COLORS OF POETRY: COMPUTATIONAL DECONSTRUCTION

by

JASON R ROBINSON

(Under the Direction of Susan Canty Quinlan)

ABSTRACT

It should be reasonable to believe that computer software could aid in poetry analysis and creation the same way that software already helps graphic artists and musicians today. What we currently use to write literature has functionality that is not much more advanced than what the typewriter had to offer, yet examples of electronically created or modified graphics and music are ubiquitous in nearly every aspect of our culture. Why can't software have a similar impact on literature? Can computers do more than spellcheck and grammar check for literary students and artists? In this work I will illustrate a useful place for software within the study and composition of Spanish poetry.

INDEX WORDS: Poetics and Technology, Poética y tecnología, Computer poetry, Spanish poetry software, Software para poesía, Applied linguistics, Lingüística aplicada, Textual analysis

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Poetry
I, too, dislike it.
Reading, it, however, with a perfect contempt for it, one discovers
in it, after all, a place for the genuine.
Marianne Moore

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CHAPTER 1

INTRODUCTION

<u>The Basic Idea</u>

It should be reasonable to believe that computer software could aid in literary analysis and composition the same way that software already helps graphic artists and musicians. For musicians there is software that splices, samples, mixes and analyzes rhythms; graphic artists have software that combines, manipulates, animates and creates many other stunning effects; and writers have at their disposal a few brands of word processors with spellcheck and (pseudo)grammar check. The tools we use to write literature have functionality that is not much more advanced than what a sturdy typewriter and dusty dictionary had to offer a hundred years ago.[1] Examples of electronically created or modified graphics and/or music that are generated by advanced, intelligent software applications are in virtually every TV show, movie, magazine and web page. Could software have an equivalent impact on literature? Can computers do more than spellcheck and (pseudo)grammar check for students and artists of literature?

We must pose the supposition for the reader (even if for just the duration of this thesis) that the marriage of technology and literature should be desired. Were this the case, students and writers would demand functionality in software that could potentially empower literature to be adorned with aesthetics and applications hitherto unimagined.

The goal of this paper is not to emit a series of definitive uses of software within poetry, and the goal is especially not to define the role of poetry in our technophile culture (although, some uses of software will be defined along with some of my own thoughts on poetry). In

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tandem with this thesis I have developed a software application, *Colors of Poetry*, as just one example of how software will be better utilized to develop and interpret literature. Software can do much more than save word processing documents. This paper is not intended to argue that the *Colors of Poetry*[2] software is the optimal solution for poets, but without examples from this software as proof, the rest of this paper would be purely speculative and not as convincing in arguing that technology can have the same impact on literature that technology has in other media arts.

It is important to identify and delimit the scope of this paper because this work incorporates so many disparate concepts. It synthesizes linguistics, technology, programming, and poetics, and then presents all of this in a form that simulates the increasingly in vogue concept of synesthesia.[3] By combining high-tech, craft and aesthetics, this thesis applies a very *Bauhaus*[4] point of view to poetry, Spanish poetry in this paper specifically. This text also takes into consideration the lessons that we have learned from digital poetry and its predecessor visual poetry. In short, this text could touch upon one theory or another that has been mentioned or quoted at least once by every modern-day scholar who has ever published a paper. But I am not so ambitious as to offer an all-encompassing theory, resolution, answer, to these fields. My goal is simple.

If it is as Hartman says: "Talking about computer poetry is almost like talking about extraterrestrial intelligence: great speculation, no examples." (1), I wanted to offer examples with minimal speculation. I wanted to create a writing tool that was useful to writers of Spanish poetry.[5] I utilize linguistics, programming, semiotic representations and a great deal of subjective judgment to attempt this task. In digital and visual poetics, I have found many helpful

maxims, especially when I have had to make judgment calls; all the same, there exists a very large divide between my goals and the goals of proponents of digital poetry.

Visual and digital poetry movements are more concerned with the end product of poetry developed through "new" media techniques. I am more concerned with the developing a tool that poets or readers will use if they choose to in any way they choose to. The frame of reference for aesthetics within digital poetics, according to "The Aesthetics of Digital Poetry," is something other than the traditional book culture-paradigm (Block, Heibach and Wenz 23); while the reference for aesthetics with the software tool is the user's prerogative in the same way that a pen may be used to write, draw or stab.

If anything, the software that I have developed for Spanish poetry, *Colors of Poetry*, is more concerned with the traditional book culture, even though it could be utilized for digital aesthetics if the user wanted to (which will also be illustrated in Chapter 3). This is because the final output of the software, creative or educational, is what the users make of it. If someone uses the software to write a poem with a certain rhythmic effect, their focus is not visual at all, even though they might have used visual analysis in developing the poem. The confusion, however, is conceived the moment one sees the software's output. The audience recognizes immediately that the new media techniques that the visual and digital poets have nurtured in their own poetics, are the same techniques that this software tool takes advantage of for poetic analysis.

Visual poetry popularized the aesthetics of white space and non-linear text. Poems could be read frontwards, backwards, right to left, etc., or they could invoke the *Gestalt* effect, the big picture as a whole effect, and then introduce irony later on the micro scale once the viewer has had enough time to examine the picture further. For the end user, the *Colors of Poetry* software

does the same thing. Under the covers the software converts the text that the user is working with into a series of numbers and then applies complex linguistic and graphic algorithms. Then this undercover work produces an image that is displayed to the user. An output image capitalizes on the *verbivocovisual* and *Gestalt* effects that occur immediately upon being viewed.[6] The numbers could have just as easily been converted into musical notes and played to the user, but this presents the same problem as traditional poetic analysis: it is serial. A fullscreen image can be viewed and appreciated, to some extent, immediately; whereas a series of musical notes, traditional poetic analysis, or traditional text has to be read from start to finish.

The *Colors of Poetry* software is not intended to deprecate the traditional pleasures of any analyzed text, nor is it intended to apply unrealistically rigid rules to something as fluid as poetry. Instead, the software offers its user an instantaneous appreciation for the linguistic patterns such as rhyme, alliteration or rhythm that the author has embedded (consciously or not) into the poem. For the student who must define these poetic patterns either as homework or as the antecedent to an appropriate interpretation of the poem, the software saves time. To the author, the poet who uses the software, it offers the same thing that many forms of digital poetry offers: interaction.

During the poetic process, poets become creators and readers of their own work. They can analyze their own poetry while they compose it interactively with the software and then make adjustments according to whatever aesthetics to which they subscribe. More harmonious and symmetrical patterns can be visualized from lesser harmonious and symmetrical patterns and modified by double clicking a line or a particular object that is out of place (according to the poets' sense of aesthetics) in order to add something more appropriate to their personal aesthetics. Then the poets may remove or add other linguistic filters to re-evaluate the poem.

When the poets are satisfied with the different types of analysis, then they may return to the text. An implicit hypothesis, of course, is that if the building blocks are aesthetically pleasing, then the end text will be aesthetically pleasing.

This remains to be seen just as in any experimental process, whether it is creative or analytical. Friedrich Block in his essay "Eight Digits of Digital Poetics" tells us what many other modern literary theorists might tell us:

> [E]xperimental literature has always been about language or the signs themselves, their technical, material, semantic, and pragmatic possibilities. It has been about breaking bounds in the direction of fine arts and music, and also toward science. It has also been about observing the formulation and understanding process of producers and recipients. (311)

And then he finishes this quote with "Therefore, experimental poetry has always been media poetry." This paper's position argues that this also applies to all other aspects of "experimental" poetry (and literatures) including analysis, interpretation, creative process and medium, and not just the finished product, the text.

Block's quote, while adequate in highlighting concerns in media literature, brings us right back to my initial question. Why is it considered experimental when we are talking about literature, but not so when we are talking about other media such as graphics or music? Why are poets such as Max Bense, Charles Hartman, Oswald Wiener, Kostenlanetz, Jim Rosenberg, Jackson Mac Low, Reinhard Döhl, Augusto de Campos, Eduardo Kac, Ladislao Pablo Gyori, William Chamberlain, Thomas Etter, and John Cayley in such privileged positions to talk about and create new technologically advanced poetries, while the rest of the literary talent is not?

The simple answer, the answer that holds true for most of the great poets from all time periods, is knowledge. The aforementioned poets not only have access to knowledge (and technology), but they also want to use it to elevate their craft whether they explore double meanings of Latinisms or the poets simply "create a code that converts words into amino acids and produce with it a three-dimensional protein-poem, thus completely bypassing the need to use a gene to encode the protein" (Kac 247). However, because access nowadays to knowledge and technology is more available than ever in developed nations, the more complex answer has nothing to do with the lack of [access to] knowledge. It has to do with both the desire to experiment and the resistance to that which is experimental --until it has proven itself and, thus, no longer is experimental.

Computer poetry (or, for this paper, perhaps more appropriately termed *Prosthesis poetry*[7] following Brian McHale's example) should no longer seem experimental. This holds true not because this has been experimented with since the *Auto-Beatnik* program in 1962 according to Hartman (2). Nor is it true because Raymond Roussel was already describing machine poetry in his literature from about the same time (McHale 3). Even though Carol Donley claimed in 1985, a few years before the average American household had a personal computer, that "Many poets actually enjoy writing their own programs or designing programs with computer programming assistants. They also work eagerly with interactive software developed by others." (178), this is still not why prosthesis poetry should be no longer viewed as experimental.

Prosthesis poetry is no longer experimental because it is already indirectly influenced by technology. Linguistics was not hesitant in adapting technology for research, and poetics and linguistics are, according to Roman Jakobson, very closely related. Many people just are not cognizant of the extent of technology's presence already in literature. Or some people even

resist this synergetic relationship between technology, literature and linguistics.   However, literature can easily follow the path that has been paved by linguistics.

Technology and Linguistics

Computers are readily used to help linguists expose and quantify elements of language in the pursuit of science.   From *PRATT* to *WordNet* and other word association tools, to online conjugators, reflexors and lemmatizers to the ever increasing sources of online language corpora linguists are benefiting from the use of technology.   These technologies are used to analyze handwriting, voice patterns, intonation, current, historical and future linguistic tendencies. Technology has helped linguistics confirm their place among scientists.

So, how does literature benefit? These linguistic tools and are all fun to play with, but how do students and writers utilize them productively? And more importantly, why should students and writers use software like these productively?

Take the case of *WordNet* (http://wordnet.princeton.edu/) developed at Princeton University. *WordNet'*s primary function is the very same function that poets have fulfilled since the modest beginnings of metaphor and metonymy. *WordNet* is an organizational tool of word relationships. With *WordNet* the user can easily identify the relationship between "leaves" and "trees" and compare this to the relationship between "fingers" and "people." Many linguists use this tool to study semantic word relationships in communication, but do poets use this software to compose their poetry? I suspect that a privileged few do, but not many.

The software has limited accessibility to the average student or writer. It is true that the commands and output are cryptic and complicated for a technovice to learn overnight (although, they are much more intuitive with newer GUI[8] versions of this tool). However, what keeps *WordNet* most inaccessible is that few students and writers of literature know about it or similar

tools, while large numbers of linguists use these types of tools all the time. Many linguistic articles can be found concerning *WordNet,* some artificial intelligence articles can be found on it, but I have yet been able to find single article concerning *WordNet* and its ability *to greatly impact* literature.

There appears to be an illogical divide between linguistics and literature, even when literature could benefit from common linguistic knowledge and tools.

<u>Linguistics and Literature</u>

One stereotype is that linguistics and literature do not mix. The former is science; the latter is art. Poets may rebel against the constraints that they feel grammar and linguistics causes for poetry. Just recently I read a quote from an interview in 1965 with the famous Brazilian writer, João Guimarães Rosa, making the common complaint that grammar and the "so called science of linguistics" were invented by the enemies of poetry[9] (Lorenz 70-71). The true irony of Guimarães Rosa's statement is that he himself was a master generative linguist and probably never realized it.

This confusion, when it does happen, is usually due to the lack of understanding between the differences of grammar and linguistics. Traditional grammar, for the purpose of this paper, defines prescriptive rules to which "proper" language users should adhere. It is further ironic that in the same passage where Guimarães Rosa calls linguistics the enemy of poetry, he also claims that he wrote in the Portuguese just as they used it in Brazil (Lorenz 70), as opposed to the more formal and "grammatically correct" Portuguese. This is ironic because modern linguistics, on the other hand, defines or predicts descriptive tendencies that speakers frequently follow. A strict grammarian, for example, might condemn my split infinitive (*to greatly impact*) three paragraphs back; while a linguist like Guimarães Rosa might condone it by observing that

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the surrounding of an infinitive around an adverb is a common strategy that English speakers utilize in order *to more closely bind* an adverb with its adjacent verb. In fact, the historical linguist, or even the enthusiast of classical poetry, might point out that these types of interlocking verbal relationships and others such as chiasmus and synchysis have been popular in western literary art for thousands of years due to their highly expressive structure.

It is important to reiterate that linguists and scholars of classical poetry might come to the same conclusions concerning certain uses of language. Roman Jakobson was one of the first to make popular the link between poetics and linguistics. Perhaps one of Jakobson's most famous conclusions in his essay/chapter "Poetics and Linguistics" from *Language in Literature* is that "Poetics deals with the problems of verbal structure, just as the analysis of painting is concerned with pictorial structure. Since linguistics is the global science of verbal structure, poetics may be regarded as an integral part of linguistics" (63). His reasoning is well thought out as he explores many interesting points not only for the reader of poetry, but also for the author of poetry.

Jakobson in another essay/chapter "Subliminal Verbal Patterning" continues this exploration of the poetic process and studies what benefit linguistics should be to poets. He presents his argument by studying what poets often refer to as intuition:

> Phonology and grammar of oral poetry offer a system of complex and elaborate correspondences which come into being, take effect, and are handed down through generations without anyone's cognizance of the rules governing this intricate network. . . . Intuition may act as the main or, not seldom, even sole designer of the complicated phonological and grammatical structures in the writings of individual poets. Such structures, particularly powerful on the subliminal level, can function

without any assistance of logical judgment and patent knowledge both in the poet's

creative work and in its perception by the sensitive reader. (261)

Many of Jakobson's ideas can be extrapolated from this one passage: (1) there is a tacit

exchange of message between the reader and the poet, (2) complex and elaborate patterns are

used to communicate that message, (3) some readers of these patterns might be sensitive enough

to perceive the message; however, poets must be sensitive enough to perceive the message they

are sending, (4) the poet's intuition is based on foundation upon foundation of other people's

tacit rules and corresponds largely to the phonology and "grammar" of oral poetry. Although

each one of these points bears substantial relevance to the application of technology to poetry,

Jakobson's focus is still on what poets often refer to as intuition.

Both the study of poetics and linguistics make explicit much of the intuition that governs

the poet. How can this patent knowledge possibly be an enemy to the poet? It should be helpful.

Having knowledge of these linguistic tendencies of cause and emotive effect --using verbal

structure *A* (sound, rhyme, morphological or entomological derivative, etc.) often incites emotion

B within context *C*-- frees poets from a vague sort of intuition to which they have previously

been fettered without this knowledge. Not all causal linguistic tendencies have been defined or

researched, but the mere knowledge of the existence of some tendencies must empower writers

and scholars of literature. But there is still more resistance.

Literature and Technology

Some people not only believe that literature and linguistics do not mix, but many also do

not believe that technology and literature mix.[10] When this occurs today, it is often the result of

combining the lack of technological training and the lack of easy-to-use technology addressing

literary concerns. It is no secret that most people nowadays email and write documents with

word processors. The transition to these technologies happened easily enough because these high-tech actions are very similar to the low-tech counterpart: typing letters and documents. The variations are very minor and, therefore, easy to learn.

Likewise, most poets today probably utilize some sort of word processor to compose their poetry for the same reasons that they compose other documents by word processors. However, if poets were able to have access to some hypothetical technology that broadened, organized and diversified their abilities in a manner that also shielded the complexities presented in learning the new technology and/or linguistics, the new technology might also be quickly accepted.

The *Colors of Poetry* Software

The software presented in this paper is one possible poetry tool that works on the basic premises of Jakobson that in poetry you find patterns, symmetry and parallelisms, and the basic premises found in fractural analysis of complex systems. In "Complexity, Creativity and Computers" Bossomaier and Snyder note that an autistic genius can be a person "who builds uncharacteristically from the parts without appreciating the whole" (19), and then suggest that geniuses such as Einstein, W.B. Yeats, Cezanne, and Da Vinci all illustrated this same type of adherence, possibly obsession, to low-level details. Then the authors formulate the tacit question: What if the complexity inherent in creativity could be exploited by an extreme attention to low-level details instead of a big picture view? They define the process of a "low-level change with unpredictable consequences" as a *mindquake* (20), a form of instantaneous creativity, and claim that "many mindquakes start with somebody playing with the building blocks, possibly without any intentions or thoughts as to where they might lead." (23). Then they follow this with one final question: Since low-level details are the building blocks of all computer technology, are computers very apt tools for exploiting creativity?

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Although I am regretfully reducing to a one paragraph summary a fascinating take on creativity, their argument supports my own initiative with poetic software and correlates very strongly to William Dickey's insightful observations made circa 1985:

> The computer permits an evident freedom of page composition and presentation: the poem can be written and seen as belonging to a fluid rather than a static definition of visual space. Poetry will move toward a further use of this freedom as text and graphics become interchangeable parts of one language.
>
> As J. David Bolter points out in *Turing's Man*, composition with a computer is in some ways closer to spoken than to written language: the freedom of revision and the effect of moving text permit approximations of improvisatory oral composition. The possibilities of synthesis of text presentation and oral presentation have hardly begun to be explored.
>
> Poetry depends on the quantifiable base of a recognizable rhythmic pattern repeated and varied in time. Such bases can be identified, manipulated, even generated by computer programs.
>
> Poetry is generated by an intersection of form and the unexpected. Even as the computer can recognize form, it can generate or assist in the generation of chance elements through random seeding, opening the way to new arrangements and new associations productive of patterns of meaning. . . .
>
> The computer, always paradoxical, may fling poetry forward and back: to a complex simultaneous language of text/visual/voice and to a formal structure as exact as that of the Irish bards: both elements may be needed to anticipate and respond to human experience in the twenty-first century. (qtd. in Chatfield 179)

The *Colors of Poetry* software works by deconstructing a text into its low-level linguistic building blocks.[11] The user can implement any number of linguistic filters to look at linguistic phenomena that a poet might not consciously think about --at first-- such as voiced versus voiceless sounds, point of articulation or scales of sonority. The *Colors of Poetry* software first identifies these low-level structures, converts them into series of numbers and translates them into various visual effects. For example, each phoneme is converted into a sonority value from 1 to 9 and then later assigned a corresponding color.

This sonority color is the emphasis for most of the analysis in this thesis because sonority is of great importance to poets. First, it highlights rhymes and near rhymes, such as the similarity in sound between /f/, /θ/ and /s/. Each of these sounds belongs to the obstruent class, more specifically as fricative sounds. Sonority corresponds with approximately the amount of airflow during the articulation of the sound, which also corresponds to roughly how loud people perceive these sounds in relation to other sounds. For these reasons, sonority is partly what makes some near rhymes closer than other near rhymes. Accordingly, in Spanish *para* and *cara* are closer in sound than *Sara* would be to either of these words. The p's and hard c's are both considered stops because the airflow stops during articulation, while the airflow is only somewhat restricted during the articulation of the s sound.

The second reason why sonority is important to poetry is because sonority also has a huge impact on the syllable structure in Spanish. In fact, it is probably a universal trait that identifies syllable structure cross-linguistically. The nucleus of every syllable (the highest vowel) will have the least amount of obstruction of breath flow; the beginning and ending of the syllable will have the greatest amount of obstruction. Sonority, whether the student and poet are aware or not, is one of the keys to classical western poetics.

For these reasons, this software and thesis pay close attention to sonority. The sonority of the entire poem is averaged so that the poem may be quantified and compared to other poems; just as each the sonority from each line and syllable is averaged, quantified and represented visually. It is logical to reason that poets will emphasize their important lines by making the lines stand out from the rest of their verses. The average sonority of a line is just one way that poets highlight these lines, but any unique feature could be evaluated. The most common way to make any attribute in poetry stand out is to make it rare. The rarer the element, the more likely it is valuable to the author. If these features can be quantified, their rarity can easily be calculated, or with visual output, seen. The software, thus, quantifies higher level features for the entire poem, medium range building blocks for each line, and then lower and lower levels for syllable and sounds; and offers a means to evaluate the value of the linguistic detail.

However, it does not matter whether a poet is concerned first with higher level details such as message and then later works down to the levels of poem format, rhyme, rhythm and then syllable structure; or if the poet wishes to work first with any low-level aspects of language; the software will allow the user to look at, improvise and play with the building blocks at any stage of their creativity.

The description, thus far, of software that converts a written text into numbers, converts those numbers to images and patterns and then back into a new text sounds much like Eduardo Kak's *Genesis* where verses of the Bible are transcribed into Morse Code and then altered through bacterial culture mutations and then translated back into text (Block, Heibach and Wenz 29). *Genesis* does enable the user to alter text by indirectly manipulating the bacterial culture with ultraviolet rays, but Kak considers this to be an artistic expression through *biopoetry*.[12] Even though the *Colors of Poetry* software does incorporate artistic elements, its author does not

consider it to be a form of artistic expression. It is a tool that anyone can use to write or draw as they please. Artistic aesthetics, in the eye of the beholder, can be augmented by such tools. And this is what I intend on proving.

<u>Proving It</u>

Although the visual aesthetic value from the *Colors of Poetry* software would doubtless appeal to many people --especially the hearing impaired-- as a way of extending the poetry experience; prostesis poetry, in general, has two primary uses: (1) for the student of poetry and (2) for the writers of poetry. I will first illustrate how the *Colors of Poetry* software might enable a novice student of poetry to analyze a poem's structure professionally. My process will be to analyze a few poems with the software. I will then compare the computer generated results with the results from the Spanish poetry expert Antonio Quilis in his book *Métrica Española*. Then I will also use the software to analyze a poem from a resident professor-poet Luis Correa-Díaz and compare my results with his own poetic intentions. These tests should evaluate the computer software's ability to identify linguistic components within poetry, and ultimately illustrate how software could empower novice students with the ability to analyze poems more professionally and confidently.

The second part of proving it will be to prove it to the writers of poetry. My theory is that software with advanced linguistic functionality should enable poets to create finer grained poetry or texts with forms of aesthetics that might be impossible or impractical without software. I will use the software to work with the poems that will have been previously analyzed as proof for the students to illustrate the complexity that this tool allows even a non-native speaker of Spanish to generate poetry.

CHAPTER 2

USES FOR THE STUDENT

<u>Comparisons with Antonio Quilis</u>

Software that effectively analyzes poetry will be able to offer the same quality of analysis that the experts in poetics could offer. This section can be considered a dialog with Antonio Quilis' "Comentarios Métricos" chapter (174) in his book *Métrica Española*. It will show the similarities between the analyses of two set poems that Quilis offers and the corresponding results from the *Colors of Poetry* software. If the results are comparable, it should help affirm that software is at least as valid a tool as Antonio Quilis' book.

```
1.   Quién - di - rá - que - te - vió ↓ / - y_en - qué - mo - mén - to ↓//
2.   Qué - do - lór - de - pe - núm - bra_i - lu - mi - ná - da ↓ //
3.   Dós - vó - ces - sué - nan ↓ / - el - re - lój - y_el - vién - to ↓//
4.   mien - tras - fló - ta - sin - ti - la - ma - dru - gá - da ↓ ///
5.   Ún - de - lí - rio - de - nár - do - ce - ni - cién - to ↑ //
6.   in - vá - de - tu - ca - bé - za - de - li - cá - da ↓ //
7.   Hóm - bre ↓ / - Pa - sión ↓ / - Do - lór - de - lúz ↓ / - Me - mén - to
     ↓ //
8.   Vuél - ve_hé - cho - lú - na_y - co - ra - zón - de - ná - da ↓ ///
9.   Vuél - ve_hé - cho - lú - na ↓ / - con - mi - pró - pia - má - no - ↑ //
10.  lan - za - ré - tu - man - zá - na - so - bre_el - rí - o →
11.  túr - bio - de - ró - jos - pé - ces - de - ve - rá - no ↓ ///
12.  Y - tú ↑ / _a - rrí - ba_↓ / en - lo - ál - to ↓ / - ver - de_y - frí -
     o ↓ //
13.  ol - ví - da - me ↓ / - y_ol - ví - da_al - mún - do - vá - no ↓ //
14.  de - li - cá - do - Gio - cón - do ↓ / a - mí - go - mí - o ↓ ////
```

Quilis' analysis of Fenderico García Lorca's poem "En la muerte de José de Ciria y Escalante"[13] is divided by the criteria of syllabic division, accentuation, pauses and tone. Quilis

then offers analysis very similar[14] to this table (176). The up and down arrows ("↓↑") refer to what Quilis calls tone and what others may call pitch or even intonation.[15] The right arrow represents instances of enjambment.[16] The slash ("/") refers to the pause or caesura type and length; the more slashes, the longer the pause. And the underscore ("_") illustrates instances of synalepha.

By selecting the appropriate settings the *Colors of Poetry* software output does indeed illustrate nearly everything that Quilis acknowledges in his own analysis matrix:

Other than the color shading,[17] the three primary differences between Quilis' analysis and the software's analysis are (1) the type of accentuation analyzed, (2) slight variances in tone or intonation and (3) the instances of synalepha in orange that ignore cases of diphthongization

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already represented in the phonemic transcription. The software relies completely on the phonemic transcription of the text in the background because the transcription automatically includes the syllabification, accentuation, diphthongization, and most instances of phonological groups.[18] It is this information that allows the software to compute its analysis of the poem.

The software's output shows the same syllabification that Quilis points out: that verses 4, 5, 6, 7 and 11 have 11 phonological syllables; 1, 2, 3, 9, 10 and 14 have 12 phonological syllables, but also contain one instance of synalepha; 8 and 13 have 13 syllables, but also two possible instances of synalepha (176-77). The difference in diphthongs versus synalepha is simply two ways of looking at the same phonological element: Quilis is recognizing the word boundaries; the software recognizes phonological phrases (breath groups) instead. In either case, these sounds have the tendency of merging together in speech.

Accentuation analysis of Spanish poems is more problematic. It is debated amongst linguists, and as well amongst poets. The term itself, accentuation, is deceptive because there are different types of accentual analysis. Domínguez Caparrós notes that José Coll y Vehí made this distinction in 1866 between prosodic analysis and rhythmic analysis that is still valid today (82). Most Spanish grammar books give the rules for prosodic analysis; Hammond restates them on page 306, Whitley on page 63 and Navarro Tomás in *Pronunciación español* studies them between 183 and 186. Quilis gives the rules for the rhythmic analysis on pages 22-26; Navarro Tomás lays out these rules on pages 185-95.

Because the former type of accentuation analysis, prosodic, is fairly stable and deviances from the grammatical rules are rare (Whitley, 63), this is what the software uses. The latter type of analysis, rhythmic, also appears to be stable and with few exceptions; however, it relies completely on the grammatical function of the words within a text. That is to say that a poem

that casually mentions *señor Pérez* would have a rhythmic accent on the *o* (/#se·ñór·pé·reθ#/), while the phrase that directly addressed *señor Pérez*, inciting the vocative use, would not (/se·ñor·pé·rez/). The word *luego* as an adverb does retain the rhythmic accent (/#lûé·go#/), but as a conjunction loses this accent (/lue·go/). The word *para* as the third person singular form of *parar* would retain the accent (/#pá·ra#/), while the preposition *para* would not (/pa·ra/). Although a computer program could accurately determine many of these functional uses within prose (and a somewhat less accurately within poetry), the current version of this software does not make these distinctions. As far as rhythmic accentuation is concerned, Quilis observes that all verses in this poem have accents over the 2nd, 4th, 6th or 8th and 10th syllables and concludes that the rhythm is iambic, although some verses contain extra-rhythmic accents as well (178).

The slight variances in intonation --the line borders still show the same rising and falling that Quilis denotes by up and down arrows at the end of the breath group-- shows a little bit more information than Quilis does by following the guidelines that Hammond (317) and Whitley (69) suggest.

Quilis studies the pauses in the poem in a little more depth than the software. Verses 4, 8, and 11 have strophic pauses, and all of the rest of the verses present verse pauses except for the last verse and verse 10. The pause after the final verse is not considered a verse pause because it is the last pause of the poem, while verse 10 contains enjambment and should not pause as the software analysis suggests it should. In this case, verse 10 ends in a noun that is modified by the first word in the next line. Being able to identify cases like this requires, again, the knowledge of the words' grammatical functions. Verses 2, 4, 5, 6, 8, 10, and 11 include no internal pauses. Quilis does also mention that in verse 12 and 14 there are synalepha, pauses and a lowering of tone simultaneously (178-79).

Both analyses were very similar. In some cases the software's functionality is limited --

mostly due to the author's time constraints, but also in some cases also due to semantic and

technical constraints. However, the greatest difference in the two analyses is efficiency. Typing

Quilis' table (without even including the time required by Quilis to analyze the poem) took

several minutes while the software took about two seconds to generate the analysis above.

Automation always works between this balance of accuracy and speed. Software tools take a

fraction of the time to do the job, but human judgment is approximated for tasks that are not yet

implemented in the software. All too often people ask, "Is it better to do the task by hand and

perhaps avoid mistakes? Or is it better to quickly do the task with 95% accuracy?" But the true

strength in these types of software tools materializes when the two methods are combined: the

software generates the initial analysis and the student verifies the accuracy.

Another poem that Quilis analyzes in depth is the poem "A Córdoba"[19] by Luis de

Góngora. Quilis produces a similar table (193-94) to the table before:

1. óh_ex - cél - so - mú - ro ↓ /óh - tó - rres - co - ro - ná - das [↑, →, or none]
2. de_ho - nór ↓ / - de - ma - jes - tád ↓ / - de - ga - llar - dí - a ↓ //
3. Óh - grán - rí - o ↓ / grán - réy - de_An - da - lu - cí - a ↓ /
4. de_a - ré - nas - nó - bles ↑ / - yá - que - nó - do - rá - das ↓ ///
5. Óh - fér - til - llá - no_↓ / óh - sié - rras - le - van - tá - das ↓ /
6. que - pri - vi - lé - gia_el - cié - lo_↑ y - dó - ra_el - dí - a ↓ //
7. Óh - siém - pre - glo - ri - ó - sa - pá - tria - mí - a ↓ /
8. tán - to - por - plú - mas ↑ / cuan - do - por - es - pá - das ↓ ///
9. Si_en - tre_a - qué - llas - ru - í - nas - y - des - pó - jos
10. que_en - ri - qué - ce - Ge - níl ↑ / - y - Dáu - ro - bá - ña ↑ /
11. tu - me - mó - ria - nó - fué_a - li - mén - to - mí - o ↑ ///
12. nún - ca - me - réz - can - mis - au - sén - tes - ó - jos ↑ /
13. vér - tu - mú - ro ↓ / - tus - tó - rres ↑ / y - tu - rí - o ↓ /
14. tu - llá - no_y - sié - rra_↓ / óh - pá - tria_↓ / óh - flór - de_Es - pá - ña ↓ ///

The *Colors of Poetry* software again offers comparable analysis (with all of the exceptions

stated in the previous example still applying). The results, although more colorful than Quilis',

again match up well to his analysis. The theoretical tone or intonation analysis is a more descriptive; diphthongization is automatic, and several sites of possible synalepha are acknowledged. One thing that seems immediately more pronounced in the automatic colored output is the sonority of the different lines. Each of the lines of poetry has a very different average sonority value, here represented by very different colors.[20] In the previous example the fourth and twelfth lines vary the most from the poem average color, whereas in this poem all of the lines show a greater variance. Each line is significantly different from the rest as far as sonority is concerned. The fact that each line has a more unique sound average suggests a continually changing tone in content.
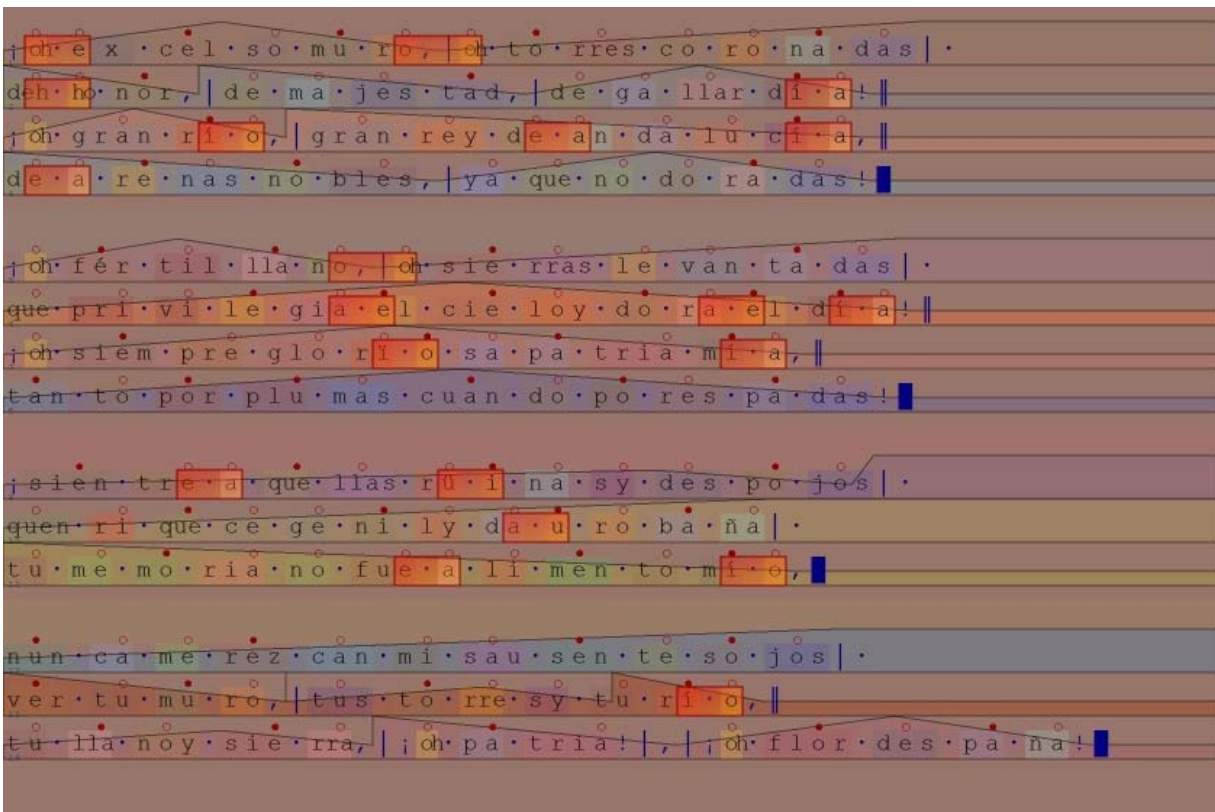
Quilis offers the timber (rhyme) analysis: ABBA-ABBA-CDE-CED (198-199), which the software also has no problem illustrating in its own way:
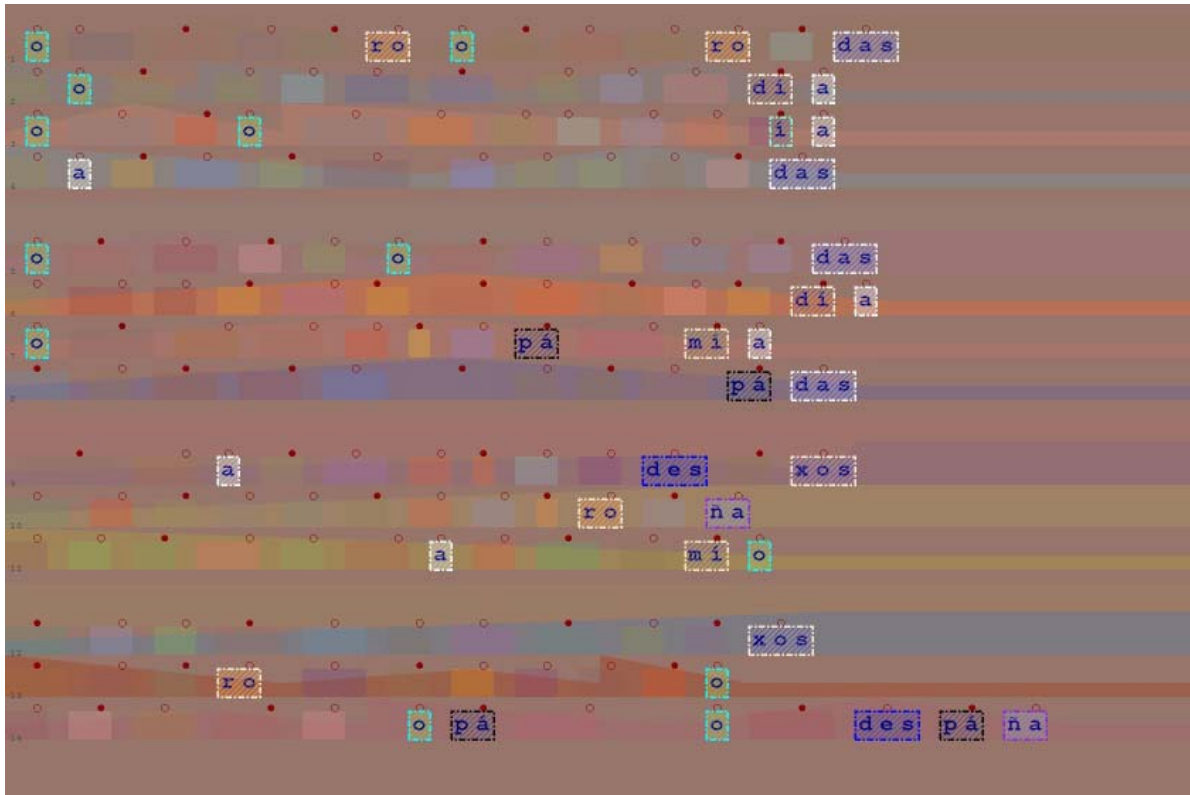
In this case some software settings were excluded to make the image less cluttered by removing most of the text, so that we could isolate the rhyme. The program then analyzed the last three syllables from each line. If any of these syllables matched the syllables at the end of another line, a highlighted color was assigned to that syllable configuration and then the program also highlighted all other occurrences of these syllables throughout the entire poem. This system not only highlights the plays on sound (/*das*/, /*des*/, /*xos*/), but it also shows what could be visualized as a battle between /*o*/'s and /*a*/'s, if you ignore the /*das*/, /*des*/ and /*xos*/'s that stay on the left side of the poem. The /*o*/ syllables attack from the upper-left corner and move diagonally to the opposite corner; while the /*a*/ syllables move from a reciprocal diagonal position to the right side of the poem. The /*a*/'s appear to be either fleeing or perhaps in *rüinas*. It does take a tiny bit of imagination, and perhaps the reader does not even see and/or interpret the same

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contest between these two phonemes and remains skeptical. The interesting thing, though, is Quilis' stylistic analysis of this poem.

Quilis interprets this poem, with the help of Jakobson, as a conversation between the poet Góngora and his beloved city, "Córdoba; ésta es la segunda persona: el receptor. El poeta y Córdoba son los dos ejes del proceso de la enunciación; fuera de esta bipolaridad se sitúa la tercera persona, Granada, que el poeta opone a su lugar de nacimiento." (200). Notice the vocalic structures of the two city names --*o-o* verses *a-a*. Quilis furthers this sentiment saying that the first part of the poem praises C*ó*rd*o*ba and Gr*a*n*a*da is practically despised (202). Quilis, through various types of analysis of the different poetic elements, noted the same opposition between these two cities for the poet that the software found a trace of. The software helped identify one more poetic/linguistic element that supports Quilis' interpretation.

Luis de Góngora is considered a master poet, in part, because he was able to utilize effectively all aspects of his poetry in unison to communicate the intended message. Although it is doubtful that Góngora, while composing his poem, had access to software that helped him visualize the opposition of sounds /a/ and /o/ in the same fashion that I had, it is not doubtful that this oppositional, visual effect was intentional. It is not impossible to find studies of the shared poetics between Góngora and the instigator of visual poetry, Mallarmé. In fact, Gabriel Rodriguez goes as far as suggesting that a French translation of Góngora's "Las Soledades" would have been incomprehensible to the pre-mallarmean French reader (279).

With this poem, software was able to identify not just basic metrics and rhyme, but it also identified a possible theme for interpretation of the poem. The software was able to take the student through the technical steps of viewing the poem's structure, and it highlighted areas that could have importance to the meaning of the poem. The software did not magically interpret the

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poem. Of course, the knowledge that *Genil* and *Dauro* were rivers in Granada and knowledge of the fact that Góngora was born in Córdoba would have been necessary for understanding these highlighted areas of interest.

Comparisons with Luis Correa-Díaz

Theoretical speculation about an author's intent compared to the author's true intent is one type of validation that can, at times, be flawed. What might be more convincing would be to interview Góngora himself and ask what elements did he include in the poem and why (assuming that these poetic elements were deliberate), and then compare the elements that he claimed to have included to the analysis that the software offers. If the software were effective, it would be successful in identifying many of these poetic elements. The only fault to this method is our extremely limited access to Góngora himself. Therefore, I have chosen a more accessible poet, Luis Correa-Díaz.   I took one of his poems "Cordero de Dios," generated analysis with the *Colors of Poetry* software and interviewed the poet, to compare the results of the software with the poet's sense of his own poem.

This offers another good test of the software's utility, this time without the Quilis crutch to lean upon. Correa-Díaz has graciously offered this poem "Cordero de Dios" to analyze, about which he gave me no hints or guidance for interpretation. In fact, he told me absolutely nothing about this poem:

Cordero de Dios

Esta vez sí que las maté
de un viaje le estoy haciendo el juego
que más le gusta a Nuestra Señora de la Soledad a la cabrona
y en su propia casa para colmo le creo todo lo que cuenta
que pasa afuera eso es lo único que la pone
en lenguas echarle carbón al miedo roer la sesera abusar
de un pobre diablo zumbar como una reina
alrededor de las cenizas de la memoria instalarse entre ceja y ceja

meter la mano sucia en la sopa del espejo perseguir con voz
desorbitada los sueños en el jardín de las delicias abrirle un ojo
con el cigarro a cada hoja tapar el sol cuando se cansa el jadeo
que la recorre de un puro silencio llamar su campanario
la queda y reventarle a uno la cara de una cachetada magistral
mandar que se acueste seguido a oscuras
para luego acto imperdonable suyo dejarlo sin comida
cama de una plaza a la que llegará después ebria
de sí pero fría como una tapia la cita parda
de un lugar común donde desovan los que dilatan el suicidio y se
      aniñan con los angelitos
en chácharas platónicas mientras se castigan por la espalda
fetales a cualquier precio total ella paga en oro la idolatría
una las gotas sangre semen lágrimas y la baba dulce
de la sonrisa el charco capital en que se despierta el cordero
y acabe el lector en alegoría si quiere

I used the software to output the closest format that I could to Quilis' initial tables with another of the software's features, textual analysis. Here an abbreviated version displays three different perspectives of syllabification and accent structures for the first ten lines, and is overall fairly compliant to the Quilis style matrix:

```
1.   es·ta·vez·sí·que·las·ma·té
     ó   o  ó  ó  o   o   o  ó
     vc·cv·cvc·cv·cv·cvc·cv·cv

2.   deun·via·je·les·toy·ha·cien·do·el·jue·go
      oo   oó o  o   oo o  oó  o ó  oó  o
     cVc·cV·cv·cvc·cV·v·cVc·cv·vc·cV·cv

3.   que·más·le·gus·ta·nues·tra·se·ño·ra·de·la·so·le·da·da·la·ca·bro·na
      o  ó   o  ó   o  oó   o  o  ó  o  o  o  o  o  ó  o  o  o  ó  o
     cv·cvc·cv·cvc·cv·cVc·ccv·cv·cv·cv·cv·cv·cv·cv·cv·cv·cv·cv·ccv·cv

4.   yen·su·pro·pia·ca·sa·pa·ra·col·mo·le·cre·o·to·do·lo·que·cuen·ta
     oo   o  ó  oo  ó  o  ó  o   o  o  ó  ó  o  o  o  oó   o
     Vc·cv·ccv·cV·cv·cv·cv·cv·cvc·cv·cv·ccv·v·cv·cv·cv·cv·cVc·cv

5.   que·pa·sa·fue·ra·e·so·es·lo·ú·ni·co·que·la·po·ne
      o  ó  o  oó  o ó  oo   o ó  o  o  o  o  ó  o
     cv·cv·cv·cV·cv·v·cv·vc·cv·v·cv·cv·cv·cv·cv·cv

6.   en·len·gua·se·char·le·car·bó·nal·mie·do·ro·er·la·se·se·ra·bu·sar
      o  ó   oo  o  ó   o  o  ó  ó  oó  o  oó   o  o  ó  o  o  ó
     vc·cvc·cV·cv·cvc·cv·cvc·cv·cvc·cV·cv·cv·vc·cv·cv·cv·cv·cv·cvc

7.   deun·po·bre·dia·blo·zum·bar·co·mo·u·na·re·i·na
      oo   ó  o  oó   o  o  ó  ó  oó  o  oó  o
     cVc·cv·ccv·cV·ccv·cvc·cvc·cv·cv·v·cv·cv·v·cv
```

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8. al·re·de·dor·de·las·ce·ni·zas·de·la·me·mo·riains·ta·lar·sen·tre·ce·jay·ce·ja
   o o o ó o o o ó o o o o ó ooo o ó o   o ó oo ó o
   vc·cv·cv·cvc·cv·cvc·cv·cv·cvc·cv·cv·cv·cv·cVcc·cv·cvc·cvc·ccv·cv·cV·cv·cv

9. me·ter·la·ma·no·su·cia·en·la·so·pa·de·les·pe·jo·per·se·guir·con·voz
    o ó o ó o ó oo o o ó o ó o ó o o o ó o ó
   cv·cvc·cv·cv·cv·cv·cV·vc·cv·cv·cv·cv·cvc·cv·cv·cvc·cv·cvc·cvc·cvc

10. de·sor·bi·ta·da·los·sue·ño·se·nel·jar·dín·de·las·de·li·cia·sa·brir·leu·no·jo
    o o o ó o o oo ó o ó o ó o o o ó oo o ó oo ó o
   cv·cvc·cv·cv·cv·cvc·cV·cv·cv·cvc·cvc·cvc·cv·cvc·cv·cv·cV·cv·ccvc·cV·cv·cv

What it is missing in this text-based analysis are possible sites of synalepha and analysis of tone. It does show diphthongization ('V') but not the possible locations for synalepha because this feature is not yet present in the text-based analysis (only in the image analysis, which we have already seen). Tone, on the other hand, is much more difficult to quantify in either format with this poem because it lacks all punctuation. This poetic element forces the reader to interpret the tone from the context and words alone. This is a much larger, and more fundamental, limitation of this prototype software. The software that would effectively do this would have to do the same thing that a human would: read for context and rely on a history of word associations for possible interpretations --another feat beyond the scope of this relatively short thesis, but not completely impossible.

So what does the software accomplish with its visual analysis of this poem? The visual analysis here is not as useful for identifying the metrics because this poem pays much less attention to metrics than the previous two poems. Nevertheless, the visual interpretation suggests that the poem does display careful attention to sonority. Because each phoneme is color-coded by sonority and each syllable is color-coded by an average of all of its constituent sounds, any visible color pattern is also a sound pattern that was encoded by its author.
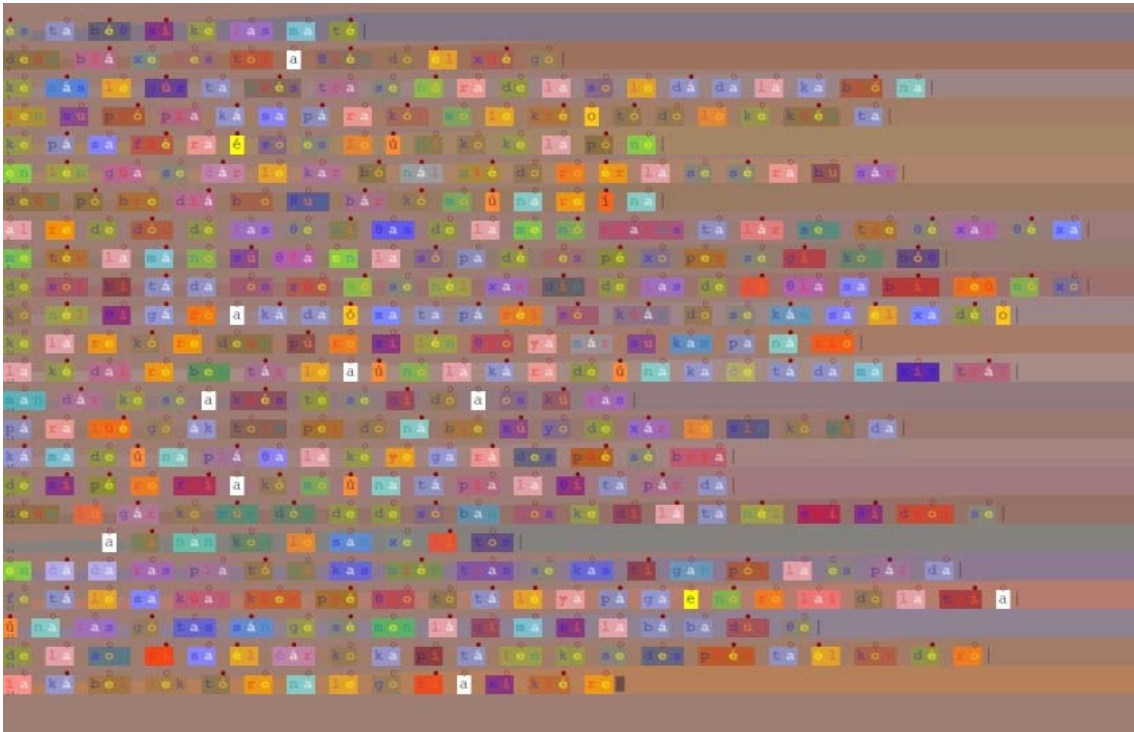
Follow the green shades (stops, affricates, fricatives are blue; nasals are green; and /o/'s and /e/'s are yellow) along the left-hand side and along in the center of the picture. A vague figure eight forms an axis between these shades of green and is highlighted by patterns of orange and pink. The highlighting makes more sense when you realize that the /y/'s and /r/'s are a shade of red all combined with either the yellow vowels or the white /a/. Then if you follow these axis curves to the end of the poem, you will also note a wavy correlation at the ends of each line.[21]
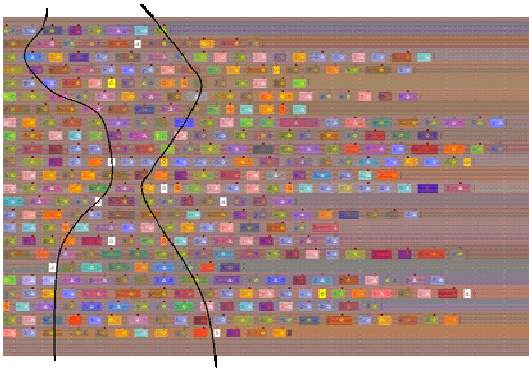
Whether the author intended this effect with great deliberation, or this pattern exists perchance is irrelevant. The effects are there and they highlight an important sound axis to this poem. Jakobson claims that "[w]ords similar in sound are drawn together in meaning." (86). These similar sound patterns also fit into Jakobson's concept of parallelism that is according to him necessary for any poetics.

If we use the visual analysis to break up the poem more or less along this sonority axis, we do find three tiers of meaning (though not as elaborate or designed as Octavio Paz and Haroldo de Campos' "Transblanco," for example). If I were forced to make broad generalizations, I would conclude that the first column tends to set the stage or finishes the thought presented in the line above; the second tends to invoke strong mental image; and the third tends to explain. The two most flagrant exceptions to this generalization are the first and last lines. In the first line the first few syllables appear out of place, and according to the sonorous division of greens on the outside, blues and purples on the inside the /te/ and /ke/ syllables fulfill this function, but also split up the word *maté*. It is not clear which column *maté* belongs in adding to the immediate confusion. Who or what was killed? Why? The last line is less problematic and clearly isolates an axis of significance: *y acabe el lector / en alegoría / si quiere*.

1.	Esta vez sí que	las ma	-té
2.	de un	viaje le estoy	haciendo el juego
3.	que	más le gusta a Nuestra	Señora de la Soledad a la cabrona
4.	y en	su propia casa para col-	-mo le creo todo lo que cuenta
5.	que	pasa afuera eso es	lo único que la pone
6.	en len-	-guas echarle car-	-bón al miedo roer la sesera abusar
7.	de un pobre	diablo zumbar	como una reina
8.	alrededor de	las	cenizas de la memoria instalarse entre ceja y ceja
9.	meter la mano	sucia	en la sopa del espejo perseguir con voz
10.	desorbitada	los sueño-	-s en el jardín de las delicias abrirle un ojo
11.	con el	cigarro a cada hoja tapar el sol	cuando se cansa el jadeo
12.	que la recorre de	de un puro	silencio llamar su campanario
13.	la queda y reven-	-tarle a	uno la cara de una cachetada magistral
14.	mandar que se	acues-	-te seguido a oscuras
15.	para luego	acto imper-	-donable suyo dejarlo sin comida
16.	cama de	una plaza a la	que llegará después ebria
17.	de sí pero	fría	como una tapia la cita parda
18.	de un	lugar común	donde desovan los que dilatan el suicidio y se

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19.	aniñan	con los	angelitos
20.	en	cháchacras	platónicas mientras se castigan por la espalda
21.	fe-	-tales a cual-	-quier precio total ella paga en oro la idolatría
22.	una	las gotas sangre semen	lágrimas y la baba dulce
23.	de	la sonrisa el char-	-co capital en que se despierta el cordero
24.	y acabe el lecto-	-r en ale-	goría si quiere

If one re-reads the poem by this very approximate division of sonority, the intended message becomes a little more apparent, but not crystal clear. A fuzzy image or emotion emerges especially when the readers follow this axis. I would describe this poem as a form of sonorous impressionism. Images and sounds are suggested, and when the poem is finished, the readers end in allegory if they so choose. The *Merriam-Webster Online Dictionary* defines Allegory as:

> **1 :** the expression by means of symbolic fictional figures and actions of truths or generalizations about human existence; *also* **:** an instance (as in a story or painting) of such expression
>
> **2 :** a symbolic representation **:** EMBLEM

Both of these definitions seem appropriate for a poem that expresses feelings or evokes images which may not be able to be expressed with straightforward language; a poem whose narrator describes actions, which are certainly symbolic and not literal; and a poem that represents all of this emotion and frustration with a fuzzy symbolic representation. But it is not the poem that ends in allegory, it is the reader because in order for the reader to discover the allegory, the reader must participate. The reader must collaborate with the parallelisms that this poem offers primarily in sound.

Or so was my interpretation with the aid of the *Colors of Poetry* software. To be quite frank with the reader, I was expecting approximate results along the same lines that the software

offered for Góngora's poem, especially due to the fact that this poem was so very different than any of the poems that I had as yet tested with the software. There was no punctuation, little capitalization[22] and no standard classical poetic form was used. I was not expecting such accurate and complete results.

When consulted about his intentions and after having read the above analysis, Correa-Díaz called these results "gratamente sorprendente" in personal correspondence. He was astonished because the software's analysis was precisely able to isolate sonority as key factor in his poetic intentions: "I view parallelism in sonority as a means to carry a unique meaning through the entire poem." (Correa-Díaz). Furthermore, in response to the axes of meaning that the sonority analysis helped identify Correa-Díaz affirms "This is a very perceptive way to put it, and I think the program has helped the reader to come to this."

It appears that Correa-Díaz agrees that software makes a valuable tool for the readers of poetry. Now what can I do to convince the readers that software can be an invaluable tool for the poet?

CHAPTER 3

USES FOR THE POET

If I Were a Poet

In order to prove the value of prosthesis poetry, this section will provide some examples of how software might be used to compose poetry. The *Colors of Poetry* software was the principle software tool that I used in tandem with the occasional reference to Mark Davies' *Corpus del Español*[23] website. I must emphasize that I am not a native Spanish speaker and I do not write poetry. It is not my preferred literary genre. In fact, as far as poetry is concerned, I, along with Marianne Moore, dislike it (even though I have developed a genuine respect for poetry through my efforts writing this thesis and software). Therefore, for all intents and purposes the odds of my being able to write quality poetry in Spanish are negligible. With the odds against me, I offer some examples of poetry merely to illustrate a few possible strategies for using software tools to write poetry.

Example 1

My very first attempt at creating poetry with the *Colors of Poetry* software was to add two extra stanzas to García Lorca's "En la muerte de José de Ciria y Escalante." I was not trying to forge new stanzas that could pass as originals written by García Lorca. In fact, I paid little attention to copy style or content. This was more an exercise in what all artists do: replicate other artists' work.

In this case I replicated the levels of sonority that García Lorca had already laid out in the poem that we have analyzed in the previous chapter. I inserted two new stanzas that copy

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sonority from the lines in previous stanzas. This provides a very rigid constraint if each sound of

the new line must match the corresponding sound in sonority. In this attempt, the first line of the

each new stanza matches the approximate sonority of the last line of the previous stanza; the

second line of the new stanza matches the penultimate of the previous and the third line matches

the antepenultimate of the previous stanza. Here is the visual analysis of the original lines

matched with the corresponding new lines that were developed with the *Colors of Poetry*

software:

mien·tras·flo·ta·sin·ti·la·ma·dru·ga·da.
miem·bra, vo·ce·sin·ti·mas, o·bli·ga·da.

dos·vo·ce·sue·nan: el·re·lo·jyel·vien·to,
voz ob·se·sión·fiel, llo·re·syal·tiem·po

¡qué·do·lor·de·pe·num·brai·lu·mi·na·da!
de·do·ler·te, al·men·dra·e·li·mi·na·da.

tur·bio·de·ro·jos·pe·ces·de·ve·ra·no,
vir·tió·el·pró·cer, ve·jez·ve·te·ra·no

lan·za·ré·tu·man·za·na·so·brel·ri·o
ran·cio, re·di·men·de·li·ne·fa·ble·li·o

vuel·ve·cho·lu·na: con·mi·pro·pia·ma·no
vuel·co, é·cha·lo·al·ma·tón·mi·cro·bioi·na·ne

At a few points there are slight variations including a few extra syllables and occurrences

of punctuation (pauses in breath flow), but overall the similarities should be obvious through this

visualized sonority graph generated by the software. Here are the new matching lines merged within the original poem:

¿Quién dirá que te vio, y en qué momento?
¡Qué dolor de penumbra iluminada!
Dos voces suenan: el reloj y el viento,
mientras flota sin ti la madrugada.

Miembra, voces íntimas, obligada.
Voz, obsesión fiel, llores y al tiempo
de dolerte, almendra eliminada.

Un delirio de nardo ceniciento
invade tu cabeza delicada.
¡Hombre! ¡Pasión! ¡Dolor de luz! Memento.
Vuelve hecho luna y corazón de nada.

Vuelve hecho luna: con mi propia mano
lanzaré tu manzana sobre el río
turbio de rojos peces de verano,

Virtió el prócer, vejez veterano
rancio, redimen del inefable lío.
Vuelco, échalo al matón microbio inane.

Y tú, arriba, en lo alto, verde y frío,
¡olvídate! Y olvida al mundo vano,
delicado Giocondo, amigo mío.

The second and fifth stanzas are, of course, the amendments. I did not highlight the text using any special formatting or emphasis because I wanted the reader to realize just how much these verses already stand out due to the lack of attention to meaning and rhythm. They do not seem to fit, but are included anyway so that the reader can compare the variances in sound with the corresponding original lines. The fifth stanza is more pronounced than the second because its words are further from the traditionally perceived rhyme. However, I did not go as far as to pair *mano* with *llámame* (49·48 and 59·49·48, respectively).

The strikingly out of place stanzas suggest that sonority is not the most important aspect in writing verses "similar" to others. Naturally, rhythm plays a very important role in poetics. It would make an interesting linguistics study to quantify this and compare it with other perceived aspects in poetry harmonics. That would tell us what traits in a poem (per various social demographics, perhaps) are more important to incite certain desired effects. If such a study were to conclude, for example, that people tend to associate phrases with parallel sonority, poets could associate one metaphor with sonority instead of *like* or *as*; or even more likely, marketing companies could use software to associate one item of mass appeal to the product that they are selling.[24]

Example 2

The second example still works with García Lorca's poem, but strays from an adherence to sonority. This time the aesthetic adherence is set to voiced and voiceless consonants. In English this is the difference between "z" and "s," "g" and "k" or "d" and "t".[25] This can also account for some near rhymes such as *to* and *do* in English. The sonority scale in the previous poetry example ranged from 1 to 9. Now the range is binary, 1 or 0. The example that might best appeal to members of the digerati would somehow embed binary code into a poem, but this study is not so esoteric. Instead, it applies the constraints of a different pattern: Morse Code.[26] I wrote a small phrase in Morse Code for each line. Then I looked for words where the consonants matched this pattern constraint with all voiced consonants being dashes and all voiceless consonants being dots. This means that every consonant in this poem communicated two messages simultaneously: the traditional sound that is represented by the grapheme, and now also either a dot or a dash as part of a Morse Code message. The result is what could be seen as two responses, a poem within a poem, to García Lorca's original poem:

En las muertes de José de Ciria y Escalante y Federico García Lorca

¿Quién dijo que te fió, y en nada fijas?

```
.-  -..  ..  ---  ...
 a   d   i   o   s
```

¡Qué dolor de lares que captó bichos!

```
.---  ---  ...  ..-..
 j    o    s     é
```

Dos captan valor: el pueblo y cieno.

```
- .  ...-  ---  -.--    .-
t e    v    o    y      a
```

Constan de caídos, y sin tu graznar, cien cielos.

```
.  -..-  -  .-.  .-  --.--  .-  .-.
e    x   t   r    a    ñ     a   r
```

Tu yema gestó tu nardo fosco,

```
.-  -..  ..  ---  ...
a    d    i    o    s
```

Triscando la cabeza de cada Titán.

```
.-..  ---  .-.  -.-.  .-
 l     o    r    c     a
```

¡Vates! ¡Huesos! ¡Dolor de luz! Mentor.

```
- .  ...-  ---  -.--    .-
t e    v    o    y      a
```

Por poesía mera, Eúfrates vuelve hecho luna y placidez.

```
.  -..-  -  .-.  .-  --.--  .-  .-.
e    x   t   r    a    ñ     a   r
```

Por poesía traspasó mi propio artificio.

```
.-..  .-  ...-  .  .-.  -...  .
 l     a    v    e   r    d    e
```

Idóneo, tu manzana arrojo hacia el río oscuro

```
--  .-  -.  --..  .-  -.  .-
 m    a    n    z    a    n    a
```

de turbia presencia de ahogado salmonete ya.

```
-.--  .-  .-.  ---  .---  .-
 y     a    r    o    j     a
```

Y tu imagen está alto--tus fríos paseos iguales arriba

```
.-  .-.  .-.  ..  -...  .-  -.--
 a    r    r    i    b    a    y
```

¡olvídate! Moscas y cisnes--todo se puso vano con este mundo,

```
---  .-..  ...-  ..  -..  .-  -.  -..  ---
 o    l     v    i    d    a    n    d    o
```

Si naces, la muerte te sigue y tu perdón escapa.

```
.-..  ---  ...  -..  ---  ...
 l     o    s    d    o    s
```

Wherever possible, I tried to reuse the same words from the original poem. Nearly every line reuses one of the original words, but this proved difficult when none of the words fit at all in the aesthetic pattern of the Morse Code message. One of the more difficult lines "¡olvídate! Y olvida al mundo vano" has just one voiceless consonant, the /t/, while the corresponding Morse Code has 14 dots and 12 dashes. It was felicitous that *olvidate* had three voiced consonants and one voiceless, matching the first four pattern parts of the Morse Code message. Nonetheless, it was impossible to keep *mundo* and *vano* together. The process of filling in spaces from this pattern was greatly facilitated with two of the software features: the visual output and the word query functions.

The visual output helped very much seeing this pattern because the voiced consonants are underlined as if they were the Morse Code dashes, while the voiceless are represented by highlighted blue circles as if they were dots. Words could be moved to one side or another, and new words that completed the pattern were inserted. The final image, without any text displays this Morse Code message depicted in voiced and voiceless consonants. The idea of embedding codes or secret messages in poetry, of course, is not new; however, what is new is the availability of technology to make this task much easier.
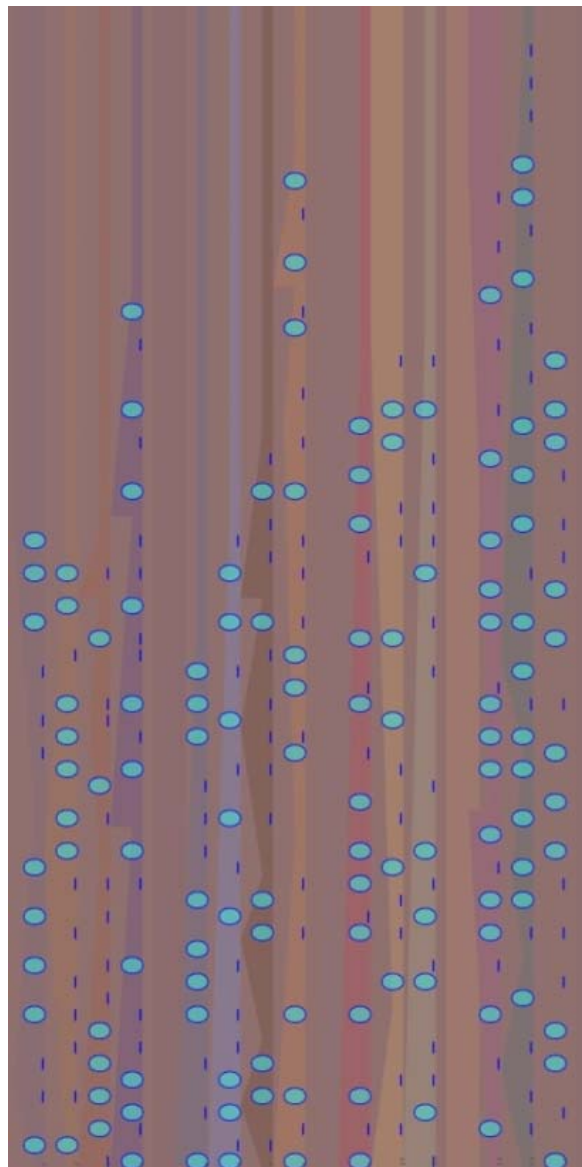
The Word Lookup feature then allowed me to enter in the precise pattern template that I was looking for such as "V*V*U*V" (Voiced-anything in between-Voiced-anything in between-Unvoiced-anything in between-Voiced). If I were lucky, a list of 15 to 300 words would fill this requirement, but in most cases I had to choose from about 2,000 words for each pattern grouping that I tried to match. Once I had the list of possible words to choose from, it was merely a matter of linking these patterns and words in the poem. This process mirrors what poets must often do, whether consciously or not: they look for the best word, in meaning and other aesthetic constraints, from all of the combinations that they deem possible. The poets' lyrical genius will be proven if the audience, too, perceives these groupings of words as the best. But not all poets are lyrical.

Example 3

The next few examples that this paper illustrates, work loosely with Góngora's poem "A Córdoba" that was analyzed in the previous chapter as well. These two examples are less formalistic and more visual in nature, and both share the same basic technique. First I used Jonathan Mathews' *ASCII Generator dotNET* to convert an image into its ASCII[27] text image equivalent --an impression of the image using only the plain text letters "CÓRDOBA" and "córdoba." Once I had an image drawn out in text, I used the *Colors of Poetry* to do the same type of interpretations of this text image that we have seen in the Garcia Lorca examples.

The first ASCII image was of a flower, the "flower of Spain." The entire image was much too large to show; and a resized, smaller version looked so convincing that it appeared to be nothing more than a black and white image of a flower.[28] Below illustrates a portion of the eye of this flower of Spain and one of the petals.

```
rcorcrrrcAaorrcoccrrrrrrrcoooooocoocrrrrrrrrrrrrrrrrrrrrrrrrcooCaaCocrrrrrrrrcoaorcccrroBBBBrr
rrccrrrrrccccrrobcrrrrrrcooooooocrrrrrrrrrrrrrrrrrrrccoCabbAoocccccrrrrcoCbODDOdacrocaBBBBord
rrrcrrrcrrcoorrorrrrrrcooooocrrrrrrrrrrrrrrrrrccooCCCCCoocccccoCbÓÓBOCabbbaCCCAaaCcCCBBBBBbr
rrrrcodbbÓBÓOCrrccrroCocrrrrrrrrrrrrrrrrrcccoooccrrrrrrcoaÓBBBBBBBBBAooooooooCCCaCCÓBBBBBB
rrccobBbobbbÓBBÓadaborrrrrrrrrrrrrrrrrrrrrrrrrrrrccoCdÓBBBBBBBBBBBBBBBBBaooooooooCCCobBBBBBBBB
rccobdaooccoaCbÓBOObaCrrrrrrrrrrrrrrccccooaÓBBBBBBBBBBBBBBBBBBBBBBBBÓaooooooCCoCBBBBBBBC
ocBcbDoCórdobacoÓBOrCBOrrrrrrrcaOaooccccccccccrrrrrrrrrrrrrrcCÓBBBBBBBBOaCoooccaBBBBBbc
ocBoAaCórdobaCórdobabdBbrrcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrroOBBBBBBBBBBOÓBBBBBBBocc
ccBoCórdobaCórdobabCaÓBBÓÓÓÓÓOdbbbbbaACCooccccrccccrrrrrrrrrrrrrrrroOBBBBBBBBBBBBBBBcoo
rccBrrCórdobabDDadbÓDÓÓÓBÓaCÓObDÓÓÓÓ000dbbACooooccccccccccccooocrrrrrrrrrcaBBBDOBBBBBBBBoo
ccddBccCórdobaCÓBaBÓDbabbbacoCrrccooCAaaabbbddDDddbbbbbaaCooocrrrrrrrrrrrrrrraBBBBBBÓBBBocc
croOBODbbaoÓbdBBOdabdbCCoooocrrrrrrrrrrrccccccccccccccccrrrrrrrrrrrrrrrrrrrrrrrCBBBBBBÓoc
accocoCDoCBDBBÓaDACÓÓOdbbCoCoorrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrcBBBBBdcc
BcrcocCocoaoDbCAbbaCbbbbbbcoaacrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrroBBBbco
crrcÓaaAaACaCadOBÓbooCaaCccaOOarrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrBBOco
rrrróbocodBBbbOÓODDarrrrcoocccrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrBBoc
rrrcDorrraCCCcrcadbÓorrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrÓBBD
rrroAorrcorrrrrrobCbrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrDBBB
rrcCCcrrcorrrrrrrccrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrraBBB
rrCACrrcocrrrrrrrroorrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrcoCBBBB
cAAcrrrcccrrrrrrrrrrobcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrBBBBBB
barrrrccccrrrrrrrrrrrrAOcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrroBBBBB
CrrcrrcccrrrrrrrrrrrrbórcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrcrcCbBBBBBBB
rrrcrrccrrrrrrrrrrrrrbóorrrrrrcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrBBBBBBBBBB
rrrcrrcccrrrrrrrrrrrrraóorrrrroocrrrrrrrrrrrrrrrrrrrrrrrrrrrCBBBBBBBBBBBBB
rrrrrrcccrrrrrrrrrrrrrraóCrrrrccoocrrrrrrrrrrrrrrrrrrrrrrrrrrrrcBBBBBBBBBBBBBB
rrrrrrcccrrrrrrrrrrrrrrrbDacrrrrrrroaoocrrrrrrrrrrrrrrrrrrrrrrÓBBBBBBBBBBBBB
rrrrrroccrrrrrrrrrrrrrrrrbbacrrrrrrrrooOBBBÓorrrrrrrrrrrrrrrrrcBBBBBBBBBBBBBB
rrrrrrccrrrrrrrrrrrrrrrrrrcbaaorrrrrrrrrcOObDDCcrrrrrrrrrrrrrrrroOBBBBBBBBBBBBBB
rrrrrrccrrrrrrrrrrrrrrrrrrrcaCAorrrrrrrrrrcObdOÓDCcrrrrrrrrrrrrcaÓBBBBÓÓÓBBBBBBBBBBBBB
rrrrrrorrrrrrrrrrrrrrrrrrrrcCCCorrrrrrrrrrrcDaAabbDDDOBÓBBBBBBBBBBBBBBBÓÓÓBBBBBBBBBB
rrrcrrrccrrrrrrrrrrrrrrrrrrrccoCocrrrrrrrrrrrrcbCoCCadOÓÓBBBBBBBBBBBBBBBBBÓÓBBBBBBBBB
```

The output from the *Colors of Poetry* software was also much too large. In this first image

I have selected approximately the same region from the ASCII picture above:

The two different sections do not appear very similar. This image remains unclear until you view the entire image at 13% the size of the original *Colors of Poetry* output:

The image, aesthetically pleasing enough, creates a metaphor that is worthy of Guillaume Apollinaire. From a linguistics point of view, the ASCII version could not really be pronounced; from a poetics point of view, a flower is created by the word *Córdoba* alone through the interpretation process that the software offers. And yet this image incites an extremely emotive but visual effect from the dramatic contrast in colors. It suggests both violence and tranquility jumbled together.

Example 4

The next example utilizes the same basic technique, but this time the metaphor I create is a different type of visual metaphor of Góngora's poem (simulacrum, if you like that term). First, I converted Góngora's poem into an image. Of course, it is difficult to distinguish between the text and image; they look nearly the same; and that is the postmodern point.

```
             A Córdoba

    ¡Oh excelso muro, oh torres coronadas
de honor, de majestad, de gallardía!
¡Oh gran río, gran rey de Andalucía,
de arenas nobles, ya que no doradas!

    ¡Oh fértil llano, oh sierras levantadas
que privilegia el cielo y dora el día!
¡Oh siempre gloriosa patria mía,
tanto por plumas cuando por espadas!

    ¡Si entre aquellas rüinas y despojos
que enriquece Genil y Dauro baña
tu memoria no fue alimento mío,

    nunca merezcan mis ausentes ojos
ver tu muro, tus torres y tu río,
tu llano y sierra, ¡oh patria!, ¡oh flor de España!
```

Then I used Mathews' software again to take this image of the text and convert it back into an ASCII impression of the text image above using only the letters in *Córdoba*. From there I changed the last few "words" to include the letters *oh flor de España*. In the end we have text that looks vaguely like the original poem; however, the text is not nearly as comprehensible in the traditional sense as the original poem. It is an ASCII impression of the original poem, a vague reference to the *flor de España*.

```
                                  o
                A      Cc  oÓoRrrdDoOoBb A
                aaa    CCoooOr dDDCooBBaaa


           r BBDBb    rBcrÓrCrrÓó B co Cd    cBbócoócrbó      bACBC   BB óCcdrobroÓrCc    cC obcbcrdccOc OroBrcCrAr
           BroOcoOr  cBrcBrBcrBc B rBrOBr  AbÓBBóB rBB Ór    BÓoCB    cb BÓCo dc Ób cB   AO bBoB rBCCóCcBobBrBBrÓc
        o                                                                                                      r
oBÓoO    COrroroorCcror      CBrbc    ÓOrró drrArcr B  cccBC      cBBrb    Co or B bb cocorrBccA ro B
bBoOC   cACoBoCóoÓóAo B   rBocBr    BbBóB BcCd có Ó rBdoBc Ó   oBoAd   rBrBb B od ÓBbc bBrco BB C
                 r                                r                       rr
   BBdBo    corcr roróc   Óc Ór Ac     ocrc  CroC   co córcc  rDÓrbr  rBorCrrBc b B rcccr CC rC
rB óbcoÓ   dBBO ÓBCÓó   B  BrrBb B   rBBóc cBÓCÓr  bo ÓdrBB   oBoóO   rDoCóCoÓroB ÓrcBAAc Có BB Ór
 o           r                             r                                                      r
róAcC    ocrr oArCc ccro   bcrCrBbroO or Cr    roc oc   cccccrór  Óoroc  cBCccrCr orrBc A or B
AÓcOC   rBOdr BorbbrBBrBr  rÓóoBooBrrO Br Oo B   rBBrBB  ÓBÓÓOoBr  BboÓÓ  dÓcóDod rBboÓcoBrCA A
                                     r      r          r


                        r
           r BBDBb    rBrcBcóc Br B rB    Bc B  DcbAróA     bACBC   oo dC BocóróorrOrbr  cB OócoC AcCDrBc cCrBB OrCc
           BroOcoOr  rB bC B  Br B  B   Bo B cBóAbCÓB dr  BOoCÓ   cB oD Bróc B  dBrCd   rB BorBorBóCDror BBoBocBcoB
        o                                             c                                  c
obccocdC    coroc Brrcc B CÓ dcroc B ró    rDr B    Ar B oO oC Co    orr   CBrCroc rb   córrB    óB B ó BB
bBBoBcBc    BBcó  Bc Bc B có BrcBB B oBr  oBr B   rBr B OO cb BÓ   BBc  rBócBoÓ óB   CBrrB    rBD B cBrrr
          r                            r                                r
   BÓCBo    rc ob bcrdocororróo   corcb bccorrB CCror oc    Co rorB cr bC ro   bOroó cA
rB AócoÓ   rBrcÓ BrcbOBBcB  Bc   OBórD BAóc B ÓBrCCrBB   BDrOB Ó B  CO BB   Bóbob BB Ór
 C                          r                          r
CD  CrCcrB cAr   Ccrorrc    Co B crrCbrro Cr   Crrcc ccoórrBcoc   oCrcorCr   oó crroc cccBorOrbr Br
rO oBCóo B CBo  rBAcBoDr   cBO B oBCOóÓóBrDo   BrrBBrBOCóoCDcÓÓ  BBcbOoD    Bd obCBArBboBcCBróó ó
            r               r                                     r                    r


           r oB CÓ   rBcoOrBorÓrrBc   rÓróooocCÓrAB Br Ccco   rÓrOÓDrB Ób cArór   Cor  cBBcOrCcrbcrdc B óArbr
           Br ÓrcB  oBrbdcccrB cBr   dBoDBoBbóO cO ÓcrBÓrBr  có cBC B OdcóBrÓo   BB   oBobb oDóBCoBC BrBBrób
         C                           r                                           r r      r        r
obccocdC   cbroCrbr B rorrcrócro oOr rBrrórcó oC Br   ocr  cBd crcccorroc  BD  ooBB cr
bBBCBoBc   OO bóbO  B oBBoBcBrcO bO   OocBróbccÓ Bo  BBc  rBcrBboBCÓ rBÓ   ÓdroBooorBÓ
           r                           rc                        r
CÓ cc    cBCcCrCócocrCr B ó   córrór    Brrcrrór   rb B Ó BbcCrrCród oC   oÓorB oo
rD DBr   oÓÓBb BCBdóóo  B CBr  CDAoBc    B cBóAO    BB B rB BCBBroboró BB   bDBrB ÓB oo
           r                                                                         r


                 cÓcooooAórór oC   BÓobocbroÓrrdrbr CcoOr  rBÓrB co    cCcocco bócDocB oÓrCc    cOc B AArbr
                 COóoBóCbCBrrBB   BóBBrCo ÓÓ borBrrBOCOC  rBÓcB rBr   BBoBdrBrBocbb B ÓD oB   oBC BrÓBrób
                                                                                             r   r
óocobrbr  óB cc   rOCCccor oo    Bc ccro  Bc orrorocróó or   orr   B ccc  dc BrrCr
oBrBorB   rb dBr  oÓÓBÓcÓ BB Dr  Cc BBrbo  órrBAbc B Bo Cb   BBc  B cBO  B BrcBo B
                                                                            r                              cr
óB ccr   B  B  órbcror  oc   rCrrB ACrCrcCr br    r cArBo   cór o Bcrór B  d BB      oOóH    FF l Orr  DDee   EessPp a  ña A  Bo
rO OBr   Br B CBAóóoBb  BBr  rÓc B BorÓ óo oBo B   B óBooOr  BBcrBrorrÓ B cBrrc oo   cB oOoHh  Ff LóóOR  DdeE   EeSSPpAaAñÑñaaa o
           r                       r      C        r                      r       o
```

From this impression I used the *Colors of Poetry* software to format the visual analysis into the same manner that I had for the earlier "flower of Spain." Though the results may be less emotive than the "flower of Spain," the interpretation of this "poem" is much more comprehensible. What is poetry? Can poets compose truly original poetry? Is it simulacrum? Is there nothing new under the sun? Which is more significant, structure or sign? These are obviously popular postmodern questions that this poem raises. Then in applying the visual analysis to this poem and submitting that as the "new" poem, it instantiates a subsequent Warholian view of intellectual property far from the intentions that Góngora presumably ever had:

41
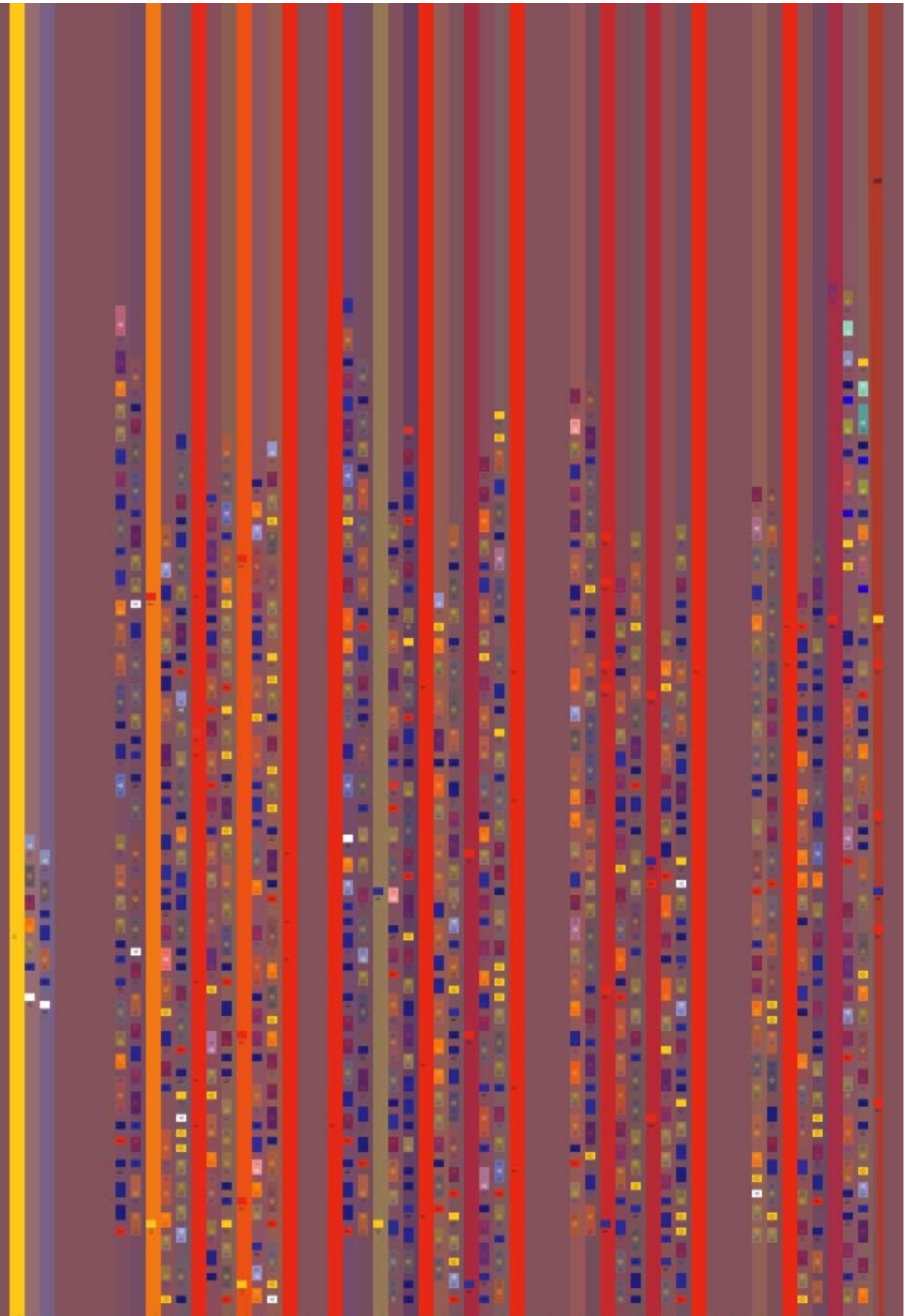
<u>Example 5</u>

For my final poem I put aside these purely visual means of creating poetry and returned to a slightly more semantic approach. I took another look at Luis Correa-Díaz' poem "Cordero de Dios" and its sonority axis and the patterns that it forms. With the aid of the software, the exploitation of these sound axes is simplified. Again I used the *Colors of* Poetry Word Lookup feature along with Mark Davies *Corpus del Español.* I tried to maintain the same meaning and tone, and changed principally the words in this original axis:

Cordero de Dios jr

que la embarré este turno yo sí
de una querella la estoy ensuciando más el juego
que más peló la mala reina así Nuestra Señora de la Soledad a la cabrona
todo que coarta para que lo suyo me tragara para más remate
que sucediera afuera a reses suyas es lo único que la ponía
de miedo vadear la cabeza cíclope y crucífera
yo su sumo peor nulo yo afligido me acosa su griterío de madona
llegó a aullar el loro y relatar su perpetua memoria a instalarse entre ceja y ceja
meter a filo sucio en que percibo el espejo con voz
exagerada el reino por la cima del jardín de las delicias quemar
con el cigarro diurno al hartísimo sol cuando se agota el jadeo
fatigoso receloso en puro silencioso llamar su campanario
la queda y reventarle y en benéficas cachetadas magistrales
se ha de recluir reposado en consumiendo llamas de oscuridad
sigue luego el acto inhumano que es suyo, ahí a mano abierta sin comida sin nada
suele a una cama de plaza encasillar a la maraña después beoda
pero de sí fría y serena amen en cita una mañana obligada
de un lugar y por mermar en el suicidio azul y no a fe se
    bañan ellas en las abundancias
en una frívola cháchara mientras se castigan por la espalda
fetales a cualquier valor total ella paga en oro la idolatría
una las gotas sangre semen lágrimas y la baba dulce
de la sonrisa el charco capital en que se despierta el cordero
y acabe el lector en alegoría si quiere

Now if we review the visual analysis we will see the sonority axis better defined. Patterns of clear correlations of sonority can be easily identified:
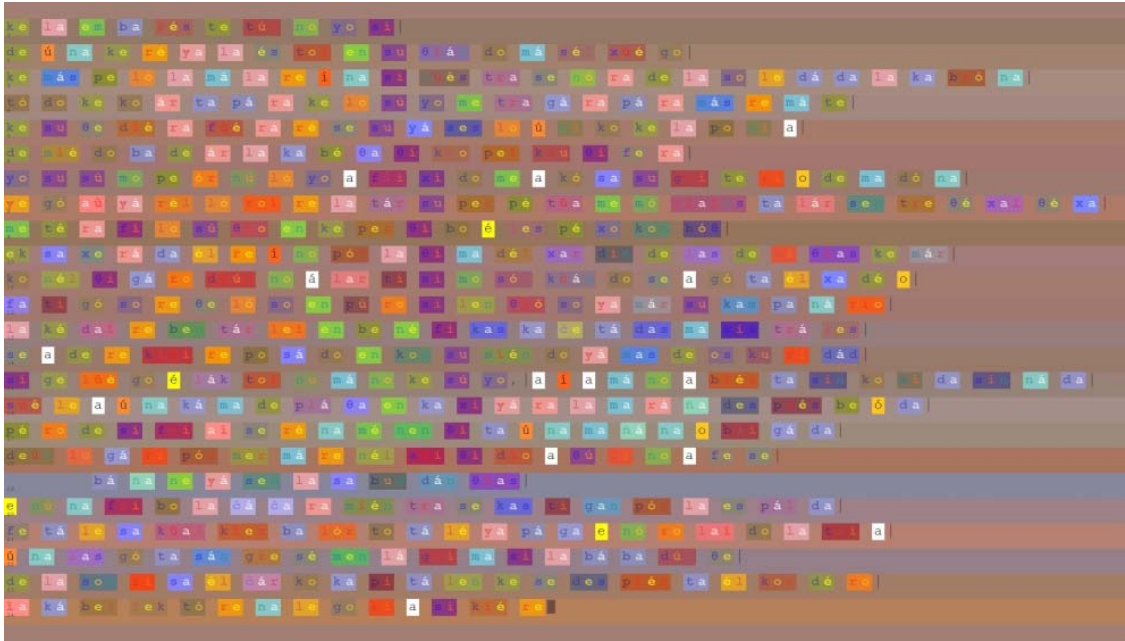
However, what began as the solidification of these sonority sections ended up imposing my own cultural allegory: the popular nursery rhyme, "Mary had a little lamb." The more I worked on this poem, the more easily this image started to take shape to me. To the reader, this may resemble more a Rorschach inkblot test; so, below is an approximate guide to the locations of these shapes.
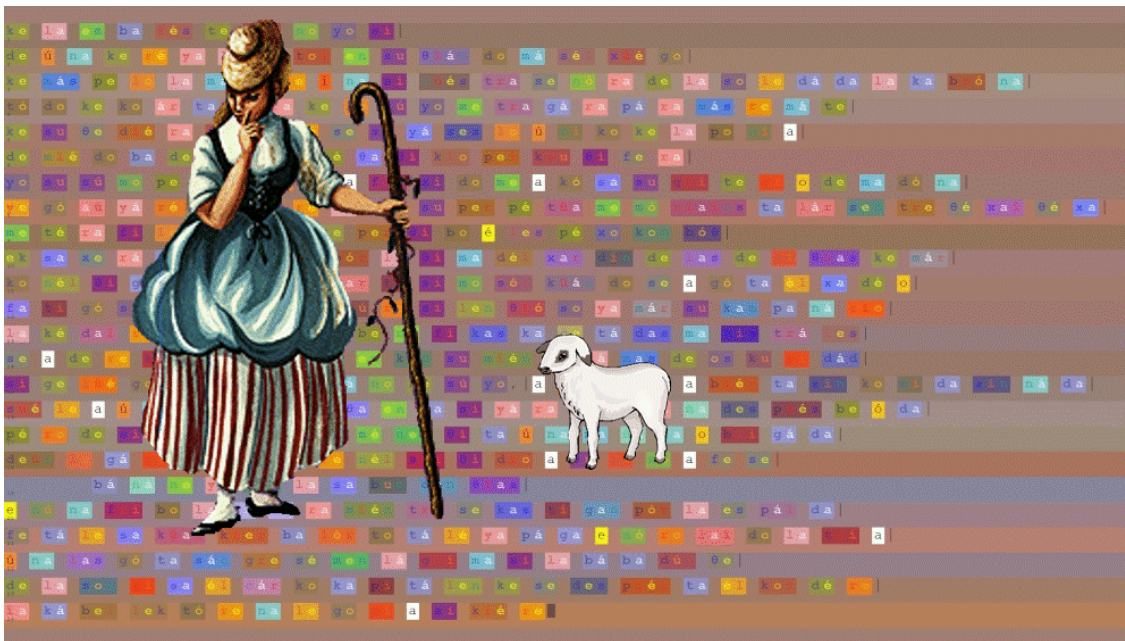
Although, the result is not as explicit as I would prefer, it does clearly illustrate some extraordinary possibility with signs, structure and significance through sonority patterns. In addition, even without the visual interpretation generated by the software, the poem still maintains significant aesthetic attributes, supporting the theory that the fostering of linguistic patterns in a text will add to the aesthetic worth of the poem.

To what extent did the software aid the poet in creating this aesthetic worth? The readers have seen some reasonably complex examples. The software did not write the poems by itself. To be completely honest, "Cordero de Dios jr" and "En las muertes de José de Ciria y Escalante y Federico García Lorca" both required a full and exhausting day each to write. It is fair to say that professional poet trained in these techniques would have been able to accomplish the same feats in at least the same amount of time. But I am not a trained professional in Spanish poetics, and what was much more a handicap was my lack in native fluency. Nearly every word that I changed in "Cordero de Dios jr" required me to reference roughly 10 dictionary words to find an appropriate meaning. And then for most of those words I also consulted the Davies online corpus to verify that the usage was correct, or to search for the most common preposition or modifier for the given word. A native speaker would not have had to do so many queries and would have saved even more time.

CHAPTER 4

CONCLUSION

The marriage of technology and literature should be desired because this merger is already happening. It will continue to happen because it is beneficial to readers and writers, it allows for adaptation to new mediums, and most importantly the advantages far outweigh the disadvantages. Many linguists and some avant-gardes poets are aware of these advantages and are already consciously applying technology to their work with language. It is inevitable that more and more people will begin to see the benefits that technology brings to the various fields and perspectives of literature. The reasons that some people might have to the contrary are unfounded.

I architected, programmed and implemented significant software[29] to help support this case, and then continued this thesis to prove this point. My goal with this software and paper was to illustrate a few different ways in which software might be able to escape some of the old typewriter paradigms that word processors perpetuate, even if this paper has only scratched the surface of some functions that a software tool might provide readers and writers.

The examples in Chapter 2 illustrate the advantages that software offers a student of Spanish poetry. My software analysizes most major linguistic features of texts. It deconstructed poems according to the syllabification, rhyme, intonation, pauses and meter with accuracy that was close to Antonio Quilis' professional analysis. The software was also capable of highlighting areas of semantic interest within the poems by isolating interesting linguistic

phenomena. Using software, students with very little knowledge of poetics or linguistics can analyze the basic features of a poem with a professional aptitude.

Chapter 3 illustrates some features that would be beneficial to the writers. I even contributed my own Spanish poems in this section. If I, an improbable poet of Spanish verse, can use a tool to write poetry, then a professional should be all the more capable.

In some of my examples absurd aesthetic constraints were applied. Hidden messages were embedded into external messages; more meaning was compacted into the old traditional message. Without software it would have been impossible or at least impractical to write a poem with such rigid constraints. The *Colors of Poetry* also afforded the author with the complexity to look up words based on sonority, accentuation and syllable structure --mimicking the mental processes that poets must go through when they are trying to think of the perfect word for their aesthetic constraints.

Other examples in that chapter showed how other media poets could also take advantage of the same software to create visual poems following some of the visual traditions that have developed in the past hundred years. Poets are free to apply and consider any aesthetic constraints that they deem important, but multi-media software offers an advantage. It automates how someone might analyze their poetics, offers different views of the poem's linguistic structure, and offers powerful word query features. A clever poet could even play with and manipulate the rules that the software applies to poetry. Poetry prosthesis is an analytical writing tool for poets just as graphics software is a drawing tool for graphic artists.

However, the uses of software should not be restricted to poetry students and esoteric poetics. The point of this paper is to provoke awareness. The same software used to analyze and

compose poetry could enhance the poetic experience of the hearing impaired. But literature software also applies to more than poetry students, esoteric poets and the hearing impaired.

The software must, in order to present the output coherently to the viewer, be able to define and categorize the text. The text is generalized into a series of numbers that is later reinterpreted, in the case of the *Colors of Poetry* software, visually. Much of the visual analysis presented in this paper was through the series of numbers that represented the sonority of a poem. By averaging the sonority of separate sounds, I was able to quantify the different parts of a poem. This is just one possible technique to compare and contrast not only individual sounds, but now different poems, lines, rhymes and syllables. It is not a way of measuring aesthetics through beauty coefficients the way George David Birkhoff or Max Bense might (Scha and Bod); however, the averaging of sonority does allow comparisons from one scale to another in order to allow the reader to make aesthetic observations and generalizations concerning poems. This method could and should be implemented using other linguistic attributes of poetry in order to abstract or generalize a text.

The entire text is turned into a generalized, numeric fingerprint that is unique for that text. So, what would happen if all texts were categorized by their fingerprint? What would happen when all texts can be searched by this numeric fingerprint? Imagine shopping online for your favorite author whose texts have some common linguistic traits. Then the website suggests other unknown or unread authors whose texts also have similar styles and generalized text fingerprints.[30] Now the realm of literature is expanded to poetry students, esoteric poets, the hearing impaired and anyone who buys or sells books online. Or what if it is found that a certain text fingerprint, say texts with the consonant cluster /pl/, tends to far outsell all other books to children? Now, writers who earn their livings by writing children books might use software to

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help find, suggest or neologize all words that have /pl/ in them appropriate for the books that they are writing. Of course, cereal marketers would also use the same software to help write jingles aimed at young children. Now we may include children or anyone who has children to our list of people who would be impacted by uses of software with literature.

My point is that people who are thinking and searching for these possibilities will have an advantage over people who do not choose to apply this merger of technology and literature. Students will be able to analyze texts accurately and faster, poets will more easily be able to add more compact meaning and implement difficult aesthetic constraints, some people may benefit by applying poetry to other senses, and people selling literature will be able to successfully target their marketing audiences.

No doubt should remain that software is useful for analyzing poetry and no doubt should remain that software resources could benefit writers. We have answered the question of whether computers can do more than spellcheck for students and writers. The question "Could software have a similar impact on literature?" is a question that this paper cannot answer. It is a question for the reader to continue considering.

APPENDIX A

POEMS ANALYZED

<u>Texts in Chapter 2</u>

En la muerte de José de Ciria y Escalante by Federico Garcia Lorca

¿Quién dirá que te vio, y en qué momento?
¡Qué dolor de penumbra iluminada!
Dos voces suenan: el reloj y el viento,
mientras flota sin ti la madrugada.

Un delirio de nardo ceniciento
invade tu cabeza delicada.
¡Hombre! ¡Pasión! ¡Dolor de luz! Memento.
Vuelve hecho luna y corazón de nada.

Vuelve hecho luna: con mi propia mano
lanzaré tu manzana sobre el río
turbio de rojos peces de verano.

Y tú, arriba, en lo alto, verde y frío,
¡olvídate! Y olvida al mundo vano,
delicado Giocondo, amigo mío.

 A Córdoba by Luis Góngora

   ¡Oh excelso muro, oh torres coronadas
de honor, de majestad, de gallardía!
¡Oh gran río, gran rey de Andalucía,
de arenas nobles, ya que no doradas!

   ¡Oh fértil llano, oh sierras levantadas
que privilegia el cielo y dora el día!
¡Oh siempre glorïosa patria mía,
tanto por plumas cuando por espadas!

   ¡Si entre aquellas rüinas y despojos

que enriquece Genil y Dauro baña
tu memoria no fue alimento mío,

   nunca merezcan mis ausentes ojos
ver tu muro, tus torres y tu río,
tu llano y sierra, ¡oh patria!, ¡oh flor de España!

Cordero de Dios by Luis Correa-Díaz

Esta vez sí que las maté
de un viaje le estoy haciendo el juego
que más le gusta a Nuestra Señora de la Soledad a la cabrona
y en su propia casa para colmo le creo todo lo que cuenta
que pasa afuera eso es lo único que la pone
en lenguas echarle carbón al miedo roer la sesera abusar
de un pobre diablo zumbar como una reina
alrededor de las cenizas de la memoria instalarse entre ceja y ceja
meter la mano sucia en la sopa del espejo perseguir con voz
desorbitada los sueños en el jardín de las delicias abrirle un ojo
con el cigarro a cada hoja tapar el sol cuando se cansa el jadeo
que la recorre de un puro silencio llamar su campanario
la queda y reventarle a uno la cara de una cachetada magistral
mandar que se acueste seguido a oscuras
para luego acto imperdonable suyo dejarlo sin comida
cama de una plaza a la que llegará después ebria
de sí pero fría como una tapia la cita parda
de un lugar común donde desovan los que dilatan el suicidio y se
        aniñan con los angelitos
en chácharas platónicas mientras se castigan por la espalda
fetales a cualquier precio total ella paga en oro la idolatría
una las gotas sangre semen lágrimas y la baba dulce
de la sonrisa el charco capital en que se despierta el cordero
y acabe el lector en alegoría si quiere

Texts in Chapter 3

[fragments]
...
Miembros, voces íntimas, laberinto
vespertino, te concilian, matutino.
¡Quondam olor de medio azahar y albedrío!
...
endeliñados ardorosamente a nada,
mientras frota contra la temporada,

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```
la próxima: un atardecer tardío.
```

En las muertes de José de Ciria y Escalante y Federico García Lorca

¿Quién dijo que te fió, y en nada fijas?

¡Qué dolor de lares que captó bichos!

Dos captan valor: el pueblo y cieno.

Constan de caídos, y sin tu graznar, cien cielos.

```
.- -.. .. —— ...
A   D   I   O   S
.—— —— ... ..-..
 J   O   S   É
- . ...- ——— -.—   .-
T E   V   O   Y     A
. -..- - .-. .- —.— .- .-.
E   X  T  R  A  Ñ   A  R
```

Tu yema gestó tu nardo fosco,

Triscando la cabeza de cada Titán.

¡Vates! ¡Huesos! ¡Dolor de luz! Mentor.

Por poesía mera, Eúfrates vuelve hecho luna y placidez.

```
.- -.. .. —— ...
A   D   I   O   S
.-.. ——— .-. -.-. .-
 L    O    R    C    A
- . ...- ——— -.—   .-
T E   V   O   Y     A
. -..- - .-. .- —.— .- .-.
E   X  T  R  A  Ñ   A  R
```

Por poesía traspasó mi propio artificio.

Idóneo, tu manzana arrojo hacia el río oscuro

de turbia presencia de ahogado salmonete ya.

```
.-.. .- ...- . .-. -.. .
L    A   V    E  R  D   E
— .- -. —.. .- -. .-
M  A  N  Z   A  N  A
-.— .-  .-. ——— .—— .-
Y   A   R   O    J   A
```

Y tu imagen está alto--tus fríos paseos iguales arriba

¡olvídate! Moscas y cisnes--todo se puso vano con este mundo,

Si naces, la muerte te sigue y tu perdón escapa.

```
.- .-. .-. .. -... .- -.—
A   R   R   I  B   A  Y
— .-.. ...- .. -.. .- -. -.. ———
O   L    V    I  D   A  N  D   O
.-.. ——— ... -.. —— ...
L    O    S   D   O   S
```

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flor de España

```
                                    o
                    A     Cc oÓoRrrdDoOoBb A
                    aaa    CCooooOr dDDCooBBaaa


            r BBDBb    rBcrÓrCrróó B co Cd  cBbócoócrbó      bACBC    BB óCcdrobroÓrCc    cC obcbcrdccOc OroBrcCrAr
            BroOcoOr  cBrcBrBcrBc B rBrOBr  AbÓBBóB rBB Ór   BÓoCB   cb BÓCO dc Ób cB   AO bBoB rBCCóCcBobBrBBróc
        o                                                                                        r
    oBÓoO   COrroroorCcror       CBrbc   ÓOrró drrArcr B  cccBC     cBBrb   Co or B bb cocorrBccA ro B
    bBoOC   cACoBoCóoÓóAo  B   rBocBr  BbBóB BcCd có Ó rBdoBo Ó   oBoAd   rBBrBb B od ÓBbc bBrco BB C
            r       r                          r                      rr                       r
      BBdBo   corcr roróc   Óc Ór Ac    ocrc CroC    co córccr  rDÓrbr  rBorCrrBc b B rcccr CC rC
    rB óbcoÓ   dBBO ÓBCóO   B  BrrBb B   rBBóc cBÓCÓr  bo ÓdrBB   oBoóO   rDoCóCoóroB ÓrcBAAc Có BB Ór
    o           r                                                                              r
    róáCC   ocrr oArCc ccro    bcrCrBbroO or Cr    roc oc   cccccrór   Óoroc  cBCccrCr orrBc A or B
    AÓCOC   rBOdr BorbbrBBrBr  róóoBooBrrO Br Oo B   rBBrBB  ÓBóÓOoBr   BboÓÓ   dÓcóDod rBboócoBrCA A
                            r                        r                r


            r BBDBb    rBrcBcóc Br B rB    Bc B DcbAróA    bACBC    oo dC BocóróorrOrbr   cB OócoC AcCDrBc cCrBB OrCc
            BroOcoOr  rB bC B  Br B  B    Bo B cBóAbCÓB dr   BOocÓ   cB oD Bróc B  dBrCd   rB BorBorBóCDror BBoBocBcoB
        o                                                         c
    obccocdC   coroc Brrcc B CÓ dcroc B ró   rDr B    Ar B oO oC Co    orr   CBrCroc rb   córrB    óB B ó BB
    bBBoBcBc   BBcÓ  Bc Bc B CÓ BrcBB B oBr   oBr B   rBr B OO cb BÓ    BBc rBócBoÓ óB   CBrrB    rBD B cBrrr
            r                                                                               r
      BÓCBo   rc ob bcrdocororróo   corcb bccorrB CCror oc   Co rorB cr bC ro   bOroó cA
    rB AócoÓ   rBrcÓ BrcbOBBcB  Bc  OBórD BAóc B ÓBrCCrBB   BDrOB Ó B  CO BB   Bóbob BB Ór
    C                         r                                                r
    CD  CrCcrB cAr   Ccrorrc   Co B crrCbrro Cr   Crrcc ccoórrBcoc   oCrcorCr   oó crroc cccBorOrbr Br
    rO oBCóo B CBo  rBAcBoDr   cBO B oBCOóÓóBrDo   BrrBBrBOCóoCDcÓÓ   BBcbOoD   Bd obCBArBboBcCBróó ó
                r                   r                                      r                r


            r oB CÓ   rBcoOrBorÓrrBc    rÓróoooccÓrAB Br Ccco   rÓrOÓDrB Ób cArór    Cor  cBBcOrCcrbcrdc B óArbr
            Br ÓrcB   oBrbdcccrB cBr   dBoDBoBbóO cO ÓcrBÓrBr   có cBC B OdcÓBróo    BB   oBobb oDóBCoBC BrBBrób
            C                                r                                       r  r           r    r
    obccocdC   cbroCrbr B rorrcrócro oOr  rBrrórcó oC Br   ocr  cBd crcccorroc   BD  ooBB cr
    bBBCBoBc   OO bóbO  B oBBoBcBrcO bO   OocBróbccÓ Bo   BBc  rBcrBboBCÓ rBÓ   ÓdroBoooorBÓ
            r                                   rc                                   r
    CÓ cc   cBCcCrCócocrCr B ó   córrór   Brrcrrór   rb B  Ó BbcCrrCród oC   oÓorB oo
    rD DBr  oÓÓBb BCBdóóo  B CBr  CDAoBc   B cBóAO    BB B rB BCBBroboró BB   bDBrB ÓB oo
                                                                                    r


            cÓcoooAórór oC   BÓobocbroÓrrdrbr CcoOr  rBÓrB co    cCcocco bócDocB oÓrCc    cOc B AArbr
            COóoBóCbCBrrBB   BóBBrCo ÓÓ borBrrBOCOC  rBócB rBr   BBoBdrBrBocbb B ÓD oB   rBÓrBób
                                                                                    r  r
    óocobrbr   óB cc   rOCCccor oo     Bc ccro   Bc orrorocróó or   orr   B ccc   dc BrrCr
    oBrBorB    rb dBr  oÓÓBÓCÓ BB Dr   Cc BBrbo  órrBAbc B Bo Cb   BBc  B cBO   B BrcBo B
                                                                                    r                                              cr
    óB ccr   B B órbcror   oc  rCrrB ACrCrcCr br    r cArBo   cór o Bcrór B  d BB      oOóH   FF l Orr  DDee   EessPp a ña A Bo
    rO OBr   Br B CBAóóoBb   BBr  róc B Boró óo oBo B  óBooOr BBcrBrorrÓ B cBrrc oo   cB oOoHh  Ff LóóOR DdeE   EeSSPpAaAñÑñaaa o
            r                                        r  C         r                       r    o
```

Cordero de Dios jr

que la embarré este turno yo sí
de una querella la estoy ensuciando más el juego
que más peló la mala reina así Nuestra Señora de la Soledad a la cabrona
todo que coarta para que lo suyo me tragara para más remate
que sucediera afuera a reses suyas es lo único que la ponía
de miedo vadear la cabeza cíclope y crucífera
yo su sumo peor nulo yo afligido me acosa su griterío de madona
llegó a aullar el loro y relatar su perpetua memoria a instalarse entre ceja y ceja
meter a filo sucio en que percibo el espejo con voz
exagerada el reino por la cima del jardín de las delicias quemar
con el cigarro diurno al hartísimo sol cuando se agota el jadeo
fatigoso receloso en puro silencioso llamar su campanario
la queda y reventarle y en benéficas cachetadas magistrales
se ha de recluir reposado en consumiendo llamas de oscuridad

sigue luego el acto inhumano que es suyo, ahí a mano abierta sin comida sin nada
suele a una cama de plaza encasillar a la maraña después beoda
pero de sí fría y serena amen en cita una mañana obligada
de un lugar y por mermar en el suicidio azul y no a fe se
        bañan ellas en las abundancias
en una frívola cháchara mientras se castigan por la espalda
fetales a cualquier valor total ella paga en oro la idolatría
una las gotas sangre semen lágrimas y la baba dulce
de la sonrisa el charco capital en que se despierta el cordero
y acabe el lector en alegoría si quiere

APPENDIX B

SOFTWARE DESCRIPTION

<u>Basis</u>

The previous chapters addressed the purpose of software for readers and writers. This appendix is an extension of this concept. It is an attempt to satisfy the curious reader who, upon having seen the colorful output of the *Colors of Poetry* software, admits that it is pretty but is left wondering what is the basis behind this output? What kind of judgment calls were made in deciding that /a/'s would be white and /p/'s would be dark blue. The software tries to avoid most tone color type theories that you may find in Reuven Tsur or Mary Macdermott. Instead the software applies standard Spanish linguistic textbook theories (primarily phonetic) in order to interpret the poems.

The backbone of much of the analysis is a computer generated phonemic transcription of the text to be analyzed. This process translates letters into phonemes and groups of phonemes into syllables, and then adds the stress according to well defined Spanish grammatical rules. Note that the new transcription output will look very similar to the original Spanish spelling, because Spanish is fairly phonetic.

There are only a few minor differences. For example, "C" in some contexts sounds like /s/, other times like /k/, and when combined with an "h" it sounds like the English "ch" (/č/). "R" when at the beginning of a word or when it is pared with another "r" is trilled, or it can be a tap such as in the word *caro*. *Cinco* could be pronounced two different ways depending on whether the speaker makes the Castilian distinction between /s/ and /θ/.

The few characters that are not the same as the typical spelling counterparts (in this thesis) are as follows:

Phonemic Character	Traditional Spelling	Examples
y̸	ll	po**ll**o
r̃	rr, r	ca**rr**o, **r**equete
θ	c, z (Castilian)	**c**inco, **z**orro
č	ch	**ch**oza
k	c, qu	**c**asa
x	j, g	**j**abón, **g**ente
b	v, b	**v**aya, **b**onito

Here are some example transcriptions:
- *cinco* - /# θín·ko#/ or /#sín·ko#/
- *raro* - /#r̃á·ro#/
- *chirriar* - /# či·r̃íar#/
- *quebradizo* - /#ke·bra·dí· θo#/ or /#ke·bra·dí·so#/
- *caballo* - /#ka·bá·y̸o#/ or /#ka·bá·yo#/

In isolated words this would not appear to be very useful; however, it is essential for determining rhyme. *Veloz* and *dos*, for example, do not share the same spelling, but when the Castilian distinction is not made, these words could rhyme. In addition, the phonemic transcription by default with the *Colors of Poetry* software includes syllabification. Syllabic analysis keys off much of the phonemic and sonoric analyses. This analysis could enable a user to work syllable length patterns. Although this is supposedly less important in Spanish than in Latin, Ancient Greek or even English; it can still be applied to Spanish poetry.[31] Furthermore, in Spanish the syllabification of any written verse is affected by the effects of adjacent words through linguistic and poetic phenomena such as elision, sinalefa and dieresis --which become extremely important to the student of poetic verse.

<u>Accent</u>

Simple prosodic analysis displays the prosody, or syllable accent, according to the automatic, phonemic transcription. It signals which syllables have stress and which ones do not. However, it follows the grammatical rules and cannot show words that some peninsular Spanish speakers may commonly "mispronounce."

What is even more problematic is that this version of the software does not make any distinction between the type of accent depending on the semantic function of the word that authors like Quilis and Navarro often note. For example, Quilis points out that "para" when it's a preposition (e.g.: "Es para Roberto!" "It is for Robert") has no accent (23), but when it is in verb form such as a command it does have an accent (e.g.: "Para, Roberto!" "Stop, Robert"). This software currently ignores these semantic stresses and marks all tonic syllables.

The *Colors of* Poetry offers another type of accentual analysis based on the *acento rítmico*[32] that Navarro analyizes (*Pronunciación*, 195). The validity of rhythmic accent can be debated. Nevertheless, its linguistic reality suggests itself when one listens to a three syllable word such as *hablador*. Grammatical rules will tell us that the tonic syllable must be the last syllable /dór/ and the two previous syllables are supposed to have equal amounts of atony, yet the first two syllables do not have equal amounts of atony. The first syllable "ha" has an accent that is less than /dór/, but greater than /bla/. Navarro Tomás uses the notation 2-1-3 to describe this rhythm, and for *abadesa* as 2-1-3-1 (196). This notation of rhythm must also be of extreme importance to those studying or writing verse. The software internally implements the same number notation as Navarro Tomás, but then later represents this notation almost as if it were in musical notes: low yellow, orange or white; medium yellow, orange or white; and high yellow, orange or white.

Sonority

Sonority is the second largest component of the software analysis. Sonority is a concept that for my purposes I have defined as a scale measuring the amount of airflow when a certain phoneme is pronounced. It often equates somewhat to the perceived loudness, volume of sound or even aperture of the mouth during articulation.

In poetry sonority is important for two primary reasons. First, it highlights rhyme and near rhymes. Notice the similarity in sound between /f/, /θ/ and /s/. Each of these sounds belongs to the obstruent class, more specifically as fricative sounds. Just being aware of this similarity gives a poet or reader that much more ability in the context of poetry. Second, sonority also has a huge impact on the syllable structure in Spanish. It is probably a universal trait that identifies syllable structure cross-linguistically. The nucleus of every syllable (the vowel) will have the least amount of obstruction of breath; the beginning and ending of the syllable will have the greatest amount of obstruction.

The *Colors of Poetry* software calculates the sonority in 9 levels. I expanded this numbering system from other traditional number schemes[33] to separate vowels and to better approximate rhyming and near-rhyming conventions, which in turn also aligns nicely with Macdermott's findings that grouping vowel sounds by front and back sound criteria are of primary importance when communicating emotional tone in poetry (17). The numbering system I therefore implemented uses 1 for *p, b, t, d, k, g*; 2 for *ch* and [*w*]; 3 for *f, s, y, x*, [θ]; 4 for nasals; 5 for *l, ll, r, rr*; 6 for glides, 7 for *i* and *u*'s that are not glides, 8 for *o* and *e*; and 9 for *a*'s. So that Góngora's *alegoría* would be converted into the following numeric sequences:

Restituye a tu mundo horror divino,	583 17 17 38 9 17 474 18 585 17 17 48
amiga Soledad, el pie sagrado,	9 47 19 38 58 191 85 168 39 159 18
que captiva lisonja es del poblado	18 191 17 19 57 384 39 83 185 18 159 18
en hierros breves pájaro ladino.	8 468 583 158 183 19 39 58 59 17 48
Prudente cónsul, de las selvas digno,	157 184 18 184 375 18 593 385 193 171 48
de impedimentos busca desatado	1864 18 17 484 183 173 19 18 39 19 18
tu claustro verde, en valle profanado	17 159 73 158 185 18 84 19 58 158 39 49 18
de fiera menos que de peregrino.	18 368 59 48 483 18 18 18 58 17 48
¡Cuán dulcemente de la encina vieja	1694 175 38 484 18 18 59 84 37 49 168 39
tórtola viuda al mismo bosque incierto	185 18 59 167 195 473 48 183 1864 3685 18
apacibles desvíos aconseja!	9 19 37 1583 183 17 8 39 184 38 39
Endeche el siempre amado esposo muerto	84 18 285 3684 158 9 49 18 83 18 38 4685 18
con voz doliente, que tan sorda oreja	184 183 18 5684 18 18 194 385 19 8 58 39
tiene la soledad como el desierto.	168 48 59 38 58 191 18 48 85 18 3685 18

A computer program could compile lists and lists of these sonority numbers; however, as one can probably see, the lists of numbers do not immediately mean much to the human eye. Upon some scrutiny, most people would simply notice that the first line of every line in the middle of the poem begins with a 1 or that the last line of the second stanza starts with 18, and then has three 18's in the middle and then finally ends in 8. A software application would never look for a similar pattern until somebody tells it how to search for a pattern, which implies that somebody needs to notice the pattern first. More complicated patterns of numbers would be quite difficult for most people to notice at first glance. For example, notice how the interval expands between these sounds starting from the last line of the first stanza. It is quite like the lengthening and shortening of musical beats.

en hierros breves pájaro ladino.	8 468 583 158 183 19 39 58 59 17 48
Prudente cónsul, de las selvas digno,	157 184 18 184 375 18 593 385 193 171 48
de impedimentos busca desatado	1864 18 17 484 183 173 19 18 39 19 18
tu claustro verde, en valle profanado	17 159 73 158 185 18 84 19 58 158 39 49 18

Various conclusions could be drawn about this apparent change in rhythm at this part of the poem. They would have to be researched and proven (or maybe even disproven), but being able to see these patterns enables us to evaluate lesser rhymes that have not yet been defined by

thorough researchers of Spanish poetry such as Antonio Quilis and Tomás Navarro. But how can people easily find these patterns that Jakobson claims are essential to all poetics?

These numbers need to be converted into something more palatable for humans; the *Colors of Poetry* software implements them in color.

Articulation

Manner and sonority are very similar concepts within this software. Manner corresponds to how a sound is produced (occlusive [stop], fricative, affricate, lateral, vibrant and nasal). All of the stops, when preceded by the same vowel, will sound very similar. Consider the following English words: "pop" and "pot," or "sod" and "sob."

A second element of articulation is place. Place of articulation corresponds roughly to the place in the mouth where a particular sound is articulated. For example, /p/, /b/, and /m/ are all formed between the lips. The reason why /p/ and /b/ sound so much more alike than /m/ is because they are both also stops while /m/ is a nasal sound. The third primary element is whether a sound is voiced or unvoiced. The reason why /p/ and /b/ are not exactly the same, is because /b/ is voiced (the vocal chords vibrate when producing this sound). By itself manner is a useful tool for isolating patterns in poetry; however, combined with the place of articulation and whether the articulation is voiced --all three together-- we have the main qualities that make each spoken sound fairly unique.

Think of each pronounced letter (phoneme) as being a specific point within a three dimensional Cartesian coordinate system. Instead of *x* we can use Manner; instead of *y* we can use Place; and instead of *z* we can use Voiced. So each sound is a unique plot on a graph. With the same mathematical metaphor, imagine two points (10, 85, -9) and (10, 85, 18). They create parallel lines on the *x* and *y* axes, but with a differing *z* axis. Then add two more points (-10, 85,

16) and (25, 85, 16). These two points create another parallel on the y axis, but they by themselves share the same point on plane z. This is too abstract and mathematical to be poetic, but due to the manner, place and voiced/voiceless aspects of phonemes, we can create these very complex, and equally symmetrical, possibilities in a three dimensional linguistic space quite easily with software. Poets can utilize parallel sets of points on any given plane to create complex, nuanced, poetic parallelisms or "rhymes" as Jakobson might call them.

Poetic License

Poetic license is by far one of the most difficult aspects of poetry to address with software. How can one be sure that the poet intends for the reader to pause, not pause, speed up or slow down in any given point of the poem? Is the poet a typical speaker from Madrid? Is the reader a typical speaker from Buenos Aires? Many assumptions have to be made for an automatic analysis of a poem.

Some steps might be to examine a poem's metrics, match those metrics to a set format like sonnet or alexandrina, and then if a line does not match the overall emerging pattern, the software can search for signs of sinalefa[34] or dieresis.[35] Finally, one could *assume* that the author intended the poetic license element at the given point. If the poem does not match any standard poem format, then of course this method would not work. The safest, albeit most limited, way to approach this is to follow linguistic norms with punctuation and word groups, and then show where synalepha, syneresis or dieresis is possible. This is precisely the same approach for the *Colors of Poetry* software.

<u>Putting It Together</u>

The steps involved in creating a poetry analysis image are much like painting. The software paints several layers, one over another in various numbers of steps. All images start from an initial base and then further analyses can be applied, much like a painter might layer and/or mix paints on a canvas. The first few steps of image creation before selecting any additional form of analysis are as follows:

1. Each corresponding phoneme is assigned a unique color by way of a numeric, semi-transparent Red-Green-Blue value. The RGB values were calculated by the following chart:

Phoneme	Transparency	RGB Values	Phoneme	Transparency	RGB Values
/p/	49%	25, 25, 112	/î/	43%	255, 30, 20
/b/	49%	30, 30, 122	/û/	43%	255, 10, 0
/t/	49%	35, 35, 132			
/d/	49%	40, 40, 142			
/k/	49%	45, 45, 152			
/g/	49%	50, 50, 162			
/č/	47%	106, 90, 205	/i/	41%	255, 100, 25
/w/	47%	86, 60, 225	í	31%	"
			/u/	41%	255, 140, 50
			ú	31%	"
/f/	49%	40, 0, 215	/o/	39%	255, 200, 25
/θ/	49%	30, 5, 225	ó	29%	"
/s/	49%	20, 10, 235	/e/	38%	255, 255, 0
/y/	49%	10, 15, 245	é	29%	"
/x/	49%	0, 20, 255			
/m/	43%	0, 128, 160	/a/	37%	255, 255, 255
/n/	43%	20, 148, 140	á	27%	"
/ñ/	43%	40, 168, 120			
/l/	43%	200, 70, 80			
/y̵/	43%	210, 60, 60			
/r/	43%	220, 50, 40			
/ř/	43%	230, 40, 20			

2. Calculate an average of each of these RGB values for all of the phonemes present in the entire poem. This will give the user a vague idea of the whole poem's average sonority. Because so many sounds are mixed, a shade of brown can usually be expected, although the actual numeric value will very seldom be the same for any given pair of poems. The entire image is painted this unique color.

3. Skip down half a line in order to give the observer a basic idea of the general sonority of the poem.

4. For each line of text in a poem, calculate each of the sonority average of all phonemes in each line. The line is then painted this color. Any line that strays greatly from the averaged color of the entire poem, tells the observer that the sound qualities stray greatly in this particular line from the rest of the poem. In other words, it marks an important line and very likely a change in the poem's tone.

5. Each stanza is averaged much like the entire poem and each line. This averaged color bar will appear at the bottom of each stanza.

6. Finally, the sonority average of each syllable is calculated, and each syllable is then painted this color within the appropriate line.

7. The last line of the image will always be the entire poem's average from step 1.

Here is an example of the output with each step marked in red:
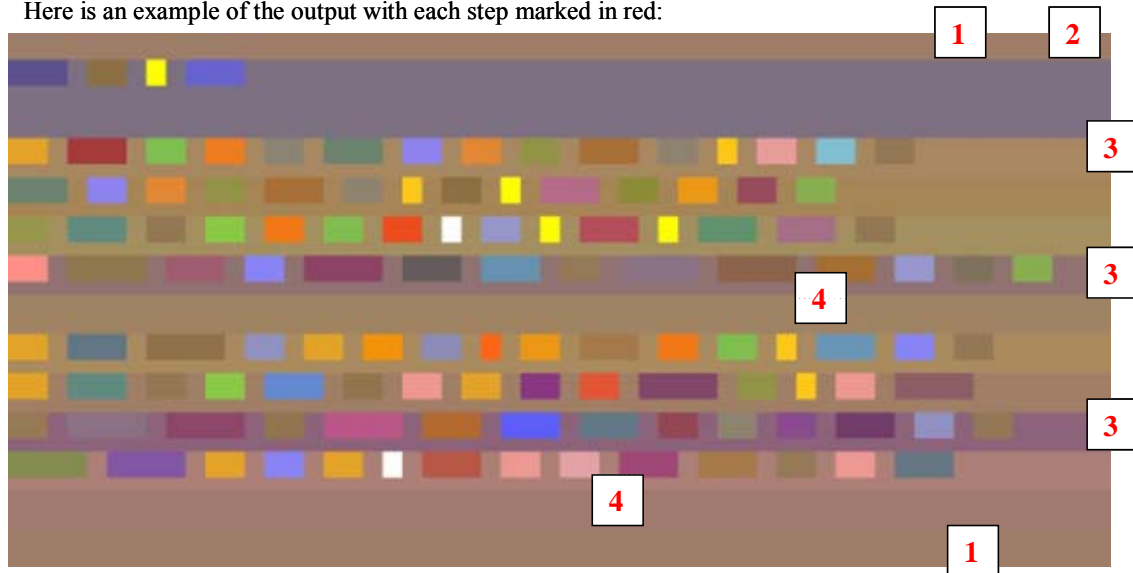
8. At this point the user can mix and match other types of analysis. All of the remaining options such as individual sonority, voiced/voiceless, manner, place, accent or rhythm will paint on top of this preliminary image. Most of the forms of analysis are semi-transparent; so, each option will enhance and merge with this initial image. In terms of painting think of mixing and/or layering paints.

Word Lookup Tool

The Word Lookup feature of the *Colors of Poetry* tool is used primarily in the composition of poetry. The software includes a searchable database of approximately 350,000 words and/or word phrases in all formats that the software uses to analyze text (phonemic transcription, sonority, syllabification, accentuation, etc.). *Dar*, *da*, *dame* and *dámelo* in this database are all considered separate, though related, words. These words were collected through a series of web data-mining techniques. Other utility software programs were written to scan websites searching for unique words, their frequency and their definitions. This database will be used in other works, but in this work it simply allows a poet to query for words according to any of the

aforesaid linguistic categories of analysis. For example, the user may query for a three syllable

word with an accent on the penultimate syllable that has the same sonoric signature of

"llamamé."

[1] Depending on the reader's perspective, hypertext literature is one clear exception to this generalization. However, this opens the scope of discussion far beyond the book reference that is the starting point for this work's application.

[2] A software application that I designed and wrote for analyzing and writing poetry in Spanish. It implements linguistics and graphics algorithms, and database and internet data mining techniques; written in approximately 20,000 lines of C++ and C# code.

[3] According to the Merriam-Webster Online Dictionary < http://www.m-w.com/dictionary/synesthesia>: "a concomitant sensation; *especially* **:** a subjective sensation or image of a sense (as of color) other than the one (as of sound) being stimulated."

[4] According to the Merriam-Webster Online Dictionary < http://www.m-w.com/dictionary/Bauhaus>: "of, relating to, or influenced by a school of design noted especially for a program that synthesized technology, craftsmanship, and design aesthetics."

[5] About the same time I finished my first software prototype, a group (Mamede, Trancoso, Araújo and Viana) with a similar goal and method for Portuguese poetry published their paper "An Electronic Assistant for Poetry Writing".

[6] Hugo Liu and Pattie Maes call this same basic process an "aesthetic reading" (Liu and Maes).

[7] This term suggests that the computer is a demystified tool or appendage of the user.

[8] Graphical User Interface.

[9] See W.B. Stanford's *Enemies of Poetry* for a more in depth look at the dialectic relationship between scientist and poet.

[10] David Laraway is one person who studies this trend in Latin American modernist poetry.

[11] More details about the *Colors of Poetry* software can be found in Appendix B.

[12] See Eduardo Kak's "Biopoetry".

[13] "En la muerte de José de Ciria y Ecalante" can be found in Appendix A.

[14] Due to limitations in font, Quilis' symbol for synalepha was replaced with "_".

[15] See Hammond (316), Whitley (67) and Navarro Tomás (209) for more details.

[16] The continuation of one verse into the next line without any pause separating the two lines.

[17] For details on the color shading and other aspects of the software analysis see Appendix B.

[18] Spanish relies on phonological grouping (breath group) of syllables instead of word boundaries as is the case with English and German.

[19] Found in Appendix A.

[20] See Appendix B, Putting It Together.

[21] Please note that this is nearly impossible to see from grayscale or black and white versions of this text.

[22] Note the *rarity* of the capalized words "Nuestra Señora de la Soledad" and how these words are key to understanding the author's message in the poem.

[23] Corpora such as these should be an invaluable to any writers who may have any doubts about how people tend to use language. For example, with Davies' website one may query thousands of Spanish texts and some oral sources to see whish preposition more frequently follows the Spanish verb *optar*.

[24] Reuven Tsur, in his book *What Makes Sound Patterns Expressive?*, studies how these types of effects of sounds sequences tend to be perceived people.

[25] If you place your fingers on your throat at the larynx during the articulation of these sounds, you will be able to feel the vibrations for the voiced sounds.

[26] Morse Code was used because binary requires a combination of eight 1's or 0's for each letter, where as Morse Code requires anywhere from one to six. The draw back is that Morse Code is really ternary, consisting of dots, dashes and pauses. It was the following of the dot dash pattern constraint that was more important for this illustration, and the pauses were ignored.

[27] ASCII (American Standard Code for Information Interchange) is commonly referred to as plain text.

[28] See Appendix A for the full version.

[29] See Appendix B for more details.

[30] Some sites that already do something similar, do so by statistical association. A rule develops over time such as "people who tend to buy book X also tend to by book Y." Then every time somebody buys book X, book Y is automatically suggested.

[31] See Domínguez Caparrós p.44.

[32] This *acento rítmico* is different from the *acento rítimico* that Domínguez Caparrós refers to on page 82.

[33] See Karen Guffey for a historical view of sonority across syllables.

[34] In poetics both synalepha and syneresis combine syllables through adjacent vowels that would normally be separated. In "¿Cómo estás?" synalepha would cause the second *o* to merge with the *e* creating a syllable *moes*. Synalepha occurs between two words; syneresis on the other hand is the same phenomenon within a word: *Po-e-ta* becomes *poe-ta*.

[35] Dieresis causes diphthongs to be separated. *Rui-do* becomes *Ru-i-do*.

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