Computer-Assisted Phonetic Analysis of English Poetry: A Preliminary Case Study of Browning and Tennyson

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Abstract

This paper discusses visualization techniques to assist with the study of the phonetic content of poetry. For one technique, RGB values are used to represent the relative weighting of phoneme classes within a line of poetry, yielding a useful tool for the discussion of the effects of lines within a poem. A selection of poems by Robert Browning and Alfred Tennyson are compared for their phonetic content. Results show that the percentage of vowel classes and consonant classes in both sets are nearly identical. This helps disprove the century-long held belief that Browning's poetry has a greater percentage of harsh consonants and Tennyson's poetry has a greater percentage of soft vowels.

KEYWORDS: Textual analysis, Phonetic analysis, Visualization, Poetry.

Introduction

The phonetic analysis of literature is not easily accessible to most students. Once the terminology, the symbols, and the rules have been learned, there is still the problem of the large amounts of phonetic data available to be examined. A four-line poem is a collection of about one hundred phonemes; a fifty-line poem usually has from 1000 to 1500 phonemes. Without the aid of computers, even the academic researcher might be intimidated by thousand-line poems and poetic sequences or collections.

What is needed is a computer application that can assist both the student and literary scholar with the phonetic analysis of literature, specifically poetry. A means of visualizing the sound of the text is important, because, on the whole, readers of English poetry seem to have gradually been losing the ability to "hear" a poem while reading: the words of a poem, especially when treated in critical discourse, increasingly *mean* more and *sound* less. North American undergraduate university students

usually have little trouble identifying basic rhyme patterns in a poem, and they often delight in learning to find alliterative patterns. This is usually the extent of their capacity for phonetic analysis, and only a small percentage of graduate students expand their capacity for such analysis. If more visualization techniques can be incorporated into the study of poetry, it might facilitate further phonetic analysis skills. Visual interaction with a poem has become more common than aural interaction: it is sometimes necessary to explain to a (naive) student why the words "through" and "though" do not rhyme or why the phrase "a certain cat" does not contain an alliteration. If the sound of a poem can be represented visually, students might have an easier time understanding the full power of poetry.

The program

AnalysePoems is designed to assist students enhance their interaction with poetry and assist scholars in accumulating data, phonetic and otherwise, about poems. The program is written in VisualBasic.NET. It currently consists of three main components: one for the inputting of data, one for metrical analysis, and one for phonetic analysis. The raw data is saved in Microsoft Access database files, and the processed data can be saved either in the database files or as XML.

The data

The program uses the Representative Poetry Online (http://rpo.library.utoronto.ca) database as its main data source; it can now also accept new poems, not originally in RPO, for input, which it then saves in a separate database, structured in the same way the RPO database is structured.[1] All the poems for the current study are taken from the RPO database.

The lexical database consists of two main tables. This first holds an entry for every word the program encounters in its analysis of the poetry. A word, here, is defined as a unique string of characters, including hyphens and apostrophes. The second table holds the broad phonetic transcription of words, indexed to the first table. The phonetic data is taken from the Cambridge *English Pronouncing Dictionary*, 16th edition. The phonetics table contains a record for each possible pronunciation of a word, as identified by the *EPD*. At the moment, only British and American English pronunciations are included, but pronunciations for other dialects as well as non-English words can be included in the database. The

EPD gives the most common pronunciations of words for English and American speakers of English, listed in descending order of frequency of use; the Phonetics table numbers the pronunciations for each word based on their occurrence in the *EPD*. Where a word does not occur in the *EPD*, I supply the broad phonetic transcription, based on *EPD* entries for similarly-sounding words and my best guess.

Both Tennyson and Browning were concerned that readers pronounce their poetry properly. To obtain a phonemic transcription of Browning's and Tennyson's poems as they themselves pronounced them would be worthwhile if it could be achieved. William Allingham recounts many instances of Tennyson's frustration with the improper pronunciation of his poems; one telling instance is: "He once more spoke a good deal about the want of some fixed standard of English pronunciation, or even some fixed way of indicating a poet's intention as to the pronunciation of his verses. 'It doesn't matter so much (he said) in poetry written for the intellect—as much of Browning's is, perhaps; but in mine it's necessary to know how to sound it properly'" (344). Allingham says he suggested Tennyson adopt a pronunciation code to remedy the problem; and while Tennyson expressed interest in this, he never pursued it. Browning—perhaps because his poetry is "written for the intellect"—was less concerned with the sound of the vowels and consonants as he was with the proper placement of stresses, especially as it pertains to rhyme (Hair, *Browning* 111-12). Because neither poet left explicit instructions as to the pronunciation of their poems; because reconstructing their personal English accent would be very difficult (Edison recorded both poets reading a few of their own poems on wax cylinders towards the end of their lives); because readers today use their own accent or one close to it when reading these poems; because, as Eric Griffiths suggests, knowing the actual pronunciation of the poets is ultimately not important—"The poet's voice is not the voice of the person who is the poet" (67); and because the *EPD* data is readily available where the phonetic data for a general reader living in London in the middle of the nineteenth century is not, the phonetics program uses late twentieth-century BBC English for its phonemic transcriptions of British poetry.[2] The program produces a general, bland representation of the sound of the poems. A narrower phonetic transcription is possible, one that better represents the subtleties of actual speech, but the analysis then becomes one of a performance of the poem—an aural interpretation—rather than an analysis of a text, generally speaking.

Some phonemic transcription standards adopted for this study are

as follows. The post-vocalic /r/ is dropped when followed by a consonant: this corresponds to current pronunciation practices as well as those for mid-nineteenth-century London.[3] The *EPD*, in its broad phonetic transcriptions, includes many optional sounds. The initial, optional /h/ in words such as *what* and *where* is dropped. Otherwise, optional phonemes are retained, such as the /p/ in *dreamed* (that is, /drempt/ instead of /dremt/, while /driːmd/ is an alternate possibility). Most importantly, perhaps, is the optional /ə/ in such words as *chosen* (/ˈtʃəʊ.zən/ instead of /ˈtʃəʊ.zn̩/ and marvel (/ˈmɑː.vəl/ instead of /ˈmɑː.vl̩/). Also, weak forms of words are used by default in favour of strong forms, especially when the *EPD* suggests they are more common, as with for (/fəʳ/ rather than /fɔːʳ/) and *should* (/ʃəd/ rather than /ʃud/). There are exceptions to this, such as *shalt* (/ʃælt/ rather than /ʃᵊlt/).

Metrical analysis

The metrical analysis component of AnalysePoems determines the dominant metrical pattern of a poem and provides a numerical estimate of its metrical regularity. Unlike many previous metrical analysis programs, the program requires only a minimal amount of initial data—in fact, it can interpolate and extrapolate missing data elements—and it does not restrict itself to iambic pentameter verse: it can handle poems with, say, trochaic catalectic metre with alternating tetrameter and trimeter lines. It is remarkably successful at actually scanning the lines of poetry, knowing only the dictionary-defined placement of syllabic stresses for most words. It also provides some initial insight into the sophistication of a poem's metrics: two poems can have the same degree of iambic regularity, but the computer, with a calculation, can suggest which of the two poems has a more naive, sing-song quality to the metre.[4]

Phonetic analysis

The phonetic analysis component of AnalysePoems will create a complete, broad phonetic transcription of any poem, so long as at least one pronunciation of each word can be found in the database. When a poem's phonetic data is first loaded, the most common pronunciation, as suggested by the *EPD*, of each word is retrieved. After the initial phonetic data is loaded, it can be edited by selecting alternate pronunciations for each word where alternate pronunciations are available. Pauses can be inserted

anywhere before, between, or after words in a line, but the present study does not make use of the occurrence of pauses. The data can be saved to a file (in XML format) for future use. The user can display the phonemic transcription of the poem in any of three different formats (with individual phonemes demarcated by spaces, with all phonemes of each syllable concatenated, or with all phonemes of each word concatenated). Visual aids can then be used on any of the three display types.

Visualizing the sound of poems

The graphical interface has a form button for each phoneme one is likely to encounter in any English-language poem. When a poem is loaded, the phonemes that are not in use by the particular poem are greyed out, providing the user with a quick view of the set of phonemes used by the poem. When the user clicks on any of the active buttons, all occurrences of that particular phoneme are highlighted in the display of the phonemic transcription. One can also select to highlight groups of phonemes, such as all plosive consonants or all diphthong vowels. One can change any of the highlight colours as desired. This component of the display allows the student to become more familiar with phonemes and the phonetic alphabet. It also allows for a quick view of the distribution of phonemes in a poem.

The user, when tired of turning phonemes on and off, can request the computer to find repeated phonetic patterns in the poem. The computer will search for repeated patterns within a given scope (i.e., number of consecutive phonemes); if it finds at least n number of matches, where n is a number from 2 to 10 selected by the user, within the scope, it highlights the matches. At the moment, nine different options are available for phonetic pattern matching: it can match on

any phoneme
the first phoneme of a syllable
the first consonant of a syllable
all consonants before the vowel of a syllable
the vowel phoneme of a syllable
the vowel when in initial position only of a syllable
the last phoneme of a syllable
the last consonants after the vowel of a syllable
the vowel and the following consonants of a syllable

For instance, using the last option, a large enough phoneme scope, and a minimum of two matches, the computer will find all rhyming words, including internal rhymes, in the poem. Each set of rhymes will be highlighted using a separate colour. When matching on all consonants before the vowel of a syllable, the computer will find all alliterating syllables within the poem.

The third main component of the phonetic analysis assists the user in looking deeper into a poem. The program allows the user to collect phonemes into one, two, or three user-defined groups and colourize the lines of the poem or a series of poems based on the relative occurrence of phonemes in each group. A convenient way to visualize the comparative weight of three independent variables is to convert them to an RGB value. In doing so, a bright red colour represents a high value for the first variable and low values for the second and third. A medium-bright cyan colour represents a low value for the first (red) variable and midrange and approximately equal values for the second (green) and third (blue) variables. If one wished to evaluate three different aspects of the sound of a poem, one could colourize the poem in order to represent visually these three aspects of the sound of the poem. The user selects which phonemes go into which group, and each group is assigned the colour red, green, or blue. The total occurrence of phonemes from each group is tabulated for each line and for each poem as a whole, and each line and each poem can then be represented by the RGB colour that results. For instance, one can call up a visual representation of the weight of plosive consonants in each line, allowing one to identify quickly which lines of a poem contain the greatest or least number of plosive sounds. One could also visually represent the relative plosive-ness of all of Shakespeare's sonnets or similar series of poems: a quick glance will reveal the poems with the greatest number of plosive consonants. This form of visualization becomes more useful when treating two or three groups of phonemes: a visual representation of, say, plosive and fricative consonants in a long poem or in Shakespeare's sonnets might quickly reveal an overall progression from a high quantity of plosives and a low quantity of fricatives to a more even distribution of the two in the middle to a high quantity of fricatives and a low quantity of plosives at the end. Such a quality would be difficult to hear and difficult to evaluate by hand. AnalysePoems can reveal these underlying patterns.

Sample poems

As an example of the usefulness of being able to highlight phonemes in a poem, consider "Late, Late, so Late" from Tennyson's *Idylls of the King*. Selecting the short vowels with one colour and the long vowels and diphthongs in another colour reveals the uneven distribution of vowel sounds throughout the poem (see Figure 1). The long and diphthong vowels tend to occur in the first half of each line, while the short vowels tend to occur in the second half of each line. An ear finely attuned to the difference in vowel quantities, such as Tennyson's own ear,[5] might be able to hear this difference when reading or listening to the poem, but the graphical representation will help most everyone else—including, it is assumed, help them develop a more finely-tuned ear for such differences in vowel sounds. One feature of the poem revealed by this visualization is the similarity of lines 5, 8, and 11. While most of the lines of the poem have a greater number of long and diphthong vowels in the first half of the lines, these three lines have fewer long and diphthong vowels. They are also each the middle lines of three of the four stanzas (the poem consists of four, three-line stanzas). The basic vowel pattern is established by the first stanza, where even the second line adheres to the pattern. The pattern is broken by the second lines of the remaining stanzas; and the departure from the pattern creates tension in the poem, which is resolved quickly by the final lines of each stanza when the poem returns to the established pattern.

Colourizing the lines of the poem using consonants groups reveals some interesting qualities. Tables 1 and 2 list the most common phonemes of British English, and groups them by standard categories. (Other categorizations are possible, but the present study uses these categories.) Figure 2 shows a colourization of the lines of "Late, Late, so Late" where the relative weight of plosive consonants are represented by the colour red. The brightest lines are the first and second lines, revealing that they contain more plosive consonants than the other lines. The colours further reveal a progression in the poem towards fewer plosives: the lines of the first half of the poem, the first two stanzas, gradually progress toward fewer plosives except that the final line of the second stanza returns to a greater number of plosives, similar to the opening lines. The second half begins similarly to the first, but ends with an attenuation of the plosives. This reveals that as the poem draws to its end, the plosive consonants are muted, leaving the auditor with a quiet ending.

Figure 3 shows the same lines colourized with the plosive conso-

nants represented by red and the fricative and affricate consonants represented by green. Many of the lines have turned slightly orange, suggesting that plosives dominate though fricatives and affricates have a presence. Most interesting are lines 10 and 11, where the lines have turned a greenish yellow: this suggests that the fricative and affricate consonants dominate the plosives in these lines, which are therefore anomalous within the poem. Lines 4, 5, and 8 show noticeable green influence: in fact, these three lines and lines 10 and 11 show a progression towards increasing fricative and affricate phonemes. The fricative consonants are soft consonants, and since the plosives reveal a tendency to attenuate while the softer consonants increase, the poem gets quieter as it draws to a close. The final line returns to red, but it is now noticeably darker than other lines, revealing that it does not have as great a proportion of plosive, fricative, and affricate consonants as do the other lines. The colourization of the lines is revealing a gradual decrescendo in the poem.

Figure 4 shows the same poem with the lines colourized in the following manner: plosive consonants in red, fricative and affricate consonants in green, and nasal and approximant consonants in blue. Lines 1, 2, 3, 4, 6, 7, and 9 of the poem are in the red to pink range and are thus heaviest with plosives; lines 5 and 12 are blue to purple and are thus heaviest with nasals and approximants; and lines 10 and 11 are light yellowy green and are thus heaviest with fricatives. Line 8 is greyish, implying a balance of the three groups. Plosives dominate the poem, and departures from plosive-dominate lines produce tension. For the middle two stanzas, the middle line of each stanza departs from the plosive dominance: in the second stanza, the middle line is heavy with nasals and approximants; in the third stanza, the middle line balances all three groups. The return to the plosive-heavy lines in the final lines of each stanza is a return to stability. Note how the first stanza establishes this stability: all three lines are plosive heavy. With the final stanza, both the first and second lines are fricative-heavy. The tension created by this departure from the pattern is even greater than in the previous two stanzas: had only the middle line departed from the pattern, then the stanza would adhere to the pattern established by the previous two stanzas. Instead, the final stanza breaks the pattern that has already broken the pattern, creating a greater degree of tension, which then gets resolved by the final line as the poem returns to a plosive-heavy line. However, the final line has a large blue component, suggesting a progression to a new state: the plosive-heavy lines themselves needed to be resolved into a line that better balances plosives with

nasals and approximants—the previous two colourizations have already shown how the plosives attenuate towards the end. The poem can thus be seen as consisting of plosive-heavy lines needing to be resolved into a better balance of plosives with nasals and approximants: the middle lines of the second and third stanzas achieve this to a small degree, but the poem pulls away, back to the plosives. Lines 10 and 11 are the most anomalous in the poem because of the great number of fricatives, and thus the lines are the greatest source of tension in the poem: they represent the climax which gets resolved by the final line where the plosives and nasals and approximants are more balanced. A colourization of the lines of the poem helps the reader understand how the poem works on a phonetic level and gives the reader some insight into the components that make up the poetic reading experience.

Tennyson's poem "Sweet and Low" from *The Princess* has some interesting phonetic features that are more easily seen than heard. The poem is a lullaby, and thus one would imagine that its sound features must combine for its intended effect: to put a child to sleep, or to remind an adult reader of songs used to put children to sleep. The poem consists of two, eight-line stanzas where the second stanza echos the first. The line, "Sweet and low, sweet and low," that opens the first stanza is very similar to the line, "Sleep and rest, sleep and rest," that opens the second; these lines, with their identical rhythmic pattern that places a heavy emphasis on the /sw/ and /sl/ sounds, help establish the lullaby quality of the poem. They also suggest the strophic, two-fold structure of the poem: that the second stanza is a repetition of the first, even though the words change. This is supported by other pairs of lines: the third lines of each stanza are very similar, the pauses at the end of the seventh lines of each stanza are similarly powerful in introducing the final lines of each stanza, which themselves are, like the opening lines of the stanzas, very similar in their rhythm in spite of having different punctuation.

While an ear well attuned to poetry can hear the similar rhythms in each stanza, it might have more difficulty with some repeated phonetic weightings. The second and fourth lines of both stanzas are identical: for a poem that relies heavily on repetition, at the word and rhythmic levels, this is not surprising. But what is surprising is that the second repeated pair echoes the first pair on a phonetic level. Figure 5 shows the results of colourizing the lines using the usual three groups of consonants (where red represents plosives, green represents fricatives and affricates, and blue represents nasals and approximants). This reveals that the second line,

"Wind of the western sea," is the same colour as not only its repetition in the fourth line, but also as lines 10 and 12, the corresponding second and fourth lines in the second stanza. The lines "Wind of the western sea" and "Father will come to thee soon" have the same consonantal phonetic weighting: i.e., the same proportion of phonemes from each of the three categories. This is another yet much more subtle way the second stanza echoes the first.

The poem displays another interesting feature: a fricative climax. The first, third, sixth, seventh, eighth, ninth, and sixteenth lines are more heavy with plosive consonants than the others: the poem begins with a moderate use of plosives, has a greater number towards the middle of the poem, attenuates them towards then end, and then returns to them for the final line. This is played against the fricatives, which dominate in the second, fourth, tenth, and twelfth lines (the repeated and echoing lines), and increase significantly in the eleventh, thirteenth, and fourteenth lines. Line 14, "Silver sails all out of the west," is heavy with fricatives; in the last two lines, the fricatives are muted while the nasals increase steadily in the final three lines. The fricative consonants, important for the phonetic echo effect between the two stanzas, seem to build up to the fourteenth line and then retreat, suggesting they are responsible for the poem's climax.

Browning and Tennyson: a test case

Robert Browning and Alfred Tennyson are interesting to use as a preliminary case study because they were writing contemporaneously with each other and their styles of poetry were often contrasted. Tennyson's poetry was often characterized by the term "musical," while Browning's was harsh, unmusical, or dissonant. Tennyson said of Browning: "If the pronunciation of the English language were forgotten, Browning would be held the greatest of modern poets" (Allingham 290), suggesting that Browning's poems are not pleasant sounding while his own are. An examination of the phonemes that make up their poems should reveal this difference.

A typical opinion of the critics is that of R. H. Hutton in 1889, at the end of the poets' careers:

> In some respects the two greatest imaginative poets of our day are striking contrasts. Browning is careless and impatient in execution; Tennyson is careful and elaborate.

> Browning is rough and ungainly; Tennyson smooth and stately. Browning trots or gallops; Tennyson walks or canters. [...] Tennyson treats words and all their associations with the utmost sympathy and reverence; Browning tumbles them about and rolls them over almost as a tempest does the rocks of an Alpine valley, sometimes producing very weird effects with them, but effects which have a great deal of the appearance of rough play about them, like the casts in some giant's game at bowls. (quoted in Litzinger and Smalley 507)

Other reviewers echoed this distinction. G. H. Lewes says that Browning "is neither a deep thinker nor a musical writer," and his poems have "an abruptness, harshness, and inelegance of versification" (quoted in Litzinger and Smalley 121). By contrast, Henry Reeves says that Tennyson's "lyrics have a melodious tone that lingers on the ear like notes of music" (quoted in Litzinger and Smalley 526). C. Edmunds echoes this distinction: "The melody of Browning is seldom or never of so finished and heightened a beauty as that of Tennyson. And so, generally, it may be affirmed, he is far from being so consummate an executive artist as his great Brother-poet" (quoted in Litzinger and Smalley 137). Swinburne says that the speakers within some of Browning's poems utter "mere inarticulations jerked up by painful fits out of the noisy verbal whirlpools of a clamorous chaos" (quoted in Litzinger and Smalley 215). As a result of many similar comments, the challenge for AnalysePoems is to determine what in Browning's poetry produces the "clamorous chaos" and what in Tennyson's poetry produces the "melodious tone": to determine if the phonetic makeup of their poetry differs in any substantial manner.

Northrop Frye, in a discussion of the musical nature of poetry, attempts a definition of the naive or sentimental use of the term "musical" as applied to poetry: it, he says, "usually means 'sounding nice.' [...] The term musical as ordinarily used is a value term meaning that the poet has produced a pleasant variety of vowel sounds and has managed to avoid the more unpronounceable clusters of consonants that abound in modern English. If he does this, he is musical, whether or not he knows a whole note from a half rest" (xi). If we ignore for the moment variety and clusters, we can compare the two poets based on the occurrence of "pleasant [...] vowel sounds" and "unpronounceable [...] consonants" in their poems. Tennyson's poems, being the more "musical," should have a greater pro-

portion of pleasant-sounding vowels; Browning's poems, being the more "harsh," should have a greater proportion of harsh-sounding consonants.

Donald Hair argues that poets and readers of poetry during the nineteenth century would have a shared understanding of the different effects of vowels and consonants. Hair quotes from Julius Hare, a contemporary of Coleridge and thus immediate precursor to Tennyson and Browning:

> the proportion between the vowels and consonants in a language will shew the relative influence of the feelings and of the understanding over the people who speak it. German grammarians have called consonants the objective, vowels the subjective element of language. As the end of human speech is two-fold, to utter feelings and to communicate thoughts, we may reasonably look to find the organs of speech adapted to this double purpose. And we do find them. The vowels express what is felt: they come more immediately from that part of the body which is less under the dominion of the will: they make the whole melody of speech: the interjections in which our bursting emotions find vent, consist chiefly of vowels, repeated sometimes over and over again, and occasionally kept from running and melting into each other by some recurring consonant. Thus they resemble the notes of beasts and birds, which are mainly vocalic, with the admixture of a consonant or two ... In consonants on the other hand, fashioned as they are by those organs about the mouth over which we have a fuller and readier controul [sic], one beholds something like the operation of the formative principle on the raw material of language, the shaping and modifying and combining or syllabling action of the intellect. (quoted in Hair, *Tennyson* 63)

Hare goes on to apply this theory directly to poetry: "Inasmuch as vowels, like feelings, may be indefinitely prolonged, while consonants are yet more fleeting and momentary than thoughts; English poets who write for song, should study to introduce as many syllables as they can with full distinct sonorous vowels, especially in those places where the voice is meant to dwell" (quoted in Hair, *Tennyson* 63). If we are to accept Hare's distinc-

tion between the use of vowels and consonants, which Hair says "became a commonplace" during the nineteenth century (63), then the more emotional and musical poet is the one who uses a greater proportion of vowel sounds, while the more objective and intellectual poet—recall Tennyson's statement that Browning's poetry is "written for the intellect—[...] perhaps" (Allingham 344)—is the one who uses a greater proportion of consonant sounds. This seems a reasonable distinction to apply to Tennyson and Browning, given, at least, the opinions of their nineteenth-century readers. One must expect, therefore, that the proportion of consonants in Browning's poetry is greater and the proportion of vowels in Tennyson's poetry is greater. Further, one expects that Tennyson made a greater use of short (i.e. "pleasant") vowel sounds, whereas Browning made a greater use of plosive (i.e. "harsh") consonant sounds.

Table 3 lists the poems used for the study. This represents an admittedly small proportion of the total poetic output of the poets, but it is a representative set of poems. The phonemes are grouped into seven categories. These are derived from standard phonetic categories, following the categorization of the *English Pronouncing Dictionary*. For British English, the consonant phonemes are categorized according to Table 1. To reduce the number of different categories, the affricates are included with the fricatives (though one could argue that they belong instead with the plosives). Table 2 contains the phonemes in each of the four vowel categories. The neutralized vowels are contentious, but are used by the *EPD*.[6] To reduced the number of categories, the neutralized vowels are included with the short vowels (though one could argue that they belong instead with the long vowels).

The results of tallying the phonemes in each of the seven categories are listed in Table 4. One result that was anticipated is that Browning uses a greater percentage of consonants than Tennyson, and Tennyson, thus, uses a greater percentage of vowels than Browning. Since Browning is known for his consonants and Tennyson for his vowels, this conforms to the general opinion. However, the difference, 0.6%, is small: it roughly equates to one extra consonant for every seven lines of poetry (using an average of 23 phonemes in a line), or about two extra consonants for a short poem. It seems reasonable to assume that such a subtle difference is not responsible for the overall general impression of the distinctness of the two poets' poems.

As expected, Browning's poetry has more plosive consonants, theoretically responsible for its harshness, and Tennyson's poetry has

more short vowel sounds, theoretically responsible for its melodiousness. The differences, however, are minimal: a difference of 0.6% in plosive consonants and of 0.2% in short vowels. These differences are probably too small to justify citing them as responsible for the relative musicality of the poems. Not even the other vowel sounds can be used: Browning has more long vowel sounds by 0.3% while Tennyson has more diphthong vowel sounds by 0.7%. Unexpectedly, the smallest difference among the phoneme groups is in the short vowel sounds.

The greatest difference between the two poets comes in their use of fricatives: Browning leads by 2.1%. This corresponds to approximately one more fricative phoneme for every two lines of poetry. While this is a more significant difference, again it does not seem large enough to support the general impression of the difference of the two poets. Besides, fricative consonants are soft sounds, and one would expect Tennyson to make a greater use of fricative consonants than Browning, if one agrees that Browning's poetry is harsher than Tennyson's.

It seems, therefore, that either the counting of individual phonemes and tabulating them by class is not sufficient to characterize the difference in the quality of their poetry, or the long held opinion about the relative "musical" quality of their verse is flawed. Frye, in his definition of the sentimental use of the word "musical" when applied to poetry—and this study does not concern itself with the more sophisticated usage of the word—refers to "a pleasant *variety* of vowel sounds" and to "unpronounceable *clusters* of consonants" (xi; emphasis added). While "variety" is a difficult measurement, "clusters" is not as difficult. An initial study of consonant clusters is to count the occurrence of contiguous consonants. When two or more consonants of the same type occur contiguously, the consonants that make up this cluster can be tallied.

Contiguous consonants were tabulated for the same poems, and the total counts by consonant class are listed in Table 5, along with the percentage of these counts out of the total number of consonant phonemes of the same class in all the poems of the poet. The results show that Tennyson's poems contain more contiguous consonants, including, unexpectedly, contiguous plosives, than do Browning's poems. The differences, however, are minimal. The greatest difference in occurrence is with approximants, where Browning's poems lead by 1.2%. This is somewhat surprising, given that approximants are soft-sounding consonants, but the number of occurrences of these is again probably too low to have a significant effect on a reader's perceptions.

Conclusion and future work

If we refuse to give up the concept that Tennyson's poetry is, as a general rule, more pleasant sounding, or more musical, than Browning's, and if we continue to believe that this difference can be quantified, then more complex phonetic analysis is needed to demonstrate the difference. The initial results presented here help disprove a naive estimation of the poets: that the one uses more consonants while the other uses more vowels, or that the one uses a greater proportion of certain types of consonants or vowels than the other. More work is needed, however, to arrive at the essential differences between the two.

Further analysis of the poems could include counting the number of consonants or vowels in stressed syllables alone, or allowing these to carry more weight than the consonants and vowels in non-stressed syllables. This would involve joining the two main components of AnalysePoems: having the computer perform an analysis of the phonetics and of the metre together. Further questions about the poets could then be answered: does Tennyson or Browning rely more on long vowel sounds in stressed syllables? Is Browning's dissonance a result of long vowel sounds in unstressed syllables? Does Tennyson mute his plosives in unstressed syllables while Browning punctuates them in his stressed syllables? Analysis of more complex repeated patterns might also reveal some telling differences, patterns such as occurrences of two plosive consonants surrounding a diphthong vowel sound. Perhaps Browning uses such as a characteristic sound in his poems, while perhaps Tennyson prefers the pattern of a fricative consonant followed by a long vowel followed by a nasal consonant. Such analysis should reveal important differences in the poems, and might significantly enhance computerized stylistics and authorship attribution.

AnalysePoems is still in its early stages of development. Its range of poems for analysis grows steadily. With a few adjustments, it shall soon be able to perform metrical and phonetic analysis on prose, potentially allowing one greater insight into characterizing the differences between poetry and prose or between various styles of prose. Its pedagogical applications will not be ignored: AnalysePoems is almost ready to be used in the classroom. It will help students realize that the Victorian admonition that a child must be seen and not heard should not apply to poetry: the unheard poem has but a partial life.

Tables

Table 1: British English consonant groups

Plosive	/p/ /b/ /t/ /d/ /k/ /g/
Nasal	/m/ /n/ /ŋ/
Fricative	/f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /h/
Affricate	/ʧ/ /ʤ/
Approximant	/r/ /j/ /w/ /l/

Table 2: British English vowel groups

Short	/ɪ/ /e/ /æ/ /ʌ/ /ɒ/ /ʊ/ /ə/
Neutralized	/i/ /u/
Long	/iː/ /ɑː/ /ɔː/ /uː/ /ɜː/
Diphthong	/eɪ/ /aɪ/ /ɔɪ/ /aʊ/ /əʊ/ /oʊ/ /ɪə/ /eə/ /ʊə/

Table 3: Poems used for the study of Browning and Tennyson

Robert Browning	Alfred Tennyson
Among the Rocks	Break, Break, Break
Life in a Love	Crossing the Bar
Love in a Life	In Memoriam 5: I sometimes hold it half a sin
Meeting at Night	In Memoriam 7: Dark house, by which once more I stand
Memorabilia	In Memoriam 11: Calm is the morn without a sound
My Last Duchess	In Memoriam 67: When on my bed the moonlight falls
My Star	In the Valley of Cauteretz
Never the Time and the Place	Late, Late, so Late
Parting at Morning	Maud, from Part I: Come into the garden, Maud
Prospice	The Princess: As tho' the land
Two in the Campagna	The Princess: Home they brought her warrior dead
	The Princess: Now sleeps the crimson petal
	The Princess: Sweet and low
	The Princess: Tears, idle tears
	The Princess: The splendour falls on castle walls
	The Princess: Thy voice is heard

Table 4:
Phoneme counts and percentage of total by category

	Browning		Tennyson	
consonants	3665	62.2%	4019	61.6%
plosive	1136	19.3 %	1220	18.7 %
nasal	628	10.7 %	739	11.3 %
fricative	1244	21.1 %	1241	19.0 %
approximant	657	11.1 %	819	12.6 %
vowels	2224	37.8 %	2505	38.4 %
short	1373	23.3 %	1533	23.5 %
long	350	6.0 %	369	5.7 %
diphthong	501	8.5 %	603	9.2 %
total phonemes	5889		6524	

Table 5:
Contiguous consonant counts and percentage of total by category

	Browning		Tennyson	
plosive	202	17.8 %	228	18.7 %
nasal	30	4.8 %	38	5.1 %
fricative	264	21.2 %	276	22.2 %
approximant	30	4.6 %	28	3.4 %

Figures

Figure 1:
Vowel distribution in Tennyson's "Late, Late, so Late"

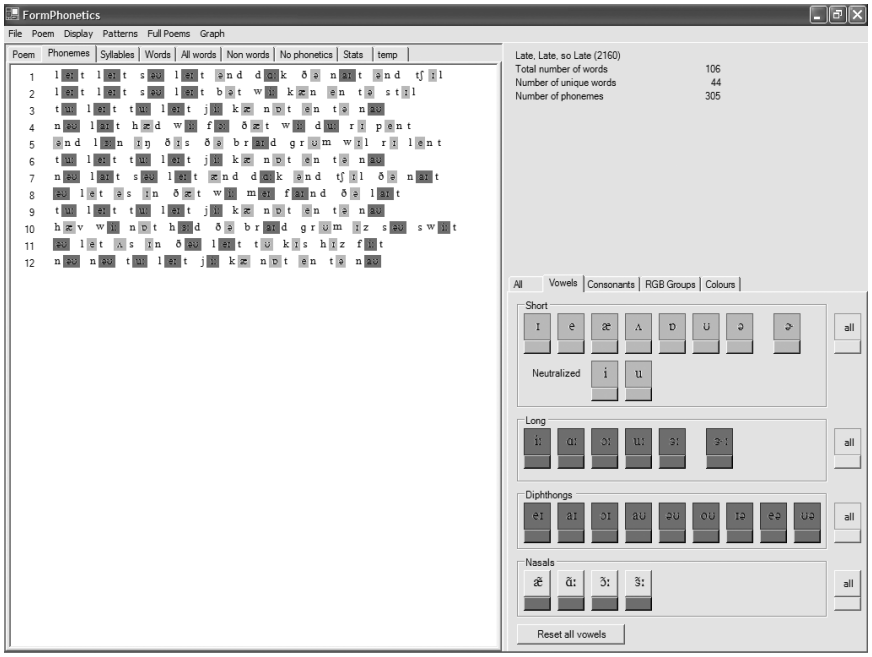


Figure 2:
"Late, Late, so Late" with lines colourized for plosive weight

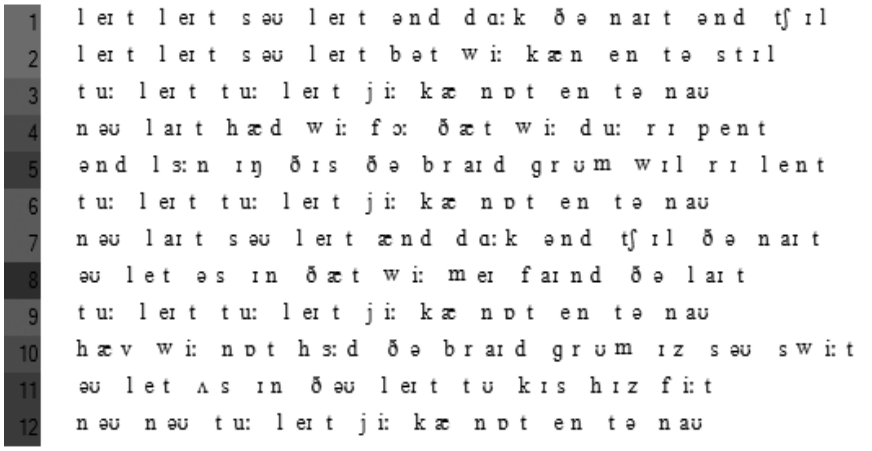


Figure 3:
“Late, Late, so Late” with lines colourized for plosive and fricative weight

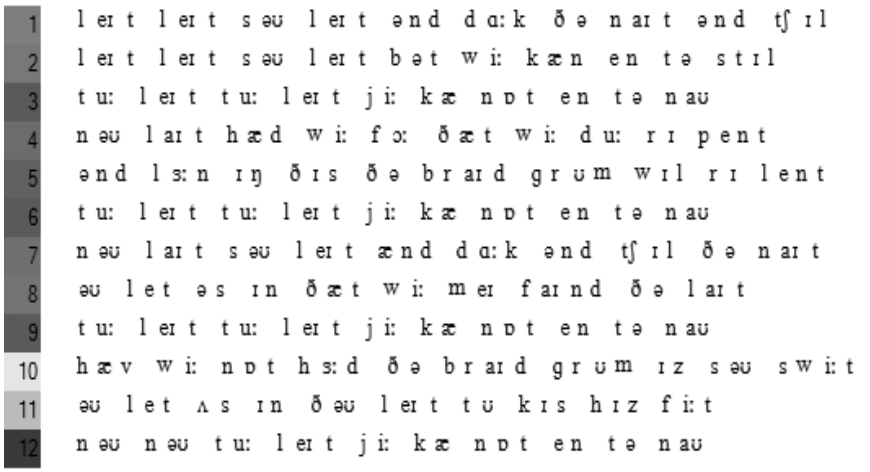


Figure 4:
“Late, Late, so Late” with lines colourized for plosive, fricative, and nasal and approximant weight

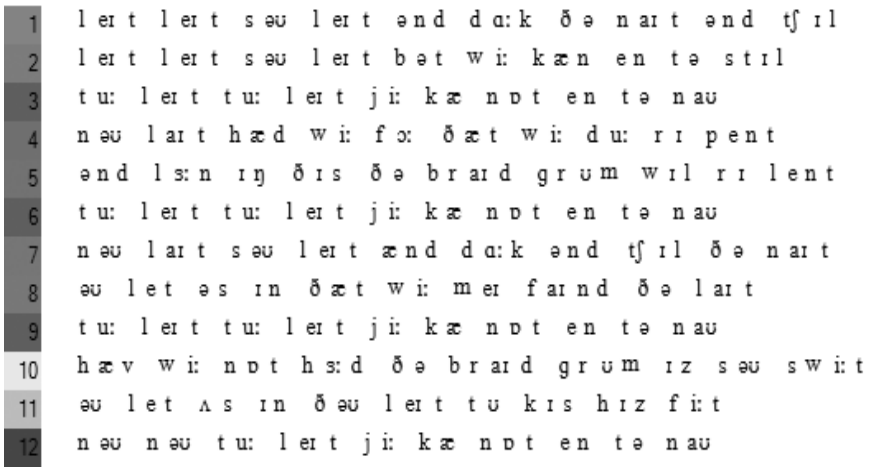
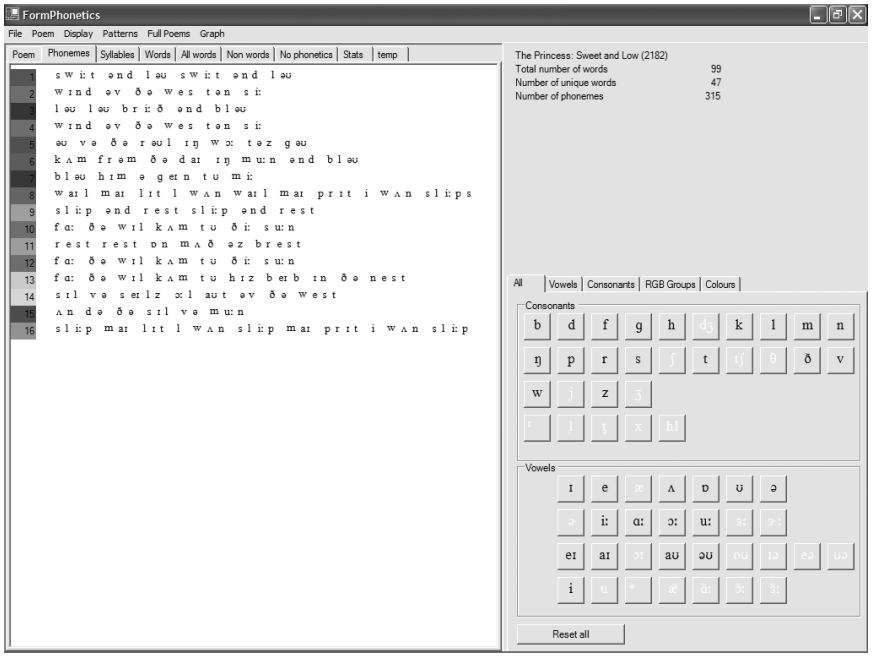


Figure 5:
"Sweet and Low" with lines colourized for plosive, fricative, and nasal and approximant weight



Notes

[1] A brief account of the structure of the RPO database is forthcoming in *Literary and Linguistic Computing*. I am grateful to Ian Lancashire for allowing me a copy of the RPO database for use with my program. I am responsible for the RPO database structure, and am thus aware of both its strengths and limitations.

[2] According to the introduction, the *EPD* gives the common pronunciations of words according to BBC English and American broadcaster, or "Network," English for the end of the twentieth century (v-vi). Since Tennyson and Browning were British, American pronunciations do not factor into this study.

[3] Charles Jones provides evidence that suggests that the post-vocalic /r/ in London disappeared during the eighteenth century (299-301). While it seems its disappearance was due in part to a fashionable affectation, one can reasonably assume that the pronunciation and omission of /r/ in mid-nineteenth-century London was similar to its pronunciation in London at the end of the twentieth century.

[4] A more detailed account of the metrical analysis component of the program is included in the same, forthcoming *Literary and Linguistic Computing* essay.

[5] Tennyson said "he thought knew the quantity of the sounds of every English word except perhaps scissors" (Eliot 328). William Allingham says that Tennyson "will not admit that any one save himself can read aloud his poems properly" (95) and writes of Tennyson's response after Allingham spontaneously quotes a line of Tennyson's: "T. (as usual), 'You don't say it properly'—and repeats it in his own sonorous manner, lingering with solemn sweetness on every vowel sound" (Allingham 158).

[6] The editor's preface to the *EPD* explains the neutralized vowels in this manner: "There are many places in present-day British and American English where the distinction between /ɪ/ and /iː/ is neutralised. For example, the final vowel of 'city' and 'seedy' seems to belong neither to the /ɪ/ phoneme nor to /iː/. The symbol /i/ is used in this case (though it is not, strictly speaking, a phoneme symbol; [...]). A parallel argument can be made for the distinction between /ʊ/ and /uː/ (with a corresponding 'neutralised' symbol /u/), though this is needed much less frequently" (xiv).

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