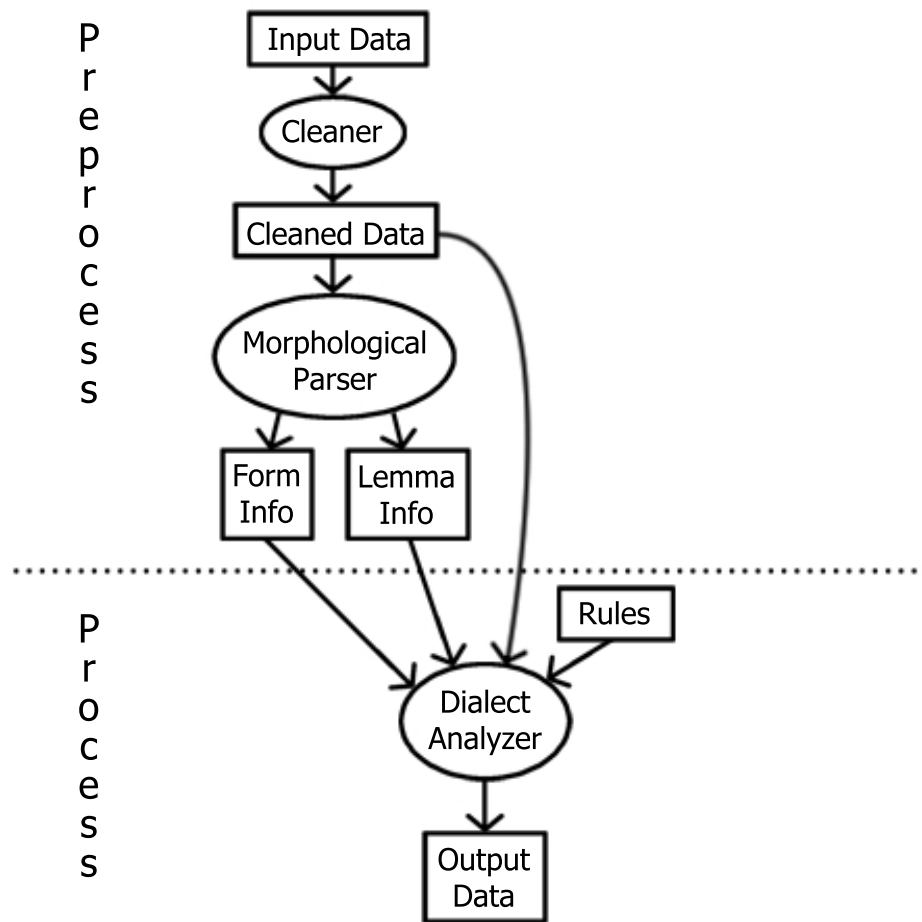
Another benefit of the rules-based approach is that it provides a user with clear interpretability (i.e. there is an easy-to-understand explanation for why the classifier made the choice it made). While a properly chosen probabilistic technique may be able to provide some interpretability, at its best it still will not match the clear-cut interpretability of a rules-based approach. In order to achieve our goal of explaining the dialect choice to the user, this clear-cut interpretability is very important.

Lastly, a rules-based method can be converted to a probabilistic method by converting each of the rules into features, so this tool can always be extended from being rules-based to being probabilistic.

## 5. Implementation

The specific tool we have created is called  $\tau\acute{\alpha}\mu\nu\nu\omicron\nu$ . The flow of control is as follows (see Figure 2):

We divide the entire process into two steps. First, the **preprocess** step cleans the data and runs a morphological parse on each word, determining information about the individual tokens and lemmas behind those tokens. Once all this information has been determined, the **process** step runs through each token in the cleaned data and uses the form info, lemma info, and rules to determine its dialect. This allows a user to change the list of rules without rerunning the computationally expensive morphological analysis. The individual steps are described below:



**Figure 2: The control flow for τάμνον.**

1. Cleaner: This runs over the input data and cleans it up, removing line numbers, actor markers, and sections of the text that have been marked dubious (see the Data section below). It then removes certain features of the text, like capitalization, which interfere with morphological parsing. It produces a single file with all of the cleaned tokens separated by spaces.
2. Morphological Parser: Before determining the dialect of a given token, it is important to know the lemma and formation behind that token. For example, is the token  $\text{πολιτῶν}$  a verb, noun, adverb? What is the lemma for this token, and how do we conjugate it? In this case,  $\text{πολιτῶν}$  is “the genitive plural form of the masculine  $\alpha$ -stem noun  $\text{πολίτης}$ , ‘citizen,’” and the way for a computer to determine that information is using a morphological parser. Designing our own morphological parser of Ancient Greek is far beyond the scope of this project, so we take advantage of Perseus’s Morpheus, an online morphological parser [6]. With the proper setup,



any program can send requests to the Perseus server for the parse of a given token, and the server will return all parses provided by Morpheus, with the appropriate lemma and morphological information. The downside of relying on Morpheus is that there is no easy way to recover when it cannot parse a token. So without implementing a large dictionary of exceptions by hand, *τάμνον* must ignore tokens that Morpheus cannot parse: mostly names like *Γοργονες*, “Gorgons,” and compounds like *κακόμητις*, very literally “bad-crafty,” but in some cases words that clearly show Doric features, like *αὔτα*, “herself,” with its Doric long *α* ending. However, Morpheus returns parses for 98% of the unique tokens in our data, so a few failures are an acceptable price.

In order to get all the necessary morphological parse information, we first run a Morpheus query for every unique token within the input text and store all of the parse results in the Form Info file. However, there is some extra information (specifically the stem-type) about certain nouns and adjectives that is necessary for proper dialect analysis, so after the first round of queries we run through every unique lemma returned and, if it matches the profile of one of these special types, we run a second query to determine if it is actually one of these types. For example, the noun with lemma *πόλις*, “city,” is an iota-stem whose Attic genitive singular is *πόλι-εως*, while the noun with lemma *χάρις*, “grace,” is not an iota-stem and its genitive singular is *χάρι-ιτος*, but examining only the lemma of each form we cannot determine which is an iota-stem and which is not. The parse returned by Morpheus does not provide information about the stem-type, so we assume that every token ending in *-ις* is an iota-stem, which means that its Attic genitive singular would end in *-εως*. We query Morpheus again with the *-εως* form to determine if our hypothesis about the word is correct; *πόλιεως* returns a match, so we know *πόλις* is an iota-stem, while *χάριεως* returns no valid parses, so we know that *χάρις* is not an iota-stem. We output this extra information for each lemma to the Lemma Info file.

3. Dialect Analyzer: This is the main piece of the program. It takes as input the cleaned data, form and lemma information for that data, and the list of rules. The biggest issue facing the dialect analyzer is that a specific token can have multiple parses with different dialect analyses. Since determining the proper parse is an area of open research and there are no simple ways to

access other resources that have this data, we store the maximum and minimum counts for all information tracked. For example, the word τε could be a particle meaning “and” that is found in all dialects or a 2nd person accusative pronoun, “you,” found only in Doric dialects. This token would increase the maximum possible number of Doric forms by one, but would not increase the minimum number. The token θάλασσα, “ocean,” on the other hand, has many parses, but all exhibit the non-Attic double sigma, so this token definitely exhibits a Doric dialect feature and would increase both the maximum and minimum count of Doric features by one.

The analyzer needs to produce 3 major data sets:

- (a) The maximum and minimum number of tokens that have Doric features, Attic features, features of both Attic and Doric at the same time, and neither Attic nor Doric dialect features, as well as the tokens associated with each of these categories. On top of this, we also keep track of tokens that have one parse that appears Attic and a different parse that appears Doric, like τιμᾶν, which could be a Doric genitive plural of the noun τιμή, “honor,” or the Attic present active infinitive of τιμάω, “I honor (someone).”
- (b) The number of possible and definite matches that are Doric for each of the rules in the list.
- (c) The parses, with the dialect for that parse and reasons for the choice, for each of the tokens.

To create the datasets, we use a 3-level loop, which runs through each token, each rule, and then each potential parse for the token, keeping track of the necessary information for each dialect, rule, token, and parse. This aggregate information is recombined at the end to produce the necessary datasets.

The reason we run through every single token individually instead of each unique token is to ensure that τᾶμνον can be extended to include information from the context of a word. For example, ἐν may be the preposition “in” or the 3rd plural imperfect indicative active form of εἶμί, the verb “to be,” and the token may be clearly one of these in one context and the other in another context. In anticipation of potentially utilizing context information in the future, τᾶμνον needs to examine each token in its position within the cleaned data.

## 6. Data

### 6.1. Lyric Sections of the Tragic Plays of Euripides

The Perseus Digital Library has online copies of each of the 19 fully surviving plays of Euripides in Ancient Greek, six from the collections of David Kovacs and 13 from the collection of Gilbert Murray [31, 32, 11]. In order to determine which sections of each play are lyric, we examined a physical copy of Murray’s collection of every play and one or more commentaries for each play. We used the formatting and commentary’s notes to determine which sections were in lyric meter and used those sections from the digitized version of the text. For a closer look at the methodology and passages chosen, see Appendix 2. The final result includes 23,047 individual tokens, 9,328 of which are unique.

One important thing to note in terms of the text data is that there are two major sources for potential differences between the digitized text and what Euripides actually wrote. The first source of errors is in the transmitted manuscripts: ancient actors could have interpolated lines, ancient scholars could have attempted to “correct” a form they saw as incorrect, and the copyists who wrote the manuscripts passed down to us may have copied forms incorrectly. The digital texts mark some of these problems by placing passages that seem interpolated into square brackets (e.g. *Hippolytus* line 72, “[παρθένων, Ἄρτεμι]”), placing text that is clearly corrupted in daggers (e.g. *Suppliants* line 993, “†λαμπάδ’ ἴν’ ὠκυθόαι νύμφαι†”) and adding words that seem to have dropped out of the sentence but have good reason to be there in brackets (e.g. *Alcestis* line 594, “σῶν <ὀρέων> τίθεται”). For our analysis, all of these types of sections are removed, the first two because they likely do not represent the original text and the third because these sections were inferred by modern editors.

The second source of errors is modern editors themselves modifying the manuscripts to include a form they believe to be correct. An example of this in general (though not in the text examined as part of this paper) is in *Andromache* line 239, where the manuscripts have δύνη, “you are strong,” but editors sometimes change this to δύνῃ [4].

Both of these types of changes could lead to the digitized texts yielding results that do not match the original text of Euripides, and if any of these changes showed a significant bias for a certain type of Doric dialect feature it could lead to bias in τάμνον's results. Unfortunately, there is no easy way to determine the original forms of terms corrupted by the manuscripts, and there are no digitized versions of the original manuscripts, so within the scope of this paper these errors are not fixable. However, our conclusions will still hold true concerning the input text presented, and the tool itself could be used on the original manuscript texts if they existed in digital form.

## 6.2. Rules for the Attic and Doric Dialects

The rules for determining whether a token shows Attic or Doric dialect features were taken from Carl Buck's book *The Greek Dialects* [5]. Specifically, we created rules for each of Buck's features of Attic-Ionic, all Non-Attic and West Greek dialects. Rules involving lemmas and forms that were not recognized by the Morpheus parser were removed, as were some rules that required recognizing the correct Proto-Greek form of a stem. For a list of the included rules, see Appendix 3.

For the rules involving tokens that Morpheus could not parse, we can assume that they do not appear very often, and therefore excluding them from the set of rules will not have a significant impact on the results. While it would be possible to build a supplementary handler for these features, that is beyond the scope of this project. The rules involving the Proto-Greek form of stems were mostly cases where the Attic form of a stem contains an η that was a long α in Proto-Greek; however, it is difficult to programmatically differentiate these new Attic ηs from ηs that were originally ηs in Proto-Greek. The best way to determine this would be to run through a digital copy of a large Ancient Greek dictionary looking for words whose dictionary entries include an alternative Doric form, but due to time constraints these rules were not included as part of this paper. While this is a limitation of the tool in its current form, it would be simple to extend the tool to include these additional rules. The issue lies in the rules list rather than the tool itself. Even without the ability to detect these specific forms, the tool can still provide insight about the prevalence of the rules included and provide a general overview of the presence of these types of Attic and Doric forms.

## 7. Evaluation

Before looking at the results, it is important to understand how accurate *τάμνον* actually is at classifying tokens as Doric or Attic. To do this, we check *τάμνον*'s results against other authorities: the analyses of Mastronarde, Schäfer and Björck and the dialect results from Perseus' Morpheus [35, 37, 4, 6]. There are two main challenges to evaluating *τάμνον*'s effectiveness: first, because *τάμνον* only reports dialect differences based on the provided rules, *τάμνον* cannot identify Doric tokens whose Doric features are not part of *τάμνον*'s rule set (e.g. long alphas in word stems); second, part of the purpose of *τάμνον* is to fix problems in Morpheus's dialect analyzer, so a match in 100% of the tokens would actually mean we have failed. We address the first problem by not testing on dialect forms which are not in *τάμνον*'s rules. We address the second problem by not simply comparing the results of *τάμνον* and Morpheus but by doing a more complicated analysis.

Unfortunately, there are very few examples of Doric forms in the works of Mastronarde, Schäfer and Björck that overlap with the rules specified by *τάμνον*, and in fact this was one of the problems with those texts we hoped to improve on. However, *τάμνον* correctly categorizes all of the forms that are mentioned in these texts and covered by its rules, like ἡδονά, “enjoyment,” at *Ion* line 1448.

When comparing *τάμνον*'s dialect analysis of each parse with Morpheus', we divide the parses into four categories: parses where *τάμνον* and Morpheus agree, those where *τάμνον* believes the parse is Doric while Morpheus does not say it is Doric (though Morpheus could mark it as other dialects), those where *τάμνον* believes the parse is Attic while Morpheus does not say it is Attic, and those where *τάμνον* believes the parse is neither Attic nor Doric while Morpheus marks the parse as at least one of them. The number of parses that fell into each of these categories (out of the 37,399 total parses) can be seen in Table 1 on the next page.

A closer analysis of the parses that *τάμνον* marks as Doric and Morpheus does not mark as Doric shows that they are all correct analyses based on the rules provided to *τάμνον*; Morpheus just does not recognize these parses as Doric. For example, Morpheus does not choose a dialect for the token δισσοῦς, “twofold (masculine plural),” but it is certainly non-Attic; the Attic form would be διττούς.

Category	Number of Parses
Analyses Match	24,978
τάμνον Doric, Morpheus not Doric	342
τάμνον Attic, Morpheus not Attic	1,462
τάμνον neither, Morpheus something	10,642

**Table 1: Results of comparison between τάμνον and Morpheus on 37,399 parses.**

A similar analysis shows that all but four of the parses that τάμνον marks as Attic and Morpheus does not mark Attic are in fact Attic by the specified rules, so τάμνον is correct in 99.66% of these cases. For an explanation of these four incorrect parses, see the Issues section below.

We did not individually analyze all of the 10,640 cases in the final category. However, a brief scan shows that these parses are either identified as Attic/Doric based on rules not included in τάμνον’s ruleset (like εὐσεβής, “religious,” parse #6, which Morpheus claims is Doric, but would not be categorized as Doric based on the rules provided in Buck) or represent odd behavior from Morpheus (like οἷα being marked as Attic, Doric, Ionic, and Aeolic, which means it can be anything, so τάμνον gives it dialect no marking).

Overall, the evaluation shows that τάμνον is (almost) always correct in the most important categories, the places where it is sure of a dialect while Morpheus does not mark that dialect, and generally either correct or acceptably ignorant when it provides no dialect but Morpheus does choose one.

### 7.1. Issues

In a few cases, like the lemmas πληγά, “a strike,” and ἄλα, “salt-works,” Morpheus does not return any parses when τάμνον queries it with a valid form of the word to determine whether the word is an  $\alpha$ -stem or not (see the Implementation section above). This means that τάμνον assumes the word is not an  $\alpha$ -stem (because there were no results) and does not catch the Doric features of the word. This is an issue with Morpheus and so is an accepted limitation of the program.

## 8. Results and Discussion

The full results are 629,866 lines long, so they will not be included in their entirety here. Instead, we will analyze the overall number of tokens in each dialect and the numeric results for specific rules.

### 8.1. Results for Overall Dialects

The results for the number of tokens in each dialect can be found in Table 2.

Category	Max # of Occurrences	Min # of Occurrences
Doric Tokens	2,830	439
Attic Tokens	2,303	594
Tokens with Doric and Attic Features	32	1
Tokens with No Dialect Features	21,819	18,031

**Table 2: Results for the number of tokens in various dialect categories.**

While recognizing that the non-exhaustive rule-list means that these results undercount the number of Attic and Doric tokens, it is still worth noting that there are many more tokens with no clear dialect markers than tokens with dialect markers. In order for the majority of the 23,047 tokens within the text to be Doric or Attic, more than 6,000 of the tokens which τᾶμνον currently marks with no dialect would have to be categorized as Attic or Doric with the addition of only a few more rules. This seems unlikely given that it marks at most about 5,000 of such tokens with its current large set of rules. This means that the majority of tokens in these sections do not have a clear dialect marked and would be the same in both dialects. Even if every Attic token were changed into its appropriate Doric form, the majority of forms would be familiar to an Attic audience. This makes sense because different Ancient Greek dialects like Attic and Doric were still mutually intelligible, so the languages had much more similarity than difference. Further, Euripides was an Attic speaker writing a piece of entertainment for an Attic-speaking audience, so it is likely that his goal was to sound Doric to his audience rather than to write a text that was indistinguishable from a spoken Doric dialect.

Another interesting result visible in the table is that there is one guaranteed example of a token with both Doric and Attic features at the same time. This token is  $\delta\iota\sigma\omega\tilde{\nu}$ , “of twofold (men/women/things),” at *Iphigenia in Aulis* 768, which shows the Doric double sigma but the Attic genitive plural ending (see  $\tau\acute{\alpha}\mu\nu\omicron\nu\tilde{\nu}$ ’s analysis in Figure 3). A purely Doric version would be  $\delta\iota\sigma\sigma\tilde{\nu}$ , while the Attic form would be  $\delta\iota\tau\tau\omega\tilde{\nu}$ . These hybrid forms are of particular note because they show that Euripides (or a later editor) was not switching between fluent Attic and fluent Doric in different parts of the lyric sections but was mixing the two dialects to create a hybrid, intentionally or not.

```

dissw=n:
  Lemma 1: disso/s: Attic & Doric
  Reasons for Attic: NE.3: Genitive plurals of alpha-stems,
  Reasons for Doric: NS.1: Doric ss = Attic tt,
  --
  Lemma 2: disso/s: Attic & Doric
  Reasons for Attic: NE.3: Genitive plurals of alpha-stems,
  Reasons for Doric: NS.1: Doric ss = Attic tt,
  --
  Lemma 3: disso/s: Attic & Doric
  Reasons for Attic: NE.3: Genitive plurals of alpha-stems,
  Reasons for Doric: NS.1: Doric ss = Attic tt,
  --

```

**Figure 3:**  $\tau\acute{\alpha}\mu\nu\omicron\nu\tilde{\nu}$ ’s evaluation of the token  $\delta\iota\sigma\omega\tilde{\nu}$ , or “dissw=n” in ASCII representation. There are three possible lemma/form combinations because  $\delta\iota\sigma\omega\tilde{\nu}$ ’s gender could be masculine, feminine, or neuter, and Morpheus differentiates each of these possibilities.

## 8.2. Results for Individual Rules

The results for each rule provide two pieces of information: the fraction of tokens *possibly* matching this rule that are Doric and the fraction of tokens *definitely* matching this rule that are Doric. After the next page, the following six pages contain graphs of these results<sup>3</sup>.

The first two graphs show the percentages of tokens that are Doric for each rule, with the first showing results for all possible occurrences of a given rule and the second showing results for only definite occurrences of the given rule.

<sup>3</sup>These graphs were created with the Python library Matplotlib [34].

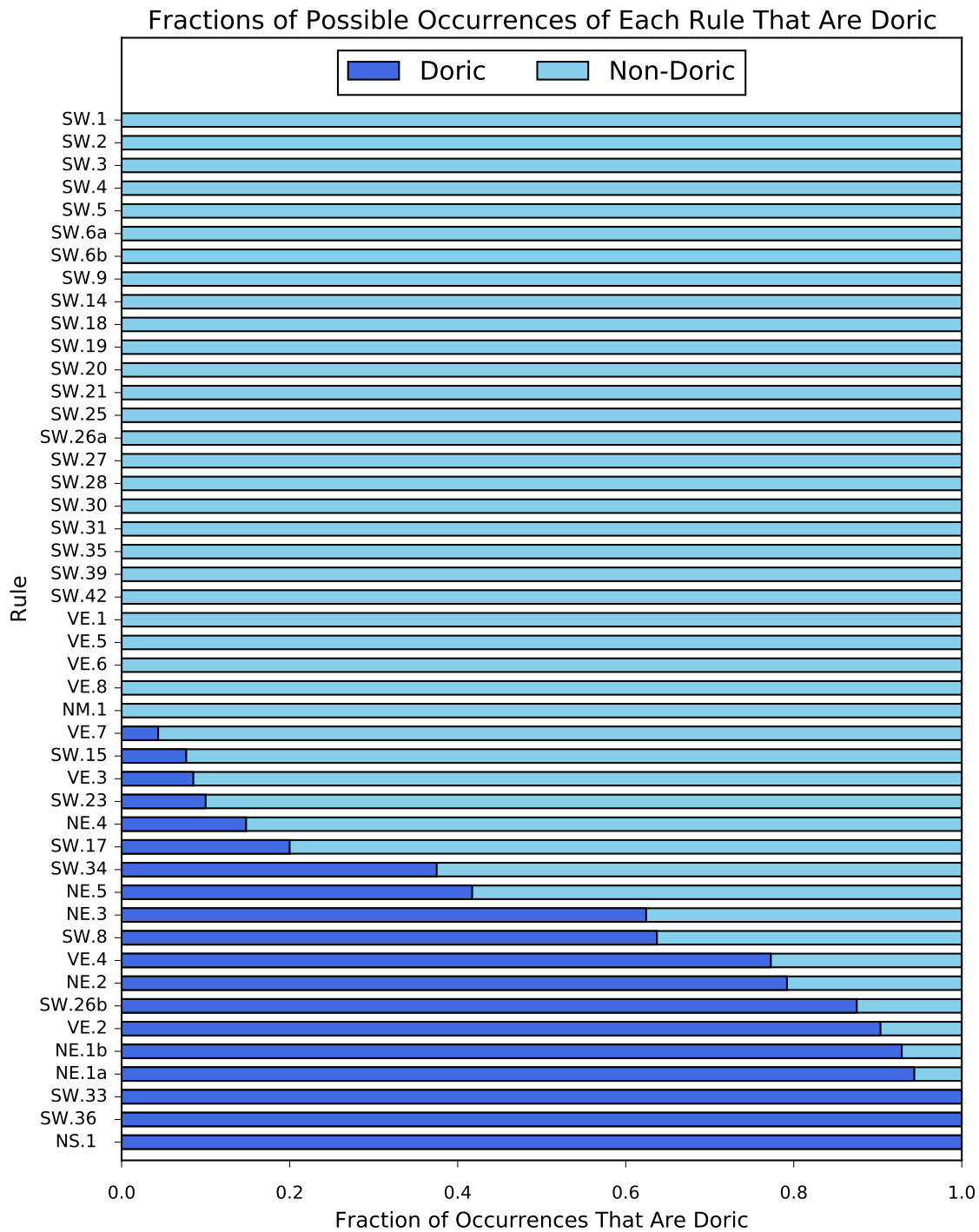


The third graph shows the actual number of potential tokens for each rule, divided into Doric and Non-Doric counts. Because the scale on this graph is very large, the fourth graph shows the same information for rules with smaller counts in more detail.

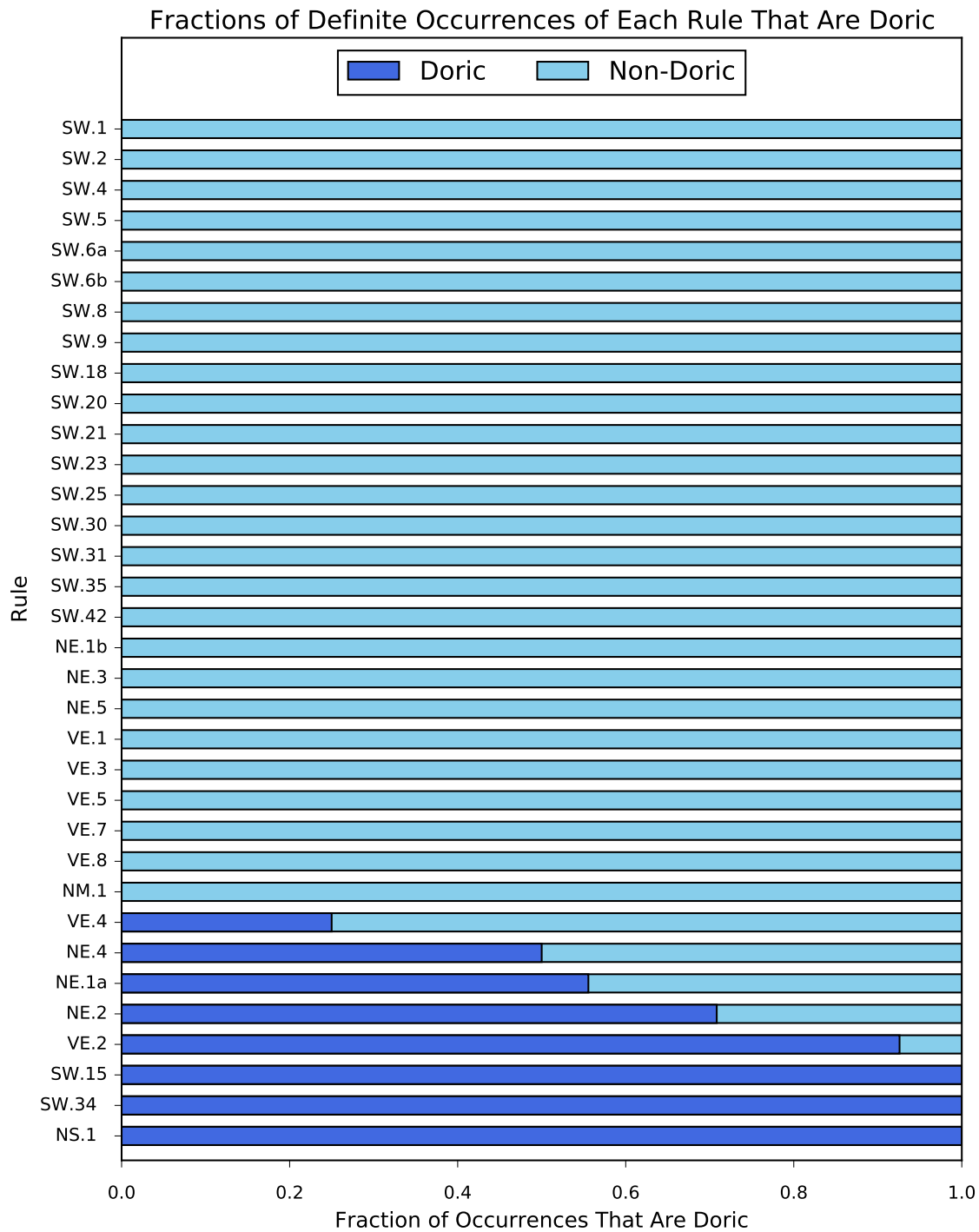
The fifth and sixth graphs are analogous to the third and fourth graphs, but show definite tokens instead of possible tokens for each rule.

Each rule is labeled with an abbreviation, which consists of a two-letter code and a number. The number is simply an index within the group of rules with the given code. The two-letter code corresponds to the type of rule. “SW” are rules that evaluate the stem of a single word; for example, rule “SW.6b” specifies the difference between Doric  $\tau\acute{\alpha}\mu\nu\omega$  and Attic  $\tau\acute{\epsilon}\mu\nu\omega$ , “to cut,” with the different vowels ( $\alpha$  vs  $\epsilon$ ) in the stem. “NE” are rules that evaluate the endings of nouns; for example, rule “NE.2” specifies the different singular endings for masculine  $\alpha$ -stems, like Doric  $\text{πολίτ-}\alpha$  vs. Attic  $\text{πολίτ-}\eta$ , both of which are dative singulars of the noun  $\text{πολίτης}$ , “citizen.” Similarly, “VE” are rules that evaluate the endings of verbs, so rule “VE.2” specifies the difference in the 1st person singular middle secondary ending, e.g. Doric  $\acute{\epsilon}\gamma\epsilon\nu\acute{o}-\mu\alpha\nu$  vs. Attic  $\acute{\epsilon}\gamma\epsilon\nu\acute{o}-\mu\eta\nu$ , where both are the 1st person singular middle aorists of the verb  $\gamma\acute{\iota}\gamma\nu\omicron\mu\alpha\iota$ , “to come about, be born.” “NS” are rules that look at broad classes of noun stems (as opposed to “SW,” which look at a single word), like the Doric double  $\sigma$  for Attic double  $\tau$  found in words like  $\theta\acute{\alpha}\lambda\alpha\tau\tau\alpha$  vs  $\theta\acute{\alpha}\lambda\alpha\sigma\sigma\alpha$  and  $\text{διττός}$  vs  $\text{δισσός}$ . “NM” looks at the so-called  $\nu$ -movable, in which certain endings can optionally have a  $\nu$  added to the end in Attic; for example,  $\lambda\acute{\epsilon}\iota\pi\omicron\upsilon\sigma\iota$  and  $\lambda\acute{\epsilon}\iota\pi\omicron\upsilon\sigma\iota\nu$  are both valid Attic forms of the 3rd person plural present active indicative of  $\lambda\acute{\epsilon}\iota\pi\omega$ , “to leave.” Specific information about each rule can be found in Table 5 and Table 6 in Appendix 3.

Also note that rules with 0 occurrences in the text are excluded from the following graphs. So none of the graphs contain rule “SW.6c” because neither  $\acute{\omicron}\beta\omicron\lambda\acute{o}\varsigma$  nor  $\acute{\omicron}\delta\epsilon\lambda\acute{o}\varsigma$  (both meaning “a coin”) appear in the text, and rule “SW.3” appears in the possible occurrences graphs but not the definite occurrences graph because there are some possible occurrences but no definite occurrences of that rule.



**Figure 4: Percentage results for possible occurrences of each rule. See Table 5 and Table 6 in Appendix 3 for the rules corresponding to the abbreviations.**



**Figure 5: Percentage results for definite occurrences of each rule. See Table 5 and Table 6 in Appendix 3 for the rules corresponding to the abbreviations.**

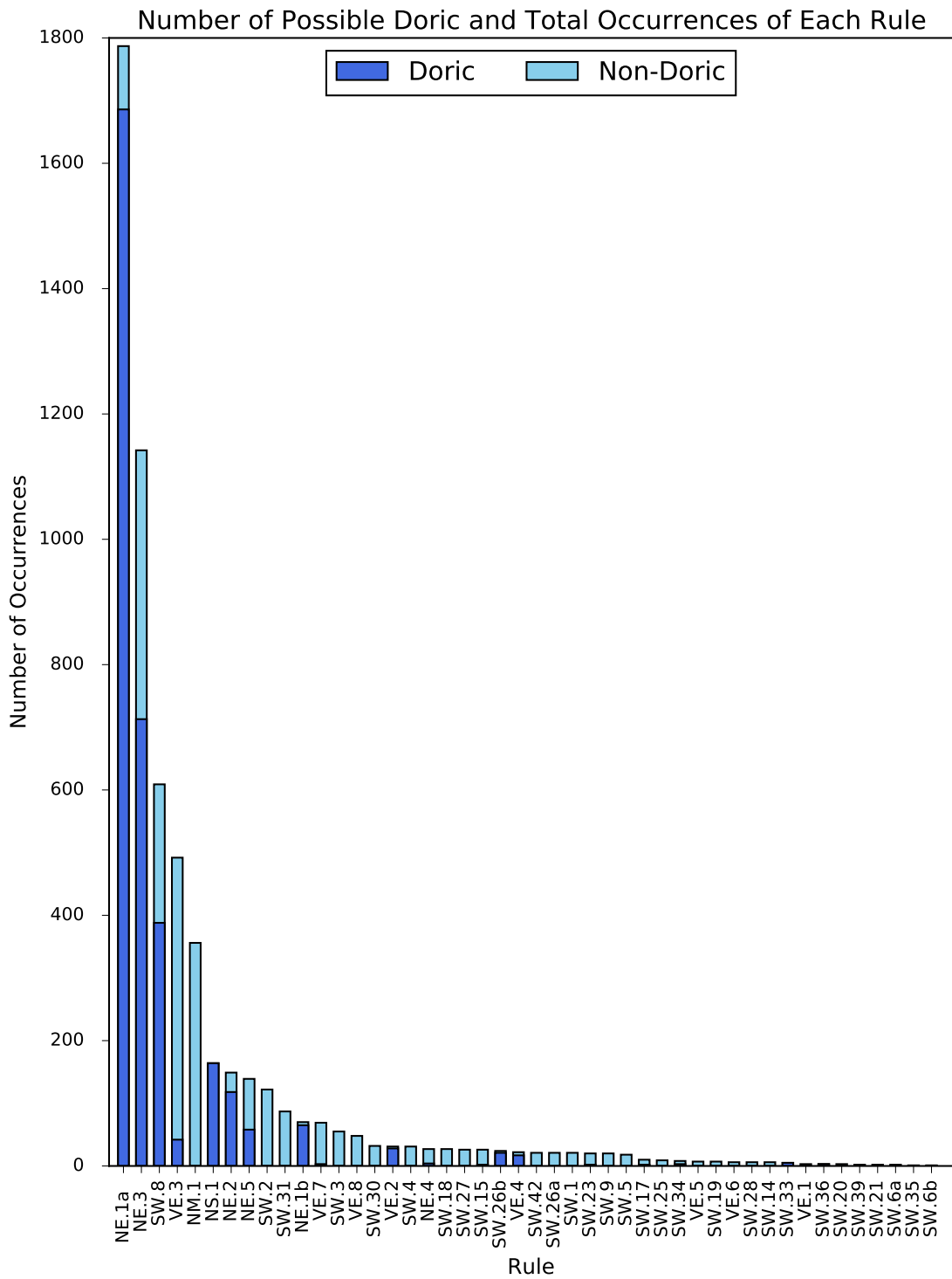
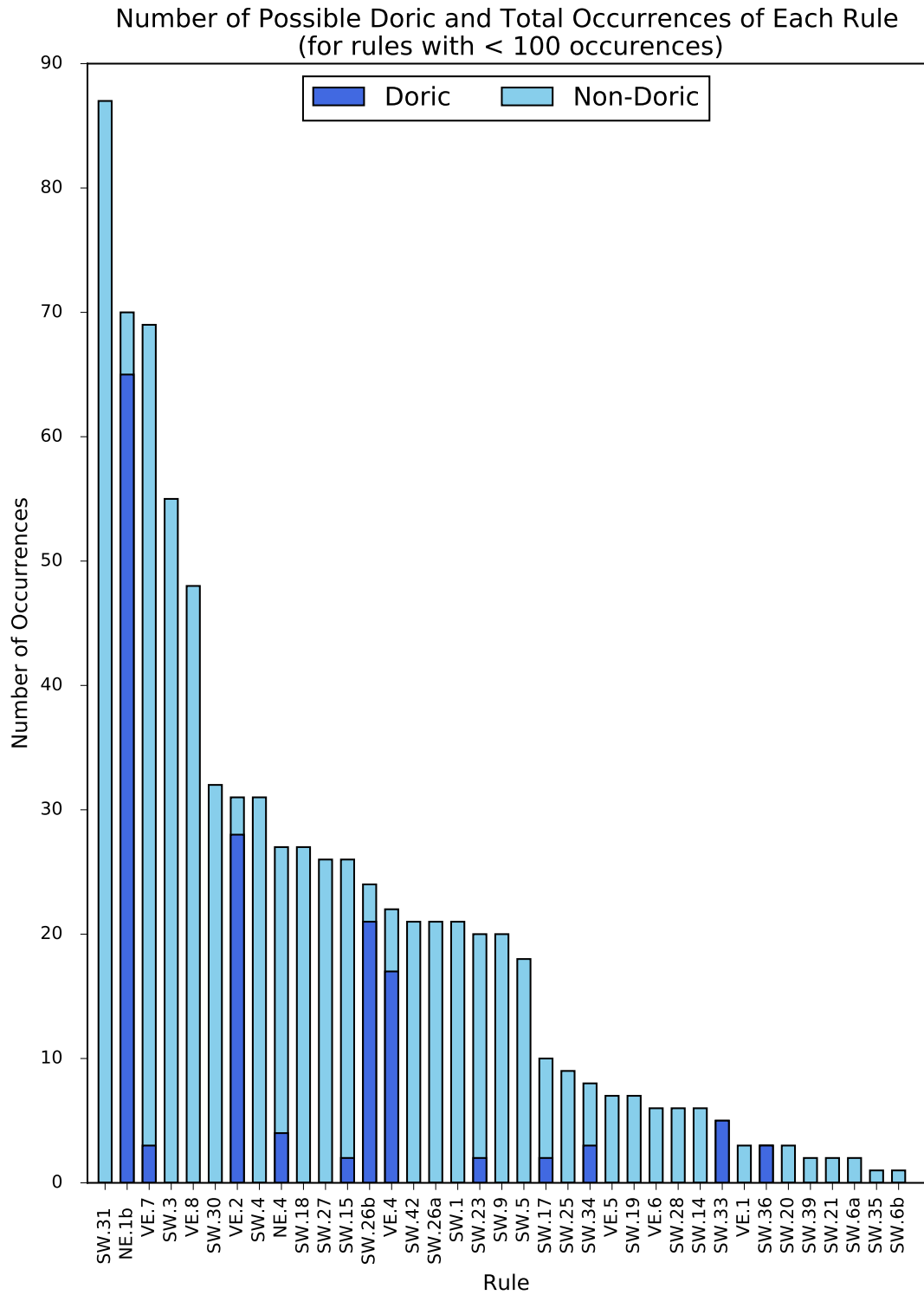


Figure 6: Count results for possible occurrences of each rule. For detail on the smaller values, see Figure 7. See Table 5 and Table 6 in Appendix 3 for the rules corresponding to the abbreviations.



**Figure 7: Detail on the smaller count results for possible occurrences of each rule in Figure 6. See Table 5 and Table 6 in Appendix 3 for the rules corresponding to the abbreviations.**

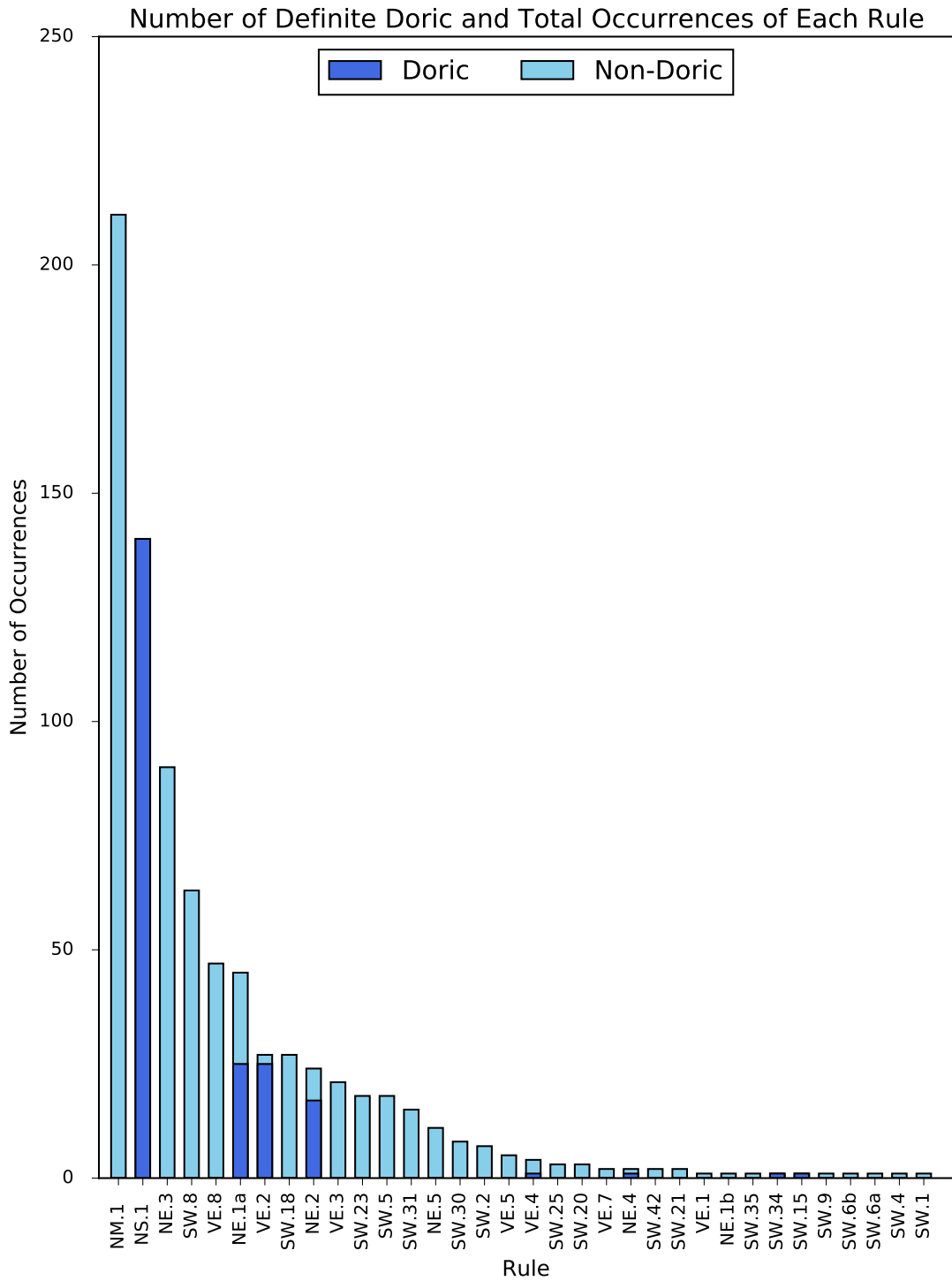
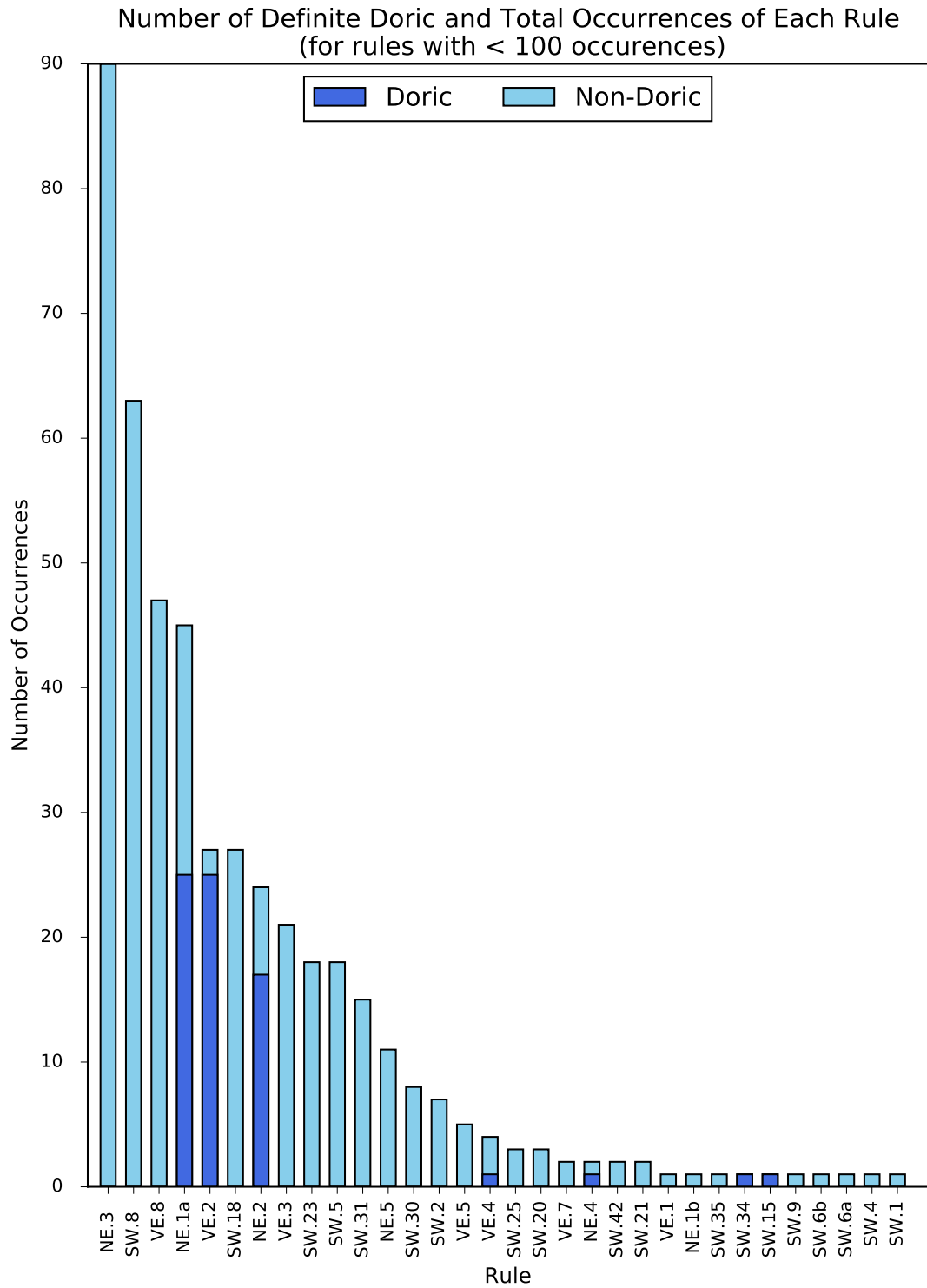


Figure 8: Count results for definite occurrences of each rule. For detail on the smaller values, see Figure 9. See Table 5 and Table 6 in Appendix 3 for the rules corresponding to the abbreviations.



**Figure 9: Detail on the smaller count results for definite occurrences of each rule in Figure 8. See Table 5 and Table 6 in Appendix 3 for the rules corresponding to the abbreviations.**

This is a rich data set with many interesting features, but here are a few points of particular interest:

1. Rule NS.1, which checks for the Doric double sigma versus the Attic double tau (e.g. *θάλασσα* vs. *θάλαττα*), shows the Doric features 100% of the time in both the potential and definite cases. This is the only feature for which this is true. Perhaps this means that the modern editors (rather than Euripides himself) recognized this feature and used the non-Attic forms instead of what the manuscripts included, but the fact that the editors chose to be consistent in this feature and no others would be interesting in itself.
2. We note that most of the single word-stem alternation (SW) rules examined displayed no Doric tokens, but that a few showed some Doric tokens and SW.33 and 36 showed only Doric tokens. Unfortunately, for the four SW rules with the highest Doric percentage, most likely none of the tokens are actually Doric for the reason specified by the rule. Every Doric token caught by rules SW.36, 33, 26b, and 8 are tokens that could be from a different lemma that is perfectly Attic (by the given rule); none of these rules have a single confirmed appearance. For example, considering rule SW.36, the only unique token it potentially occurs in is *κοινόν*, which would be the Doric nominative singular for Attic *κοινών*, “partners,” but is more likely from the (much more common) adjective *κοινός*, “common.”

Despite the false positives for those rules, the other four SW rules that show Doric forms, although they show a smaller percentage, are in fact showing the true Doric alternation. For example, looking at SW.34, the word *λάος* (*λεώς* in Attic), meaning “army,” definitely appears in its Doric form a nonzero number of times, and is in fact 100% Doric in its confirmed appearances (see Figure 5). Euripides would have been exposed to the non-Attic form of this word in the epics of Homer, as would his audience, so he would have both known about this alternation and had reason to use it. There are also Homeric precedents for the other three alternations Euripides uses: for SW.15, Homeric *τοί/ταί*, “the (plural men/women)” for Attic *οἱ/αἱ*; for SW.17, Homeric *ἱστία*, “hearth,” for Attic *ἑστία*; and for SW.23, the Homeric *ἔλω*, “to come,” for Attic *ἔρχω*.



However, it is reasonable to think that Euripides would not have used slight alterations of single words unless there was a poetic precedent; it is unlikely that he would have come across most of these variants and even less likely his entire audience would have. It also makes sense that he knew of alternative forms of words when there was poetic precedent, like  $\lambda\acute{\alpha}\omicron\varsigma$ , or changes that followed a pattern, like the alternation between double  $\sigma$  and  $\tau$ , that could be seen across many words. On the other hand, perhaps many slight alterations were used, but were changed by an editor in antiquity or the modern day; this would tell a different story, but why these editors removed (intentionally or unintentionally) only some of the alterations of this type but not others like  $\lambda\acute{\alpha}\omicron\varsigma$  would also be interesting to consider.

3. Besides the few single-word stem alternations mentioned above, most Doric features occur in noun- or verb-endings, though not in all of them. Again it makes sense that Euripides would have been aware of the Doric alternatives for noun and verb endings, because it would be easy to extrapolate the pattern from a few examples in spoken conversation or lyric precedent. However, the fact that some endings (like NE.1a and VE.4) are Doric more than 50% of the time and others like NE.4 and VE.7 are Doric sometimes but still less than 25% of the time begs the question of why. Perhaps it has something to do with how good or bad the specific alternations “sounded” when sung, but this would be an exploration for another paper. Nevertheless, a few of the discrepancies have reasonable explanations: see item 4 below.
4. VE.1 examines the secondary 3rd person dual active forms  $-\tau\eta\nu/-\tau\alpha\nu$ , while VE.2 examines the 1st person singular middle forms  $-\mu\eta\nu/-\mu\alpha\nu$ . Although on the surface it appears that, because these alternations are similar, they should show Doric coloring roughly the same amount of the time, we find that 0% of VE.1 tokens are Doric while more than 90% of VE.2 tokens are Doric. This disparity may seem strange, but there is a reasonable explanation: dual forms were very uncommon, while 1st person singular forms were used more frequently (see Figure 7). Euripides may have never had the chance to read or hear the Doric form of the 3rd person dual secondary ending, so he would have had no way of knowing it was different. On the other hand, he certainly would have read (and perhaps heard) the alternate 1st person singular form.

5. Since the  $\nu$ -movable is both a feature unique to Attic and a feature that can appear but does not have to, there is no Doric alternative to use; the Doric feature would be the total absence of the optional  $\nu$ . However, the  $\nu$ -movable was generally used when the next word began with a vowel (for ease of pronunciation) or to mark the end of a sentence (or sense-unit). Both of these features - ease of pronunciation and marking sense-endpoints - are very useful for singers in a tragic play, so it is reasonable that Euripides used this feature even though it was not truly Doric.
6. As various commentaries say, the  $\alpha$ -stem nouns do generally show endings with long  $\alpha$  instead of  $\eta$  in the maximum case, which seems to support the claim of the commentaries; however, for definite tokens of that type there are no short-alpha singulars (NE.1b) and no Doric genitive plurals (NE.3), so a closer analysis of how exactly Euripides uses these features would be an interesting starting point for follow-up research.

### 8.3. Limitations

When analyzing these results, it is important to recognize all of the caveats discussed above: the input data may not reflect the manuscripts but instead an editor's preferences, the rules are not exhaustive and may not cover all Doric and Attic tokens, the maximum counts may not be at all representative of the actual prevalence of the form but may be catching some other feature, etc. However, the goal of this tool is not to make end-all be-all statements about the dialect of this form or that form as written by Euripides; instead, its purpose is to help provide intuition and guide an inquisitive mind. If one wants to know about the prevalence of the 1st singular middle secondary ending (rule VE.2) it is much easier to search through the 31 tokens that may show this feature than to search through the 23,047 tokens in all of the data. Of course, the discussions above are a small fraction of the interesting observations that could be gained from this data, but this paper's goal is to provide the data to aid these types of analyses, not to see every possible analysis to their conclusion. Despite its limitations, this data shows that  $\tau\acute{\alpha}\mu\nu\nu\omicron\nu$  has certainly provided a wealth of numerical data that can aid in current analyses and suggest new ones.

## 9. Future Work

### 9.1. Improvements

There are a variety of interesting and useful ways to improve τάμνον:

1. Most importantly, we could go through the entries of a digitized Ancient Greek dictionary and add all the Doric-Attic stem alternations to the list of rules.
2. We could examine resources other than *The Greek Dialects* and find additional Doric dialect rules.
3. We could go through every parse in the fourth class of Evaluation types (from the Evaluation Section) and ensure that they are all problems with Morpheus, while converting everything that Morpheus gets right into rules.
4. We could add better handling of the issues with Morpheus; for example, try to draw out as much information as possible about a lemma from the tokens we find before sending the second query to Morpheus to determine the lemma's stem-type.
5. We could take advantage of context in determining which of the various potential parses to use for a word. Morpheus seems to have this data for its digitized texts, but it is either very difficult or impossible to get this information with programatic calls. However, Perseus has a variety of tools that could be utilized to select the most likely parse and lessen the need for the maximum possible/minimum definite number of tokens distinction (though probabilistic methods have their own set of errors and caveats).
6. We could output a copy of the text with tokens colored based on their dialect to provide a visual view of the distribution of dialect forms.

### 9.2. Applications

Because of the flexibility of τάμνον, there are likely many exciting applications, but here are a few that arose during the creation of the tool:

1. Use *τάμνον* to evaluate the poems of a lyric poet like Pindar, and use the correlation of the rule percentages of Pindar and the lyric sections of Euripides as potential evidence for or against the influence of Pindar on Euripides' Doric features.
2. Compare the lyric sections of Euripides to the lyric sections of the other Athenian tragedians to determine differences in writing styles and perhaps even fingerprint authorship.
3. Compare the lyric sections of the plays of Euripides against each other to examine outliers. This could, for example, be used as evidence for or against Euripides as the author of the *Rhesus*, whose true authorship has been debated, or to examine change in Euripides' style over the course of his writing career.

## 10. Conclusion

This paper began with an interest in numeric values specifying the prevalence of Doric dialect features within the lyric sections of the tragic plays of Euripides. After concluding that previous research in this area did not properly address our concerns, either because it was not exhaustive enough or did not suitably analyze the features, we decided on creating our own tool, called *τάμνον*. Because of the lack of training texts and the desire for clear interpretability, *τάμνον* uses a rules-based approach to determine the dialect of given tokens, drawing rules from Carl Buck's *The Greek Dialects* [5]. We determined the specific sections of the plays of Euripides that are lyric using a variety of commentaries, and retrieved the text of these commentaries from digital copies on the Perseus Digital Library. We found that *τάμνον*'s analyses matched up with those found in written texts and in many cases with the dialects provided by Morpheus; when it did not match up with Morpheus, *τάμνον* was generally correct or the cause of the error was a problem not with *τάμνον* but with the list of rules provided to it. In the end, *τάμνον* produced a numeric breakdown of Doric features within our texts, providing a wealth of information that is interesting even when acknowledging the potential for errors introduced by everything from the manuscripts to the limited rules accessible to *τάμνον*. Finally, *τάμνον* has room for improvement within itself and could be used in a variety of interesting applications.

## 11. Acknowledgments

First, I would like to thank my adviser, Professor Christiane Fellbaum, for her constant help and enthusiasm throughout this process. Her feedback, advice and guidance has been immensely helpful from start to finish.

I would like to thank Professor Timothy Barnes for his invaluable help with the classics side of this project. He consistently anticipated problems and proposed working solutions long before I could even realize I had a problem, and this made the entire process significantly less painful.

I would also like to recognize Professor Andrew Ford's contribution to the beginnings of this paper, first by introducing me to Attic tragedy and its "Doric" forms and then by providing insight and encouragement in the early stages of this project.

None of this project would have been possible without the incredible work of Gregory Crane and the Perseus Digital Library team. From data collection to evaluation, the Perseus Project provided resources and tools that would have been difficult or impossible for me to create on my own. *τάμνον* truly stands on the shoulders of giants.

Finally, I would like to thank my parents for encouraging my love of learning from day one. I wouldn't be here without you!

## References

- [1] Z. P. Ambrose, *Euripides' Heraclidae*. Thomas Library, 1990.
- [2] W. S. Annis, "Greek dialects - where to start," <http://www.aidoi.org/articles/dialects.html>, accessed: 2016-04-17.
- [3] E. J. Bakker, *A Companion to the Ancient Greek Language*. Blackwell, 2010. [Online]. Available: <https://books.google.com/books?id=oa42E3DP3icC>
- [4] G. Björck, *Das Alpha impurum und die tragische Kunstsprache: attische Wort-und Stilstudien*. Almqvist & Wiksell, 1950.
- [5] C. D. Buck, *The Greek dialects: Grammar, Selected Inscriptions, Glossary*. University of Chicago Press, 1955.
- [6] G. Crane, "Generating and parsing classical greek," *Literary and Linguistic Computing*, vol. 6, no. 4, pp. 243–245, 1991. [Online]. Available: <http://llc.oxfordjournals.org/content/6/4/243.abstract>
- [7] Euripides, *The Hecuba and Medea of Euripides*, W. Smith, Ed. Lockwood, 1877.
- [8] —, *Iphigenia in Tauris*, C. Jerram, Ed. Clarendon Press, 1900.
- [9] —, *The Medea of Euripides*, 2nd ed., F. Allen, Ed. Ginn & Company, 1900.
- [10] —, *Iphigenia in Tauris*, W. Bates, Ed. American Book Company, 1904.
- [11] —, *Euripidis Fabulae*, G. Murray, Ed. Clarendon Press, 1913. [Online]. Available: <http://www.perseus.tufts.edu/hopper/collection?collection=Perseus:collection:Greco-Roman>
- [12] —, *Euripides' Hecuba*, F. King, Ed. G. Bell & Sons, 1938.
- [13] —, *Iphigenia in Tauris*, M. Platnauer, Ed. Clarendon Press, 1938.
- [14] —, *Bacchae*, E. Dodds, Ed. Clarendon Press, 1960.
- [15] —, *Andromache*, P. Stevens, Ed. Clarendon Press, 1971.
- [16] —, *Alcestis*, W. Arrowsmith, Ed. Oxford University Press, 1974.
- [17] —, *Troades*, K. Lee, Ed. St. Martin's Press, 1976.
- [18] —, *Cyclops*, R. Ussher, Ed. Edizioni dell'Ateneo & Bizzarri, 1978.
- [19] —, *The Phoenissae of Euripides*, J. Powell, Ed. Arno Press, 1979.
- [20] —, *Heracles*, G. Bond, Ed. Clarendon Press, 1981.
- [21] —, *Hippolytus*, R. Hamilton, Ed. Thomas Library, 1982.
- [22] —, *Orestes*, C. Willink, Ed. Clarendon Press, 1986.
- [23] —, *Trojan Women*, S. Barlow, Ed. Aris & Phillips, 1986.
- [24] —, *Ion*, A. Owen, Ed. Bristol Classical Press, 1987.
- [25] —, *Iphigeneia at Aulis*, T. Tarkow and S. MacEwen, Eds. Thomas Library, 1988.
- [26] —, *Hippolytus*, M. Halleran, Ed. Aris & Phillips, 1995.
- [27] —, *Helen*, P. Burian, Ed. Aris & Phillips, 2007.
- [28] —, *Suppliant Women*, J. Morwood, Ed. Aris & Phillips, 2007.
- [29] —, *Helen*, W. Allan, Ed. Cambridge University Press, 2008.
- [30] —, *A Commentary on the Rhesus Attributed to Euripides*, V. Liapis, Ed. Oxford University Press, 2012.
- [31] —, *Children of Heracles; Hippolytus; Andromache; Hecuba*, D. Kovacs, Ed. Harvard University Press, 2014. [Online]. Available: <http://www.perseus.tufts.edu/hopper/collection?collection=Perseus:collection:Greco-Roman>
- [32] —, *Cyclops; Alcestis; Medea*, D. Kovacs, Ed. Harvard University Press, 2014. [Online]. Available: <http://www.perseus.tufts.edu/hopper/collection?collection=Perseus:collection:Greco-Roman>
- [33] H. Hansen and G. M. Quinn, *Greek, an intensive course*. Fordham Univ Press, 1992, vol. 1.
- [34] J. D. Hunter, "Matplotlib: A 2d graphics environment," *Computing In Science & Engineering*, vol. 9, no. 3, pp. 90–95, 2007.
- [35] D. J. Mastrorarde, *Euripides: Medea*. Cambridge University Press, 2002.
- [36] H. Roisman, *Euripides' Electra: A Commentary*. University of Oklahoma Press, 2011.
- [37] H. Schaefer, *De Dorismi in tragediis Graecis usu*. Druck von GW Tornow, 1866.
- [38] R. Scodel, *An Introduction to Greek tragedy*. Cambridge University Press, 2010. [Online]. Available: <https://books.google.com/books?id=pSTsoA51qYkC>
- [39] I. C. Storey and A. Allan, *A Guide to Ancient Greek Drama*. Blackwell, 2005, vol. 3. [Online]. Available: <https://books.google.com/books?id=Ais9XCL50CAC>

## Appendix 1: Meters

See Figure 10 for an overview of the Ancient Greek meters used in Euripides' plays and Figure 11 for a look at English meters similar to those employed by Euripides.

## Appendix 2: The Text Analyzed

### Methodology

Passages were included only if their meter was lyric, excluding lyric anapests but including all other lyric sections. Some plays include exchanges between two characters, one speaking in lyric and another in Iambic Trimeter, like lines 661-697 of the *Helen*. In these cases, the Iambic Trimeter lines were excluded. Sections that were noted as corrupted, like *Hecuba* 1056-1108, were excluded. If a reader feels that these were the wrong choices she can easily use *τάμνον* to analyze the sections of the text of her choice.

### Passages Included

Table 3 and Table 4 contain the name, the sections included, the commentaries referenced, and the digital source used for each play.

## Appendix 3: The Rules

See Table 5 and Table 6 for a list of the included rules. Missing numbers correspond to rules that were excluded due to Morpheus not being able to recognize the specific features needed. Also recall (as mentioned in the Introduction), that “Doric” features include features of all non-Attic dialects; for example, while Attic has double tau for Doric double sigma (rule NS.1), all non-Attic dialects, including Ionic and Aeolic dialects, have the double sigma. Some information necessary for rule determination was taken from Hansen and Quinn’s introduction to Ancient Greek [33].

## Appendix 4: The Code

A reader can find *τάμνον*'s code at <https://github.com/storey/tamnon>.

## A Brief Overview of Greek Meters

Key	
◡	Short Syllable
-	Long Syllable
x	Short or Long Syllable
◡◡	2 Shorts or a Long
◡◡	2 Shorts as a Long

### Iambic Trimeter

Three Iambic Metrons (x - ◡ -):

x - ◡ - x - ◡ - x - ◡ -

Example: Medea line 484:

Metron 1	Metron 2	Metron 3
- ◡ - ◡ -	- ◡ - ◡ -	- ◡ - ◡ -
τὴν Πηλιῶτιν εἰς Ἴωλκὸν ἰκόμην		

... into Iolkos at Pelion's foot I came

### Anapests

◡◡ ◡◡ ◡◡ ◡◡ | ◡◡ ◡◡ ◡◡ ◡◡

(but never 4 shorts in a row)

Example: Medea line 105:

◡◡ - - - - ◡◡ - - - -  
ἴτε νυν, χωρεῖθ' ὡς τάχως εἴσω.

go now, go inside as quickly as possible.

### Lyric Meters

There are many types of lyric meter, each with internal differences.

Two examples are below:

#### Dactylo-Epitríte:

Partial Example: Medea lines 986-9:

- ◡ - - - - ◡ - - - -  
τοῖον εἰς ἔρκος πεσεῖται

She will fall into such a trap

- - - ◡◡ - - - ◡ - - -  
καὶ μοῖραν θανάτου δύστανος: ἄταν δ'

and a fate of death, sad girl; and this bane

- ◡ - - ◡ - -  
οὐχ ὑπεκφεύξεται

she will not escape.

#### Dochmiac:

Partial Example: Medea lines 1255-7:

- - - ◡ - - ◡◡ ◡ - -  
δειλαία, τί σοι φρενοβαρῆς

Sorrowful woman, why does hard-hearted

◡ - - - ◡ - - - ◡◡ - - ◡ - -  
χόλος προσπίτνει καὶ ζαμενῆς <φόνου>

wrath fall upon you and foul murder

◡◡ ◡◡ - - ◡ - -  
φόνος ἀμείβεται;

answer murder?

Source: Mastronarde 2002

Figure 10: A brief overview of the different meters within Euripides' tragic plays.



## Meter in English Poetry

Below are examples of English meters similar to the Greek meters we discuss, though they use stress patterns instead of syllable length. Feel free to read them out loud, as it helps to hear the meter.

### Iambic (Pentameter):

(bum DUM, bum DUM, bum DUM, bum DUM, bum DUM)

Example: Romeo and Juliet (Shakespeare)

Two **households**, **both alike** in **dignity**,  
In **fair** Verona, **where** we **lay** our **scene**,  
From **ancient grudge** break **to** new **mutiny**,  
Where **civil blood** makes **civil hands** **unclean**.

### Anapestic (Trimeter):

(bum bum DUM, bum bum DUM, bum bum DUM)

Example: The Destruction of Sennacherib (Lord Byron)

The **Assyrian** came **down** like the **wolf** on the **fold**,  
And his **cohorts** were **gleaming** in **purple** and **gold**;  
And the **sheen** of their **spears** was like **stars** on the **sea**,  
When the **blue** wave rolls **nightly** on **deep** Galilee.

### Lyric (Pindaric):

(Note that there is no clear pattern in these 5 lines, unlike those above)

Example: Intimations of Immortality (William Wordsworth)

There was a time when meadow, grove, and stream,  
The earth, and every common sight,  
To me did seem  
Apparelled in celestial light,  
The glory and the freshness of a dream.

Sources:

<http://www.poetryfoundation.org/resources/learning/glossary-terms>

[http://shakespeare.mit.edu/romeo\\_juliet/full.html](http://shakespeare.mit.edu/romeo_juliet/full.html)

**Figure 11: A brief overview of English meters similar to those in Euripides' plays.**

<b>Play</b>	<b>Passages</b>	<b>Commentaries</b>	<b>Digital Source</b>
Alcestis	77-93, 98-104, 112-131, 213-237, 244-5, 48-9, 252-256, 259-263, 266-272, 393-403, 406-415, 435-475, 569-605, 872-877, 889-894, 903-910, 926-934, 962-1005	[16]	[32]
Andromache	117-146, 274-308, 465-493, 501-514, 523-536, 766-801, 825-839 (No Nurse), 841-865 (No Nurse), 1009-1046, 1173-1183, 1186-1225	[15]	[31]
Bacchae	64-169, 370-432, 519-604, 862-911, 977-1023, 1043-1035, 1037-1038, 1041-1042, 1153-1199	[14]	[11]
Cyclops	41-81, 356-374, 495-518, 608-623, 656-662	[18]	[32]
Electra	112-212, 432-486, 585-595, 699-746, 859-865, 873-874, 1147-1165, 1168-1232	[36]	[11]
Hecuba	444-483, 629-656, 905-951, 1024-1034	[7]	[11]
Helen	167-252, 330-385, 515-527, 625-661, 662-697 (No Menelaus), 1107-1164, 1301-1368, 1451-1511	[29, 27]	[11]
Heracleidae	75-110, 353-380, 608-627, 748-783, 892-927	[1]	[31]
Heracles	107-137, 348-441, 637-700, 734-814, 875-921, 1016-38, 1042-1086, 1176-1213 (No Theseus)	[20]	[11]
Hippolytus	58-72, 121-175, 362-372, 525-564, 571-595 (No Phaedra), 669-679, 732-775, 811-824, 826-833, 836-851, 1102-1152, 1268-1282	[21, 26]	[31]

**Table 3: The 19 surviving plays of Euripides with the passage included, commentaries consulted, and digital source for each play.**

<b>Play</b>	<b>Passages</b>	<b>Commentaries</b>	<b>Digital Source</b>
Ion	112-143, 184-236, 452-509, 676-712, 714-724, 763-803 (Only Kreusa), 859-861, 881-922, 1048-1105, 1445-1509 (No Ion)	[24]	[11]
Iphigenia in Aulis	164-302, 543-589, 751-800, 1036-1097, 1282-1335, 1475-1531, 1615-1620	[25]	[11]
Iphigenia in Tauris	392-455, 644-656, 827-899 (No Orestes), 1089-1151, 1234-1282	[8, 10, 13]	[11]
Medea	148-159, 173-183, 204-213, 410-445, 627-662, 824-865, 976-1001, 1251-1292	[9, 35]	[32]
Orestes	140-207, 316-347, 807-843, 960-1012, 1246-1285, 1353-1366, 1377-1502 (No Chorus), 1537-1548	[22]	[11]
Phoenissae	103-260, 301-354, 638-689, 784-832, 1019-1066, 1284-1306, 1485-1581	[19]	[11]
Rhesus	23-33, 41-51, 131-136, 195-200, 224-263, 342-379, 454-466, 527-564, 679-727, 820-832, 895-903, 906-914	[30]	[11]
Suppliants	42-86, 271-285, 365-380, 598-633, 778-836, 918-924, 955-979, 990-1008, 1012-1030, 1123-1164	[28]	[11]
Trojan Women	153-229, 235-291 (no Talthybios), 308-340, 511-567, 577-607, 799-859, 1060-1117, 1216-1218, 1226-1231, 1235-1239, 1287-1301, 1302-1332	[17, 23]	[11]

**Table 4: The 19 surviving plays of Euripides with the passage included, commentaries consulted, and digital source for each play (continued).**

Shorthand	Rule Description	Buck Section
<b>Single Word Check:</b>		
SW.1	Presence of Attic adverbs ending in -ου	132.1
SW.2	Doric αἰ = Attic εἰ	234.1
SW.3	Doric κά = Attic ἄν	134.2
SW.4	Doric ἱαρός = Attic ἱερός	13.1
SW.5	Doric Ἄρταμις = Attic Ἄρτεμις	13.2
SW.6a	Doric δέιλομαι = Attic βούλομαι	49.3-4
SW.6b	Doric τάμνω = Attic τέμνω	49.3-4
SW.6c	Doric ὀδελός = Attic ὀβολός	49.3-4
SW.8	Doric τύ = Attic σύ	61.5
SW.9	Doric πρᾶτος = Attic πρῶτος	114.1
SW.12	Doric τετρώκοντα = Attic τετταράκοντα	116
SW.13	Presence of the Doric τεός	118.1
SW.14	Doric ἐμέος = Attic ἐμοῦ	118.3b
SW.15	Doric τοί, ταί = Attic οἱ, αἱ	122
SW.17	Doric ἰστία = Attic ἐστία	11
SW.18	Doric ἄτερος = Attic ἕτερος	13a
SW.19	Doric ὄνυμα = Attic ὄνομα	22c
SW.20	Doric δέχομαι = Attic δέχομαι	66
SW.21	Doric γίνομαι = Attic γίγνομαι	86.10
SW.23	Doric ἴκω = Attic ἤκω	Glossary
SW.24	Doric τεθμός = Attic θεσμός	164
SW.25	1st & 2nd Person Plural Pronouns	119.2, 5
SW.26a	Doric ἦς = Attic ἦν	163.3
SW.26b	Doric ἦν = Attic ἦσαν	163.3
SW.27	Doric ἐμίν = Attic ἐμοί	118.4b
SW.28	Doric adverbs ending in -ει	132.2
SW.30	Attic adverbs ending in -θεν	132.8
SW.31	Doric τόκα = Attic τότε, etc.	132.11
SW.33	Doric ἄς = Attic ἕως	41.4
SW.34	Doric λαός = Attic λεώς	41.4
SW.35	Doric θεαρός = Attic θεωρός	41.4
SW.36	Doric κοινᾶν = Attic κοινῶν	41.4
SW.37	Doric χρέος = Attic χρέως	43
SW.38	Doric ἐνιαύτιος = Attic ἐνιαύσιος	61.3
SW.39	Doric πλατίος = Attic πλησίος	61.3
SW.41	Doric Ἀφροδίτιος = Attic Ἀφροδίσιος	61.3
SW.42	The present participle of εἰμί	163.8

**Table 5: A list of the rules about single words included in τάμνον.**

Shorthand	Rule Description	Buck Section
<b>Noun Endings:</b>		
NE.1a	Singular endings of feminine long $\alpha$ -stems	104
NE.1b	Singular endings of feminine short $\alpha$ -stems	104
NE.2	Singular endings of masculine $\alpha$ -stems	105
NE.3	Genitive plural endings of $\alpha$ -stems	41.4, 43
NE.4	Endings of digamma-stems (e.g. βασιλεύς)	43, 111
NE.5	Endings of iota-stems (e.g. πόλις)	109.1
<b>Verb Endings:</b>		
VE.1	3rd dual active secondary ending	138.6
VE.2	1st singular middle secondary ending	138.6
VE.3	A-contract verb endings	41.1
VE.4	Athematic 3rd plural secondary ending	138.5
VE.5	Active infinitive ending	154.1
VE.6	Athematic 3rd singular present active ending	61.1, 138.2
VE.7	3rd plural present active endings	61.1, 138.4
VE.8	1st plural active ending	138.3
<b>Noun Stems:</b>		
NS.1	Doric double $\sigma$ = Attic double $\tau$	81
<b>Nu Movable:</b>		
NM.1	$\nu$ -movable (Attic only)	102

**Table 6:** A list of the rules having to do with the more complicated features included in τάμνον.