

Distribution Agreement

In presenting this thesis as a partial fulfillment of the requirements for a degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis in whole or in part in all forms of media, now or hereafter known, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this thesis. I retain all ownership rights to the copyright of the thesis. I also retain the right to use in future works (such as articles or books) all or part of this thesis.

Andrew Jon Remissong

April 19, 2011

Dulce et Utile: On the Use of Quantitative Textual Analysis in Latin Literary Analysis

by

Andrew Remissong

Jonathan Master
Adviser

Department of Classics

Jonathan Master
Adviser

Philippa Lang
Committee Member

Judy Raggi Moore
Committee Member

April 19, 2011

Dulce et Utile: On the Use of Quantitative Textual Analysis in Latin Literary Analysis

By

Andrew Remissong

Jonathan Master

Adviser

An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Department of Classics

2011

Abstract

Dulce et Utile: On the Use of Quantitative Textual Analysis in Latin Literary Analysis
By Andrew Remissong

Quantitative textual analysis is a well known technique used in many fields of social science. Despite this, the applications of the technique to literature, and specifically that of the Ancient Mediterranean are few. This thesis functions to encourage the use of computer-assisted, quantitative textual analysis in classical philology. Chapter one begins by introducing a specific conundrum, the various meanings of the Latin word *dulcis*, or sweet. Chapter two gives a brief history of textual analysis, and explains the expansion of its use in the latter twentieth century. Chapter three defines a specific methodology to investigate problems of genre and context, specifically by investigation of the Latin word *dulcis*. Chapter four delivers the results of the application of these methods. Chapter five presents the broader conclusions drawn from the results, and suggests the use of quantitative textual analysis in addition to qualitative textual analysis in classical philology. Though this work is very preliminary, it suggests a novel technique for analysis of ancient texts. Any new technique will encounter similar challenges similar to its predecessors, and the reader is urged to consider this in reading.

Dulce et Utile: On the Use of Quantitative Textual Analysis in Latin Literary Analysis

By

Andrew Remissong

Jonathan Master

Adviser

A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Department of Classics

2011

Acknowledgements

Alexander Means, the fourth president of Emory University, was a man of many talents: a scientist, physician, minister, and teacher. I would like to acknowledge the great advice of Dr. Tom Lancaster to let this man's example serve as a model for my education in the Liberal Arts and Sciences at Emory. I hope that my attempts to merge the worlds of art and science have not dishonored the distinguished president's memory.

Further thanks are necessary to each member of my committee. For his introduction to higher level study of Latin literature, I thank Dr. Jonathan Master. Dr. Philippa Lang's work on science and medicine in the ancient world were also of great impact on the production of this text, and I thank her. Dr. Judy Raggi-Moore must be thanked for the example she has set for the use of computer-assisted techniques in language pedagogy. Her work was of great inspiration for the text below. I would be remiss to forget the impact on my education in the classics of the remaining members of the Classics Department of Emory University, especially Dr. Christine Perkell, and those of Dr. Bonna Wescoat, and the staff-in-residence of the Intercollegiate Center for Classical Studies during my stay there, Drs. Peter Burian, John Henkel, Stacey McGowen, and Mckenzie Lewis.

All errors in the text are my own.

Table of Contents

Chapter 1: On Sweetness in Antiquity	1
Chapter 2: A History of Content Analysis	10
Chapter 3: Methodology for Textual Content Analysis	17
Chapter 4: Applications of a Text's Quantified Content-Analysis	23
Chapter 5: Conclusions and Next Steps	34
Appendix I: Table and Figure Describing Computerized Textual Analysis	38
Appendix II: Frequency Analysis of dulc- in Ovid	39
Appendix III: Frequency Analysis of dulc- in Virgil	41
Appendix IV: Correlation Analysis on Ovid	43
Appendix V: Correlation Analysis on Ovid and Virgil Combined	44
Appendix VI: Occurrences of dulc- in Ovid and Virgil with encoding	45
Bibliography	62

Chapter One: On Sweetness in Antiquity

The Oxford English Dictionary, definitive, if relatively conservative, record of the English Language, gives over 30 definitions for the adjective “sweet.”¹ These are in addition to over 100 substantive forms made by the compounding of the adjective with a noun, as well as several verbal and adverbial uses of the term. Beyond those listings given in OED, any teenager can augment the list by at least one definition, that of the colloquial exclamation, “sweet!” Clearly then, though the dictionary’s editors continually amend the definitions contained therein to include the most contemporary uses, the evolution of language can at times out-speed the ability to codify it.

I mean in no way to belittle the etymological record presented in this publication. In fact, the OED gives a useful history of the word *sweet*. It traces its evolution back to the Indo-European root *swad-*, from which derive in turn not only the Greek ἡδύς, ἡδεσθαι, ἡδονή, and ἀνδάνειν², but also the Latin *suavis* and *suadere*³. Upon investigation of *suavis*, one finds again a range of translations into English, including the description of items as agreeable to the taste, nose, ears, eyes or mind.⁴ While one often finds the term listed as a synonym to *dulcis*, there is a distinct difference in their meanings, especially when used to describe items that have a taste.

Suavis refers to items agreeable to the taste, or more specifically, free from saltiness, bitterness, or acidity. *Dulcis*, on the other hand, refers specifically to the presence of the specific taste of sweetness. Why is it then that the English word for sweet, through its Germanic etymology, has arisen from the *swod-* stem, while so many

¹ Oxford English Dictionary, “Sweet”

² “sweet,” “to rejoice,” “pleasure,” and “to please” respectively.

³ “pleasant,” “to advise (properly, to make something pleasant to)”

⁴ Oxford English Dictionary, “Sweet”

romance languages⁵ evolved from *dulc-*? Clearly, *suavis* and *dulcis* held different meanings in different geographies at different times. One can take a snapshot of the use of either word at any specific time in its history, as OED does above, and examine the various meanings attributed to the word at that time. In this paper, I propose to do just that.

I begin by examining the various meanings attributed to the word *dulcis* and other words of the *dulc-* stem in the texts of Ovid, Virgil and Cicero. Upon consideration of the variant connotations the words can take in differing contexts, I shall consider the appropriateness of statistically driven textual analysis driven by classification of the use of *dulc-* stem words by level of abstraction. I continue by proposing use of textual analysis for texts of antiquity, a perhaps previously unexplored method of analysis for these texts. A specific hypothesis, on the relation of two pieces of data drawn from a text is explored, and its results summarized. The paper finishes with a brief discussion on further uses of the quantitative analysis of textual sources, and suggests some methods for its inclusion in classical pedagogy.

Let us return now to the concept above introduced, namely, *dulcis* as referring to a specific taste. Aristotle sets out the basic definitions of taste in his *De Anima*. According to him, all tastes are composed of a spectrum defined between two basic, and diametrically opposed, flavors: sweet and bitter.⁶ As in any act in which a sentient being interacts with his environment and takes in information on it, there are two definite actions required in a human's mental process of defining flavor. First, our taste buds receive a chemical stimulation from a property intrinsic to the item being tasted. A

⁵ Italian: dolce; Spanish: dulce; French: doux.

⁶ Aristotle *De Anima* II.10

neural process describing exactly what is present is then sent to our brain. Upon arriving, the second process takes place: an interpretation of the stimulation. The brain decides how to interpret this information, and what mental schema it fits. The taste schemas developed over two different individuals' lifetimes must be different.

Consider the following example. When comparing the tastes of a young child and a refined gourmand, what exact taste defines “pleasantly sweet” is significantly different. So too must be the tastes associated with the schema of “sweetness” in the minds of a modern reader and the intended audience of our ancient authors. We live in a world with every day access to a substance 600 times sweeter than sugar;⁷ certainly this must have affected our expectation for sweetness. Before beginning any study on the concept of sweetness, we note that we must clear our mental palate, and start with a mutual agreement on what the word sweet implies. By the primary entry in OED, the adjective *sweet* refers to something “having the characteristic flavor (ordinarily pleasant when not in excess) of sugar, honey, and many ripe fruits, which corresponds to one of the primary sensations of taste.” While we as inhabitants of the 21st century affiliate a certain gustatory stimulation with this concept, it is important to consider how different the items that define sweetness must have been in antiquity.

The sugar we know and love today, a consistent white grain, is a thoroughly modern invention. The first mention of cane sugar in classical literature is by the Greek geographer Eratosthenes, who describes a plant that grows in India: sugar cane. Dioscorides, roughly contemporary with our authors, describes crystallized sugar as “a substance called *sakkharon*, a sort of crystallized honey, in India and Arabia. It is found

⁷ Joeston et al. 359

in reeds; it is not unlike salt in its texture, and can be crunched between the teeth like salt.”⁸ The widespread use of crystalline sugar in Europe and the Americas did not begin until around 1500 AD.⁹ Experiencing something chemically different than our crystalline sucrose, the chemical description carried to an ancient’s brain, and hence the interpretation, could not be the same as it is today. *Dulcedo* must refer to something apart from the flavor of modern table sugar.

Honey is another of the flavors used to define sweetness, and is most definitely a product consumed for at least a few millennia. Any versed reader of Virgil can draw quick reference to *Georgics 4* and its famous references to apiculture, or to the description of the drone workers of Carthage.¹⁰ The use of such references implies a quite common knowledge of honey and bees in Virgil’s time. We know in fact that honey was the most concentrated and highly available form of sweetener in the ancient world. Honey in the ancient world was of a different taste than that produced by modern methods, having a flavor characterized by smoke and varying by the flowers that were available to the bees.¹¹ This distinct flavor, while close to the modern interpretation, is again at least slightly different.

One final source of sweetness available in antiquity, ripe fruit, again does not necessarily coincide with modern expectations. Consider for example the much-discussed apple. Dalby suggests that sweet varieties of apple were not necessarily widespread in Ancient Greece, instead they had μήλα more similar to our crabapples. Though by Roman times there were several types of apples available, as attested to by

⁸ Dioscorides *Materia Medica* 2.82.5 in Dalby 2000, 27.

⁹ See Abbot 9-72 for the development of modern sugar in the West

¹⁰ Virgil *Aen.* 1.430-436

¹¹ Dalby 2003 179

Diocletian's Price Edict on *matiana* apples, one can assume that there must have been a significant range in their sweetness, and that the average sweetness was lower than that of apples produced by twenty-first century orchards.¹² Still, the etymological link between μέλι, μήλον, and *malum* cannot be denied.¹³

One sees then the obvious spectrum of levels of sweetness enjoyed by the ancient tongue, as well as the differences between the concept of sweetness understood by an inhabitant of the ancient Mediterranean and a modern westerner. It is of immediate consequence that the word used to describe the physical sensation of sweetness would bear different meanings when describing these different tastes.

Beyond simply these slight differences in interpretation of the concept of sweetness of taste, *dulcis* can refer as well to a whole different spectrum of pleasurable sensations. Consultation of the Oxford Latin Dictionary suggests 16 different English translations of the adjective. These can be grouped into 8 specific categories, which range in definition from the most concrete (sweet in taste) to the most abstract (exerting charm in speech or writing).¹⁴ The next several paragraphs shall describe each of these categories, beginning with the suggested translation. The translations are listed in order of abstraction from the base definition (sweet in taste).

The most basic categorization is *dulcis* meaning "sweet in taste". The neuter may also be used as a substantive noun to refer to sweet food or drink. Cicero gives perhaps the simplest usage we could hope for: *dulce mel*.¹⁵ Cicero also presents an example of the

¹² Diocletian's Price Edict 6.65-67

¹³ "honey," "apple," in Greek, and "apple" in Latin, respectively.

¹⁴ Oxford Latin Dictionary 578

¹⁵ "sweet honey", *CIC.Fin.I.30*

substantive use: *ut alios dulcia alios subamara delectent*.¹⁶ The word is clearly used to describe substances both intrinsically sweet and substances that are not bitter. Cato's description of cabbage *simul . . . dulcis et amara et acris* again shows that sweetness is described as distinct from bitterness and sourness.

The second level of definition refers to another taste sensation, but in this case, not the presence of sweetness. *Dulcis*, taken in reference to water, refers to fresh water, or that which is not salty. By extension, dulce can mean fresh, or not stale, in reference to other foods. Rounding out the category are those occurrences in reference to fertile soil, having a distinctly mineral-rich flavor. All of these usages concern a physical property of the modified noun, and more specifically, the property of taste. One sees examples in again, Cicero *in hac insula . . . est fons dulcis*,¹⁷ Horace *simplex ius e dulci constat olivo*,¹⁸ and Columella *dulcem terram et frumentis habilem*.¹⁹ In all three examples, the concept of freshness, and the fostering of growth, human or plant, is evident.

The link between taste and smell is obvious, so I consider the definition of *dulcis* as “sweet smelling” or “fragrant” to be the next set of definitions. While no longer referring to the sensation of taste, smell is still caused by chemical properties of a substance, and experienced by the body's olfactory system similarly to taste, or even in conjunction with it. Virgil supplies a suitable example here, *dulcis . . . spiravit crinibus aura*,²⁰ as does Ovid, *dulci . . . thymo*.²¹ A taste does not waft through the air, nor does one

¹⁶ CIC.Fat.8

¹⁷ CIC.Ver.4.118

¹⁸ HOR.S.2.4.64

¹⁹ COL.2.2.20

²⁰ VERG.G.4.417

²¹ OV.Tr.5.13.22

typically taste another's hair; both usages then, are olfactory. While one could argue that the scents of hair and thyme are not particularly sweet, the significance is that their taste is definitively not sweet, at least considering them in comparison to sugar, honey, or ripe fruit. Instead, these items are attractive or pleasant to the sense of smell.

Continuing to develop groups, we move to another sensation of the human body, and one of the head. The group is defined by usages referring to objects or persons that are particularly sweet sounding or melodious. Cicero describes a *voce dulci et clara*.²² The description of a voice as sweet is an obvious clue that an author is referencing a sound. Of particular note here are also the many references to sweet words given in the texts. One must make a clear effort to distinguish between the description of words sounding sweet, and those words that reflect a sweet sentiment. Context, as always, allows the reader, encoding information on the passage, to make this decision. Another common usage placed into this categorization is the songs of birds. Unlike human speech, the reference here is clearly only to the sound of the bird chatter, and definitively not to the meaning of the song. These sound references, along with the taste and smell references listed above, comprise the specific physical sensations described as *dulcis*. The abstraction from a physical sensation is evident in the final three categorizations.

Beginning with the next category, and continuing from here, *dulcis* can describe nouns in a definitively non-physical manner. We consider any usage to imply something "affording enjoyment to the mind or senses," "delightful," or "agreeable" as belonging to this category. This can be conceptualized as an enjoyable physical sensation of an object without reference to the specific manner in which it is enjoyed. It is important to note

²² CIC.Orat.57.

that *dulc-* usage here, though in reference to a physical sensation, does not specify to which sensation it refers. These uses then are a level beyond those previous examples in terms of abstraction. Hence, many uses of *dulcedo*, without reference to the sense of taste, would fall into this category. We see examples here in Cicero, *nihil est . . . in historia . . . brevitate dulcius*,²³ and Virgil, *somni dulces*²⁴. Virgil's usage, as many others, presents a conundrum. Is the reader to interpret the phrase to suggest that sleep is a sensation pleasurable to the body and senses, or that it is pleasurable to the mind? To again stress my point, context is the driver of meaning. All the other descriptions given in this passage, of fat lambs and of mellow wines, are clearly physical descriptions.²⁵ As such, we shall interpret that sleep here is being described as a sweet physical sensation. As in previous groupings, here are contained a series of substantives, for example, *dulce satis umor*.²⁶

As we find yet more abstract usages, the next category refers to those things “held in affection,” “cherished” and “dear.” The reader understands the references contained in this category as things not delighting one of the human physical senses, but instead, the mind. A further distinction important for this category is that the noun modified must be something that can physically present, such a person, animal, or otherwise concrete object. This category also includes people or things that possess qualities inspiring affection, or of graciousness, indulgence, or kindness. A person exerting charm in speech or writing, is engaging, or attractive, would also be considered a part of this category. As mentioned above, the reader must take note to clarify that the speech is being described

²³ CIC.*Brut.*262

²⁴ VERG.G.I.342

²⁵ *Tum pingues agni et tum mollissima vinal/ tum somni dulces densaeque in montibus umbrae.*
VERG.G.I.341-2

²⁶ VERG.*Ecl.*3.82

as charming, not the voice of the speaker. Specific examples include Cicero, *Tulliolam, quae nobis nostra vita dulcior est*,²⁷ and Ovid, *Galatea, matura dulcior uva*.²⁸

One final category can be created by the most abstract uses of all: a non-physical dearness of a non-physical concept. We can define this as a concept held in affection, cherished or dear, for which one expresses fondness or affection. Examples include *pacis . . . dulcissimum et pulcherrimum nomen*,²⁹ Virgil's *dulci . . . adfatus amore est*,³⁰ and Ovid *darem cum dulcibus oscula verbis*.³¹

Though at first the specific usage of any occurrence of *dulcis* may seem to not fit into one of these seven categories, upon further investigation, all do. One then immediately wonders what, if any, is the significance of the existence of such varied meanings of this simple adjective. Though one can certainly analyze the significance using the traditional micro- and macro-analyses of classical philology, I shall here propose a novel investigation.

²⁷ CIC.*Ep. ad Fam.*14.VII.1.3

²⁸ OV.*Met.*13.795

²⁹ CIC.*Phil.*12.9

³⁰ VERG.*A.*6.455

³¹ OV.*Pont.*4.9.13

Chapter 2: A History of Content Analysis³²

The ability to separate each individual occurrence of *dulcis* into a discrete category by its contextual definition suggests an easy mapping from a literary concept to a piece of numerical data. Using the rules defined above and expanded below one can encode each occurrence of a *dulc-* stem,³³ and apply statistical tests to the ensuing data set, from which a wealth of information can be drawn. I shall here give a brief history of the use of textual analysis up to the twentieth century, leading to the advent of computerized textual analysis. An explanation of basic techniques of investigation will follow. Finally, I shall set forth a series of steps describing the methodology of completing a computerized textual analysis for the data drawn on words of the *dulc-* stem.

Among the first documented cases of quantitative analysis of printed materials is found amidst a controversy over a Swedish hymnal. A collection of ninety hymns called the *Songs of Zion*, published in 1743, was considered by the Orthodox Lutheran clergy to be in direct opposition to accepted liturgical beliefs, and a direct threat from an encroaching religious group, the Pietists of Germany. In an effort to show the superiority of the accepted Lutheran beliefs, counts were made of the occurrences of different religious themes or values, whether positive or negative, and then compared to the

³² A note on terminology. In this paper, when I say content analysis, I mean the analysis of information contained in any publication. Text analysis is the content analysis of any text publication, which cannot include, for example, the analysis of musical notes. Quantitative text analysis will be text analysis completed by the examination of encoded data drawn from a piece of text.

³³ Hereafter, note that my usage of the term *dulc-* means fully a Latin word containing the stem *dulc-*.

standard contemporary Lutheran hymnal. These quantitative measures and comparisons were then used both by the establishment in opposition of the hymnal, citing the prevalence of violence and blood in the new hymns, and the publishers, who claimed a simplification of the same values espoused in the previous hymnal.³⁴

This example presents the main type of so called “content analysis” used prior to the twentieth century, that is, simply counting the number of occurrences of a specific word or theme in a text. Another famous example of content analysis was completed at the behest of the New York Times in 1893. An analysis was completed of the proportion of news space dedicated to sensational stories, that is, stories of gossip and scandal. The discovery: along with a great increase in the paper’s distribution from 1881 to 1893 came a great increase in the relative amount of sensation included therein.³⁵

The examples above speak to the how early content analysis was often completed: simple measures of how often a word or theme occurred in a text, or at most, in what proportion. Great development in the field did not come until the 1940s. Interest in the propaganda techniques of Nazi Germany by the Allied Forces revitalized what was a dying field of inquiry, and led to quickening developments in quantitative textual analysis for the next several decades. One can segment the types of analysis used roughly by decades.³⁶

Frequency analysis, that is, simply counting occurrences of an item in text, was in vogue through the first several years of the 1950s. By the middle ’50s, scholars assigned “evaluative loads” to text by considering words either positively or negatively valued.

³⁴ Doving 389-393

³⁵ Stone et al. 22

³⁶ Popping 2

From this so-called valence analysis grew intensity analysis, which began to classify different strings of words with different weights based on the strength of their assertions. For example, a present tense indicative verbal clause may be assigned a value of 1, with a future tense indicative assigned $2/3$, and subjunctive $1/3$.³⁷

Surprisingly, it took several years after scholarship began mapping clauses into quantitative data before mathematical analysis began to be used on this data. Beginning in the 1960s, statistical research techniques were applied to data sets constructed from pieces of text to allow research questions regarding the occurrences of specific words, themes, and associations in the text. Themes and associations quickly gained prevalence in investigations as a type of “thematic text analysis” became the vogue of analysis. Researchers created a series of “dictionaries”, lists of words that fall into specific categories. For example, one could create a dictionary for “self-reference” that contains any words relating to the self, such as, in English: I, me, mine, my, myself, our, we, us, etc.³⁸ By creating counts of words which fall into any number of dictionaries for a text, one could characterize it as predominantly self-referential, or by example of some other dictionaries, male-oriented, obsessed with fairness, or evil. It is interesting to note how close the Swedes came to this thematic analysis in their eighteenth century investigation.

As more and more dictionaries were defined, and larger and larger texts were identified for analysis, frustration grew with the limitations of quantitative analysis. Simply put, the time required to encode and analyze this data was prohibitively expensive and universities began to divert funding to other fields, and the field of “content analysis” languished.

³⁷ Popping 2

³⁸ Popping 52-53. See Appendix I.

Cue the entry of the statistician's best friend: the computer. The ability to design a user interface for the encoding, storage, and analysis of data without intensive monetary resources allowed for the further development of the field. A team of researchers from the Massachusetts Institute of Technology, with their systemization of a computer method for content analysis, creation of hardware to support these analyses, and propositions for the power of the analysis revolutionized the field. In collaboration with the Department of Social Relations at Harvard, they released their report in August 1966.

A team of scientists and humanists had, with significant funds from the National Institute of Mental Health and National Science Foundation, developed a computer system known as the General Inquirer. The project laid forth a process of transforming explicit judgments on a piece of text into explicit rules;³⁹ they had created a framework by which a computer system, loaded with data, could make a judgment along the lines of "this editorial is for or against" a certain opinion. Understanding fully the potential implication of their project, the team considered the work as an aid to the social scientist,⁴⁰ but interestingly proposed many additional uses of the work. Aware of their contemporaries' research, they suggested the influence of Levi-Strauss's studies on mythology and Propp's analysis of plot in folktale as significant impetuses on their work. Again, in a discussion of the potential uses of their program, they suggest that it is applicable even in fields which typically do not use the term "content analysis research," including anthropology, education, history, literature, psychiatry, psychology, sociology, and most aptly for this paper, philology.

³⁹ Stone et al. 5

⁴⁰ Stone et al. *xi*

Interestingly, much of twentieth century content analysis has focused on journalism, and in turn, political science. The drivers seem obvious: money and power. Consider a few of the key cases of content analysis introduced above. The eighteenth century Swedish hymn analysis was conducted by the Lutheran church in response to a book of hymns believed to undermine orthodox Lutheran values. The encroachment of a German religious group was believed to be a direct attack on the sovereignty of the establishment. The New York Times commissioned their study to find out what makes a paper sell, and how they could maximize their profits. It was a very real fear of the Nazi ability to affect the thoughts of their people that led to the governmental funding of the 1940s that renewed interest in the field of content analysis.

The application of computer driven, quantitative content analysis to literature, while fruitful,⁴¹ is dwarfed by its applications in other fields, as well as by the application of other types of analysis to literature. Frustration with quantitative analysis, and an argument against its use for literature, was particularly well stated by Dorwin Cartwright: “One of the most serious criticisms that can be made of much of the research employing content analysis is that the ‘findings’ have no clear significance for either theory or practice. In reviewing the work in this field, one is struck by the number of studies which have apparently been guided by a sheer fascination with counting.”⁴² After a few decades of mutual exclusion between content analysis in fields of the social sciences and literature, scholars have begun to come to the realization that there is much to be gained from a fusion of quantitative and qualitative analysis.⁴³ One can draw significantly

⁴¹ Ellis 629

⁴² Cartwright, 447, in Festinger and Katz

⁴³ Pfaffenberger 12-16

greater impact from statistically analyzed data, whether in terms of correlations, expected values, or any number of other analyses. This is the type of analysis I propose for study.

Having accepted the necessity of this fusion, let us turn our attention to the remaining dichotomies of contrast introduced in Popping. The following three pairs of terms are of importance to the comprehension of arguments to follow. Of primary importance is the analysis of both manifest and latent meanings of a word in context. The manifest meaning refers to the surface meaning, or that which is undeniably present. Latent meaning is what the reader notes beyond that which is explicit on the page. Consider the phrase: “The stove is white hot.” Here, the manifest meaning of white is a color. The latent meaning instead uses white as a comparative adjective, meaning almost “extremely”. Clearly, when examining the content of a piece of text, the latent content is of greater importance than the manifest.

Another important contrast is that of denotation and connotation. The denotation of a word is its primary, specific meaning. This meaning is fixed, and accepted for all readers of the word. The connotation however, is variable, and can be different among readers. Popping uses the word “pot” as his example. By denotation, one understands an object used for cooking or carrying liquids. Connotations to different individuals could however vary, so might be the same as that denotation given above, or could be a reference to a specific drug. Both denotation and connotation have relative merits for a content analysis, depending on the researcher’s hypothesis.

Perhaps the most important contrast to discuss is that of description and interpretation. A description is a factual representation of what is present, for example, a numerical count of how many times a word appears in a text. Any analysis considering a

word's meaning in a specific context or the author's choice of the word is considered an interpretation. Given our interest in latent content, we shall inevitably be interested in the interpretation of the text.⁴⁴

⁴⁴ Popping 4-7

Chapter 3: Methodology for Textual Content Analysis

The next several pages shall detail the series of steps taken to prepare a text for quantitative analysis. Popping gives a series of actions that must be taken for the preparation of any quantitative analysis of textual content. These steps are themselves a modernization of those presented originally by Stone et al. for use with their General Inquirer mechanism.⁴⁵ I here follow the process described by Popping with additions made to reflect the needs of a literary analysis, as opposed to the analysis of a text for the social sciences.

We begin by considering the problem to be analyzed. As noted in section one above, words in Latin from the *dulc-* stem can have definitions or connotations along a wide spectrum. The distribution of the words' connotations across this spectrum is of particular interest, and we shall seek to explore many of its properties, from which connotations appear most frequently to whether a specific author uses one connotation with a special preference. Among other possible explorations is the comparison of data and statistics drawn from the connotations to those drawn from the texts from which they come. We could examine, for example, whether there is a relationship between how abstract a connotation of *dulc-* is used and how abstract a genre the piece is.

To begin preparation for the study, the first step will be to develop a testable hypothesis. There are two different types of hypothesis allowed in a textual analysis: inductive and deductive. An inductive hypothesis is "data to conclusion," in which first data is collected, then analysis leads to a conclusion. Deductive hypotheses, however,

⁴⁵ Popping 11-13

begin with a question or proposal, which the researcher seeks to verify by looking at the data. My hypothesis for *dulc*- is that there are key statistics regarding their use which can be measured, and which can then be used to make a statement about the text from which they come. This shall then be an inductive study.

For the sake of argument, we shall also construct a deductive hypothesis, in this case, that there is a direct correlation between the average level of abstraction of *dulc*- in a text and the level of inversion of its generic context. A comparison of the relative success of the inductive and deductive hypotheses may allow us to suggest one is more appropriate for quantitative analysis of classical literature than the other.

Given our desire to use quantitative data, we must operationalize the concepts we seek to measure. Here, we operationalize by placing the differing connotations of *dulc*- on a spectrum, assigning a value to each. These values will be indicative of the level of the word's abstraction. Another issue of operationalization is presented by the deductive hypothesis: how we are to define the inversion of a context. While this is rather a "fuzzy" term, let us make it more real by defining the level of inversion as the difference in expectation of genre set forth by a text's meter (its form), and the genre found in the piece as defined by its contents.

Now that we have hypotheses and have operationalized them, we must consider a representative sample of texts for the project. We desire a sample large enough to provide many samples, yet at the same time small enough to eliminate potential extraneous modifiers. I suggest for our study the collected works of Ovid and Virgil. Though from slightly different geographical regions, both were trained in rhetoric at

Rome during the latter half of the 1st Century BC.⁴⁶ The collected works of the two authors, often considered definers of the apices of Roman Epic and Elegy,⁴⁷ are clearly of seminal importance in Roman literature. As major inspirers of the corpus of scholarship on Latin literature, there is much to be gained by the introduction of a new type of analysis of their texts.

Having considered the sample of texts, Popping requires the researcher to next consider a recording unit, or a level to which the larger text will be broken down. For our purposes, the text will be divided by sentences, with those containing *dulc-* as our focus. These will further be analyzed by word sense, that is, the connotation of *dulc-* compared to the connotation of the entire sentence, theme, poem or text.

We continue by defining a set of coding rules for each of these sentences containing *dulc-*. While often the most time and resource intensive part of a quantitative content analysis,⁴⁸ Latin literature presents a unique advantage in the coding process. Due to the efforts of countless nineteenth century German scholars, great concordances of the corpus of Latin literature were created, containing references, by word, to each individual occurrence of a word. A great deal of the work has already been done for us, so to speak. In fact, Latinists have moved the data yet another step forward. The Packard Humanities Institute, beginning in 1987, created an electronic database of Latin Literature, containing the texts up to 200 AD. Peter Heslin at Durham University created

⁴⁶ See evidence of the respective birthplaces in Virgil's Epitaph: *Mantua me genuit, Calabri rapuere, tenet nunc / Parthenope; cecini Pascua rura duces*, and Ovid's birth at Sulmo in the Abruzzi (Ovid Tr.4.10). On their education, see Vit. Don.7 and Seneca Cont. 2.2.8, respectively.

⁴⁷ OV.Rem. Am. 395-396: *Tantum se nobis elegi debere fatentur/ Quantum Virgilio nobile debet epos.*

⁴⁸ Though, with the advent of scanning software that can "read" text and convert it to an electronic file, this has also changed significantly.

a graphical user interface for users of this database,⁴⁹ which has allowed modern classicists to conduct research in a much more efficient way than before. Through the late 1990s and early 2000s, the tool has been continually updated, with each version more user friendly than before. Just as Margaret Masterman said of the development of the General Inquirer, Diogenes, like the telescope, significantly enlarges the range of what possessors can see, and hence do.⁵⁰ Though the ability to conduct quantitative analysis existed previously, by putting the tool at the hands of classicists in an easy to use way, a wealth of quantitative analysis can and ought to be completed.

Taking advantage of the PHI Database through Diogenes, the above-mentioned tool, then, we begin to encode our data. First, a corpus was defined as the collected works of Ovid and Virgil. A search was completed for all sentences in the corpus containing “dulc”. Here, a distinct advantage over simple consultation of the paper concordance is the ease with which a scholar can find related words. Our search returns results for compound words containing *dulc-*, such as *praedulcis*, or *subdulcis*, rarely occurring and easily forgotten. We find 76 results in Ovid and 54 results in Virgil. The fact that both values are greater than 40, the accepted value of entries required for a statistically significant data analysis, will allow us to find statistical significance in our data, and confirm that the appropriate size texts were chosen.

Now having access to every occurrence of *dulc-* in Ovid and Virgil, each sentence is assigned a numerical value. From the definitions set forth above, it is easy to characterize most sentences by a particular definition of *dulc-*. However, there are some

⁴⁹ The interface, called *Diogenes*, also allows users to examine the data included in the TLG, the Duke Documentary Papyri collection, and the PHI-sponsored corpora of ancient inscriptions.

⁵⁰ Masterman in Stone et al. 628

complications. Consider the example of Ovid’s description of Galatea,⁵¹ above used as an example of a level 6 definition. Though by its association with a specific definition in the Oxford Latin Dictionary we are able to categorize it quite easily, the phrase shows that we must define a few additional rules for our coding.⁵² In an English translation: “Galatea, sweeter than a ripe grape” would present a significant problem, because we do not know to which noun to apply “sweeter”, Galatea or grape. Luckily, another advantage of Latin for textual analysis is its use of inflection. Since *dulcior* here agrees with *Galatea*, we know that it is a description of a person. The noun with which an adjectival form agrees will be used to define its category then, rather than any other concepts with which it may be associated. Here, the value of the metaphor is only from the latent meaning of *matura* as a level of sweetness.

An additional problem arises for any latent use of a *dulc-* stem. Only by understanding the context, and by the ability to identify forms as examples of metaphor, metonymy, and synecdoche can one classify implied meaning correctly. Though clearly this introduces interpretation into the coding of the data, the loss of data integrity in this example is minimal, as we rely on one coder for all data. Should a large-scale project be undertaken, great care would need to be taken to ensure that all those encoding data assigned the same values to each individual piece. In a single encoder data analysis, statistical significance shall remain, and most statistics will not be affected by a bias in selection of encoding levels for data.

One final problem with the encoding of the data is also noted. Most textual analysis programs written for the computer simply do not achieve that “human element”

⁵¹ *OV.Met.13.795: Galatea . . . matura dulcior uva.*

⁵² For the appropriateness of rule definition *a posteriori*, see Wood

desired. Ogilvie describes the General Inquirer as similar to an extremely enthusiastic, but extremely stupid, clerk.⁵³ Among the problems with latent definitions are those of idiomatic ambiguity.⁵⁴ While a human reader is able to interpret *dulce opus* as an idiom for sexual intercourse, or *dulce onus*, as a likely description of a child, this task is much harder for a computer to complete. By relying on human encoders, as above, this experiment shall avoid the particular problem of idiomatic ambiguity.

Having selected the means by which data will be encoded, the next step, particularly exciting, is the actual running of statistical tests on the now quantified data. Very simple analyses of the data for both Ovid and Virgil are seen in Appendices I and II, respectively. Investigation of the data from Ovid shows that over half of *dulc-* usage is in categories 5, 6 and 7. We note that if category 4, “sweet sounds” is added in, over 75% of usages are found. Ovid clearly then, throughout his literature, uses more of the abstracted forms than the purely physical forms. An investigation on the mean and median of the data set gives values of 4.55 and 5, respectively, again confirming that Ovid uses the abstracted forms more often than those referring to physical stimulation.

A similar analysis when applied to Virgil shows, not surprisingly, similar results. As in Ovid, the majority of *dulc-* usage is in category 5, 6, and 7. Here, however, approximately 70% of data falls into these categories. Unlike in Ovid, there is only one occurrence of a category 4 definition. This in and of itself introduces a significant difference between the two authors’ word usage; we have shown that a work of Virgil is far less likely to use *dulc-* in reference to a sound than is Ovid. Let us consider some other implications to be drawn from the data in Chapter 4.

⁵³ Ogilvie, Stone, et al. in Wood 275

⁵⁴ Popping 21

Chapter 4: Applications of a Text's Quantified Content-Analysis

Berelson presents a wealth of possible uses of encoded data, which can be completed after data has been collected. With regards to the substance of the content, he suggests that we are able to describe trends in type of communication, compare different levels of communication, and to construct communication standards.⁵⁵ An analysis of a classical text using encoded data could allow us to then empirically judge whether a piece of text adheres to standards of classical literature as described below.

Another area of analysis is that of the content's form. Here, for example, we can create a measure of "readability statistic" for a text. One way to complete this may be to construct a dictionary of "easy," "medium," and "hard" words for a reader's comprehension. The text could then be searched for these different words, and by comparing statistics on the observances related to each data, it would be easy to assign a piece of text this readability statistic based on the complexity of its vocabulary. Perhaps another interesting way to calculate a readability statistic, at least in regard to Latin literature to be translated, may be to consider the complexity of the piece in terms of latent definition, idiomatic ambiguity, and other linguistic complications. While *dulcis* is easily translated in context by even the most novice Latinist, not all words with many possible translations are so intuitive to an English speaker. Of particular problem could be homographs distinguishable only by their scansion; consider, for example *aera* or *verum*. While contextual clues should make it quite clear whether one is referring to bronzes or air, truth or a spit, these complications could be avoided in the selection of

⁵⁵ Berelson 27

texts for beginnings. Any well defined readability statistic, when assigned to a text, or section thereof, provides an empirical measure of the ease of translation of a document. The pedagogical applications then, are obvious.⁵⁶

Another potential discovery allowed by quantitative analysis will have to do with the producer of the content. One can, upon further investigation, determine the intentions or other characteristics of the communicators, their psychological state, or detect the existence of propaganda, for example. Perhaps the greatest application of producer-specified statistics for a philologist has to do with an empirical measure of what characterizes a specific author. While one can often tell the general style of a specific writer, by quantifying the variables that determine this style, we can compare the accepted normal values for an author to another piece attested to be by the author. For example, we could consider disputed lines of a text thought to have been added by a monastic transcriber. Entire poems attributed to an author could be tested for their authenticity by such granular analysis. We could test then, once and for all, whether the works of the *Appendix Vergiliana* were indeed written by Virgil. As the origins of a contested piece of art can be tested by its molecular analysis,⁵⁷ so too can a piece of literature be tested for its provenance by analysis of it broken into its metaphorical molecules, that is, its most elementary pieces.

Additional considerations possibly addressed by quantitative analysis include the audience of the content and its effects. One could examine the attitudes, interest, or values of the Roman population for whom the piece was written by considering which

⁵⁶ For additional discussion on the use of quantitative analysis of Latin text for pedagogical technique, see Diederich

⁵⁷ For a discussion on the scientific analysis of van Meegeren's forged Vermeers, see Keisch 1968

themes were most prevalent. Another analysis could reveal the focus of attention in the piece, or the attitudinal and behavioral responses to communication therein, which in turn would reveal those opinions held by the author.

In addition to these several possible areas of exploration, we return to the deductive hypothesis set forth in Chapter 3, namely, that there exists a statistical correlation between the abstraction of *dulc*- usage and the level of perceived inversion of content and form in examination of the text's genre. Having already classified one set of variables, the *dulc*- abstractions, we must examine the genre inversion. Aristotle tells us in *De Poetica* that all poetry⁵⁸ can be divided into genres by three characteristics: its means, object, and mode. The means of a piece of poetry is where Aristotle defines it as textual, or language based. All genres considered in this paper shall be textual. Object refers to the content of the piece, that is, what action occurs therein. It could be of a high or low type, tragic or comedic, according to Aristotle's original specifications. I suggest that there exists, as in taste, a spectrum between the two diametrically opposed forces of high and low content. Finally, mode refers to the specifics of a poem's delivery by its means. This includes, for textual poetry, its rhythm, tune, and meter.

Drawing on the technique above used to quantify data for the definition of *dulc*-, here I describe a methodology for encoding the generic inversion of a specific body of text. To begin, I describe a series of different genres of Latin literature. To each of these genres, I assign 4 key descriptions, one of which is meter. For each text, we shall begin by using primarily which genre it states itself to be, or if this is lacking, its meter, to describe the genre as described by form. The text will then be compared to the content

⁵⁸ It is important to note that "poetry" here refers to the Greek Ποιητικά, things made, rather than the typical English sense of a specific type of text.

expectations derived for each genre form, with one point assigned for each of the key descriptions of the genre it fails to meet. This will then give each text considered a value of 0-4 that characterizes the magnitude of its inversion from the expected content.⁵⁹ All formal definitions are taken from the entries for the respective genres given in the Oxford Classical Dictionary.

The first genre to be discussed, for which little discussion can be had on the key values needed, is epic. The oral epic far predates Roman society, and even the written systems of the Mediterranean. Homer formalized its rules to great extent in Greece. A Roman epic, slightly differently than a Greek one, by a modern definition⁶⁰ must contain at least the following four factors: consecutive lines of verse in the dactylic hexameter; the use of epic devices including but not limited to epithet, simile, epic plot devices, direct speech; a sense of aesthetic sublimity and dignity, with which it seeks to depict the world, a world view, objective reality, and systems of thought, in totality; and a narrative structure of unity, rationality, and causality. While it is true that as only four simple categories these units of measure undoubtedly fall short as rules for the creation of an epic, Latacz's definition suggests that any work of Roman epic must display them.

A second genre, considered by some to be a formal subclass of epic, is didactic poetry. To define the genre by its form alone would be difficult, given its use of the epic meter, as would be to define it by its content alone, which would deny any poetic quality. Instead, works of didactic poetry exist to serve both as teaching and as education.⁶¹ This

⁵⁹ Bakhtin 4 suggests that some genres are finite while others continue to develop. His definition of Roman Golden Age genres as having completed their lifecycles and hence providing large corpuses from which genre definitions can be made reinforces the decision to explore those genres here discussed.

⁶⁰ Latacz 1040-1042

⁶¹ HOR. *Ars P.* 333f

fusion is obvious in our definition. A Roman didactic poem is characterized primarily by its following of conventions of epic poetry, such as meter; its serving an educational purpose; its serving as a form of entertainment; and its serving a specific audience.

Third among the genres to consider is Roman love elegy. Though in the original Greek, the genre was classified merely by its meter, the Romans, and Catullus in particular, developed the love elegy as distinctly their own. For a work to be considered of the most pure form of love elegy, it must be written in the elegiac couplet, contain the presence of a lover and a love object, present a lament or hortatory paraenesis, and at some point discuss a distinctly Roman value. Though Catullus truly mastered the form of the elegy, Ovid as well is of great renown in its use.

The final genre defined for our purposes is that of bucolic poetry. While defined by a series of explicit rules in Greek, the first significant example, and in fact, greatest example, in Latin is Virgil's *Eclogues*. The definition then is: a piece written in hexameter, short in length and of a light manner, whose subject is either a singing shepherd or his song, and has at its base a theme of love, lament or loneliness. A consequence of the genre being defined by the example of Virgil's *Eclogues* is that we will note no inversion of our model in our only example of bucolic poetry in Ovid or Virgil: the *Eclogues* themselves.

Having now defined an encoding method for each text's generic inversion, we consider each work of Ovid and Virgil containing instances of *dulc*-. Their measures of inversion will be tested against the generic inversion in search of a statistical relationship.

We begin by discussing the works of Virgil. It comes as little surprise that the *Aeneid* meets all four requirements for an epic: it is written in dactylic hexameter, it is

full of epic devices, through its depiction of the foundation of Rome describes an entire world view, and follows a chronological series of events. Because all four categories have been fulfilled, the *Aeneid* is encoded with a “0”.

The *Georgics* also fulfill each required category. Through clear allusion to Hesiod, and the use of agriculture as a moral paradigm, one suspects from the beginning that the *Georgics* will not be particularly inverted from the expectations of a didactic poem. They are written in the epic meter, dactylic hexameter. They instruct on the values and techniques of farming, which is a learnable skill. The audience is specified as the Roman gentry. The piece is written in a manner to be pleasurable to its audience. By the fulfillment of these requirements, the *Georgics* also are encoded with a “0”.

Next, and finally for the works of Virgil, come the *Eclogues*. As noted above, the *Eclogues* are in hexameter, with a short length and light manner. They focus on the songs of shepherds, and tell of their love and loneliness. One cannot come closer to Theocritus’ *Idylls* in Latin, and Virgil’s works are rounded out with a final “0” encoding.

Ovid however, does not behave in a manner so reliable as Virgil. Let us begin by discussing briefly the two works containing *dulc-* that do not fit a rule of a previously defined genre. Ovid’s *Heroides*, a series of fictional letters written from various mythological heroines to the lovers and families, has no precedent. While indeed there were prior to their publication many works of epistolography published at Rome, including some that were fictional, the *Heroides* seem so highly divergent from these that they cannot be considered to belong to the same genre. All previous books of letters could at least theoretically have been sent to their recipients by the supposed letter writer. To believe that Ariadne, abandoned on the shores of Naxos, would be able to post a letter

to Theseus is utterly ridiculous. Ovid here, to a greater extent than in most of his other works, has so broken from the mold of previous genres, that we cannot even choose a form against which to compare the text.

Of similar concern is Ovid's *Fasti*. Though there have in the past been calendrical listings of days and their happenings before, there is not a significant corpus of poetry against which to compare *Fasti*. Yes, there is a vague similarity to Hesiod's *Works and Days*, but this would be considered by our rules (should they be applied to Greek literature) as didactic, rather than calendrical. For these reasons, I will not in this paper attempt to compute the level of inversion from expected content for the *Fasti*.

Having set aside the two examples above, let us turn our attention to the *Amores*. These are written in elegiac couplet so we examine them against the rules for elegy. The entire work details the author's tragic love for the unattainable Corinna, who serves as the recipient of the love. Individual poems are laments on the author's status, or otherwise almost odes on Corinna's perfection. Among these examples of paraenesis are the author's extolling of her virtues, her uprightness, beauty, wit, and properness, all highly desirable for a Roman woman. On account of the fulfillment of each of the four categories, we assign a value of "0" to the *Amores*.

Ex Ponto is a collection of poems written as letters from his exile to his friends and family at Rome. Each individual letter is written in elegiac couplet. The poems are also addressed each to a specific recipient. In them, Ovid laments the weather and conditions of the East, and extols the many virtues of Rome. His lament is obvious, but is not over the lost love of an explicitly defined person, but instead over Rome as a mistress. If this is indeed the case, then one must consider how to encode a non-human

mistress. I choose for this example to give a value of $\frac{1}{2}$, to indicate that the condition is met, but not wholly. As above, the rules have been modified *a posteriori*. On account of the sole inversion from expectation, and even this not being an entirely true inversion, *Ex Ponto* receives a value of $\frac{1}{2}$.

Another extremely similar work is Ovid's *Tristia*. The poems are, as above, written as letters from exile. Each letter serves as a stand alone poem, written in elegiac couplets. However, each individual entry is not assigned a recipient. On account of this inversion, the *Tristia* earns its first point. Again, similarly to *Ex Ponto*, the poems lament the author's exile from Rome, and compare the relative disgraces of life there to the many dear delights of Rome. I consider Rome herself to be the mistress, and by the rule defined for *Ex Ponto*, assign one half of a point. Clearly, there is an explicit mention of distinctly Roman values in the poem. Combining the adherence to the four categorizations, the *Tristia* earns 1.5 points.

Moving on to the *Ars Amatoria*, we see rather than an example of elegy, one of didactic poetry. While for other examples we consider the meter to be of the utmost importance in defining genre by form, it is extremely clear from the outset that the work will teach, and not be an example of a writer's love for a female.⁶² Hence, by Ovid's own definition, the work must be gauged against encoding techniques for didactic poetry. The form then shall count as the first inversion of expectation; the reader encounters a piece in Ovid's typical elegiac couplet rather than in the dactylic hexameter Virgil would have us expect. A specific audience is addressed in the works, that is, anyone unlearned in the art of the lover. The piece is also clearly written to entertain: its tone remains light-

⁶² *Siquis in hoc artem populo non novit amandi / hoc legat OV. Ars Am. I.1-2*

hearted and joking throughout. The content of the piece then, presents the clearest concern. While a didactic poem must teach, one questions whether the art of love is truly a topic that can be taught. Clearly, one can learn how to farm, but the tricks presented by the *Ars Amatoria* seem to be only ways for a reader to cause a Roman female to love him. The work does not succeed then, in once having been read, to cause the reader to be able to love. Yet this is its purpose as defined by the introduction.⁶³ Hence, another point is assigned to the *Ars Amatoria* in the encoding procedure. *Ars Amatoria* then is encoded with a value of “2”.

The final significant piece to be discussed is the *Metamorphoses*.⁶⁴ Unlike the remainder of his work, Ovid is quite clear in his intentions for the piece to be interpreted as epic, or at least imitation thereof. It is written in dactylic hexameter, which is the first hint. Ovid also makes abundantly clear his use of epic convention in the piece from the very first sentence.⁶⁵ He tells of us his epic theme, of changing forms, and calls upon the gods. As he begins his second sentence, the familiar “*Ante mare et terras . . .*” suggests that the piece will cover the entire spectrum of the Roman world, from its beginning before even the sea or lands, to the end of time. Ovid has thus fulfilled the requirement of a grand scale and completeness as well. The final category, that is a narrative structure and structural unity, does not seem to have been met in entirety however, given Ovid’s abandonment of chronological order throughout the poem. For this category, he will

⁶³ *lecto carmine doctus amet. OV. Ars Am. I.2*

⁶⁴ Though there is one usage of *dulc-* in *Ibis*, this is simply not enough data to say anything about the piece with expectations of any reasonable sort of statistical significance.

⁶⁵ *In nova fert animus mutatas dicere formas/ corpora; di, ceoptis (nam vos mutatis et illas)/ adspirate meis primaque ab origine mundi/ ad mea perpetuum deducite tempora carmen! OV. Met.I.1-4*

receive one half of a point. In total then, the *Metamorphoses* is assigned an inversion ranking of 1.5.

Again, a look at some very simply calculated statistics is enough to speak about the data. Upon calculating correlation, there is no statistically significant relationship between our two calculated statistics, the inversion value and the *dulc-* value, either for the works of Ovid alone, or for the works of Virgil. This suggests then that from the works of Ovid and Virgil, one cannot use the level of abstraction of *dulc-* in context to make a statement about the level of inversion of genre as expected by its form. We have, for the time being at least, disproven the deductive hypothesis.

Of course, there are several considerations that have weakened the value of our data. One first note is the number of references we have. While *dulc-* stems provide a large amount of variation in their definition, perhaps the selection of a different word for investigation in terms of abstraction of its definition in context would be allow a greater number of occurrences, and help to provide a more accurate result. The comparison of correlational values noted in Ovid alone and those noted when all data were examined shows a significant increase in statistical significance. However, this increase is still not enough to display a significant relationship.

Another possible revision could be made on the method of encoding for both of our variables. By tightening the definition rules for each we could provide a significantly more robust data set, which would increase the validity of the test. Rather than testing the presence of four descriptive elements in a text to determine its generic inversion, perhaps we should test for the presence of forty. Another issue with the encoding has to do with the interpretation required of the encoder. Each time an additional layer of

interpretation is added in the analysis of a text, the reliability becomes lower. Yet, it is from the interpretative analysis of latent material that we draw significant meaning. One can have a higher reliability in data by analyzing simply manifest data points, which can be very reliably coded, yet the significance of the results will be low. The implication is one must strike a careful balance in his coding of textual data to find not only reliable results, but also significant.

Chapter 5: Conclusions and Next Steps

Though we have disproven our deductive hypothesis above, the evidence does indeed support the inductive hypothesis, that we can make a statement about the usage of *dulc-* by looking at its uses in Ovid and Virgil. A simple look at the bar charts in appendices II and III shows a significant difference in the two author's uses of the *dulc-* stem in reference to olfactory stimulation. From this data alone, we can make a significant statement. Given that amongst the collected texts of three large works, Virgil uses this connotation only once, we can state that he likely does not use the connotation often in other works. That is to say, if we were to examine the uses of *dulc-* in the *Appendix Virgiliana*, or any other newly discovered work attested to Virgil, and found that its use was significant, we would raise a red flag. As previously discussed, and confirmed by the lackluster showing of the data analysis here, we should not rely on data encoded on a text quantitatively alone to make a large statement. So, at this point, we would return to traditional qualitative analysis, and examine many other vantage points before the decision to discard a poem of the *Appendix Virgiliana*. Perhaps the most significant takeaway from these results is the varying levels of applicability of the different types of hypotheses for a literary analysis: one may be better off first computing data and only after having data in hand, making a statement about this data.

I present some additional possible studies to be completed using the statistics we have already encoded, which can be computed similarly to those above. First, consider the selection of a larger group of texts for analysis. These texts will then have their *dulc-* uses encoded as defined in this paper. While we have examined the generic inversion

based on form, as compared to the *dulc*- data perhaps a simpler step would be a simple comparison to genre. Perhaps across the corpus of Latin literature the percentage of *dulc*-appearances in text is significantly higher for elegiac couplets than in prose. Another possible finding could be that it occurs in higher proportions on funerary inscriptions than in literary uses.

By looking at the collected works of an author, again, more simple statistics can be taken on the text from which *dulc*- data is drawn. One could examine, for example the stage of career in which the author wrote the text. We may find that one uses *dulc*- more abstractly in old age than in youthful writing. This data could also be affiliated with simply the actual year in which the text was written. Rather than the age of the author at the time of writing, there could be a correlation with the age of the Latin language at the time of writing. An entire text could be examined for its length. We may find that the shorter a text (perhaps in relation to its form: be it a tombstone or poem), the uses are different. It could be that there is a correlation with the placement in the text, that is, at what quantile *dulc*- occurs. All of these examinations on correlation between *dulc*- abstraction and predefined statistics on a piece are done, we must remember, not simply for the purpose of finding a correlation, but for making some statement afterwards. It is important then to keep in mind that one ought to first prove simple correlations and statistical values, which are tied to easily defended qualitative arguments, before he attempts to prove a complex relationship.

One possibility of this could be looking at *dulc*- usage by different speakers in one text. We note, for example, that the narrator of the *Aeneid* does not often refer to an individual using *dulc*-. Anna, however, in book 4, more than once refers to her dear sister

using the term. Perhaps if we increased our pool of adjectives explored, and considered words such as *suavis*, or *carus*, in addition to *dulcis*, we would see that Anna (or some other character) uses the words more often as terms of endearment than perhaps Aeneas or the narrator. We could then use this data to explore the possibility of Anna's language reflecting her own self-image,⁶⁶ be it in a negative or positive manner.

Of greater importance than any one specific test that can be completed using quantitative text analysis is the implication it holds for the field of classical philology. It is sad but true that for many American institutions of higher learning, budget constraints are beginning to affect the academic policy makers. Consider, for example, the decision of SUNY Albany in October 2010 to end admissions to its programs in French, Italian, Russian and Classics. The university's president, George M. Philip, stated the "decision was based on an extensive consultative process with faculty, and in recognition that there are comparatively fewer students enrolled in these degree programs."⁶⁷ While anyone who would read through 35 pages of a paper even vaguely relating to classical philology would certainly be offended to see that a university of SUNY's caliber would consider the elimination of language and humanities programs to be an offense to the name of liberal arts, an interesting question is indeed raised: why are there fewer students in these departments?

A quick survey of students at a top American university reveals simple answers, though perhaps not all encompassing: "I don't want to be a Latin teacher," "I need to study sciences to succeed in my intended career," "It's boring." These answers reflect

⁶⁶ Berelson 27

⁶⁷ Jaschik

what pedagogical researchers already know,⁶⁸ technology, incorporated into a classroom in a meaningful way, increases student engagement and satisfaction. Why should classical philology be any different? Upon graduation from an institution of the liberal arts, one is expected to apply the ability to learn and to incorporate knowledge of various disciplines. By beginning to explore these interdisciplinary relationships while at school, one will find himself better prepared for “the real world”. The applications of quantitative analysis, that is, the analysis of numerical data, are extremely evident in the world not only of business, but even of an academic. Universities, like corporations, must analyze budgets and numbers, and one will be inevitably be presented with quantitative data to support a decision. Even in the nineteenth century, statistical review of the production techniques led to the significant changes in the New York Times seen above. One is best served then by an education, nearly a century and a half later, that includes preparation and facility with quantitative techniques. Those students who profess an interest in classical philology, and would perhaps be more interested in the use of qualitative analysis to show correlations in textual analysis than in, for example, toxin levels in ocean water and sea slug reproduction rates, should be at least exposed to the prospect of doing so. Perhaps the inclusion of technology’s use in a classical education could even inspire more interest from students of the 21st century. The tools are there, the questions are there, and the applications are there. Now we just need to use them.

⁶⁸ Friedman and Deek 403-412

Appendix I: Table and Figure Describing Computerized Textual Analysis

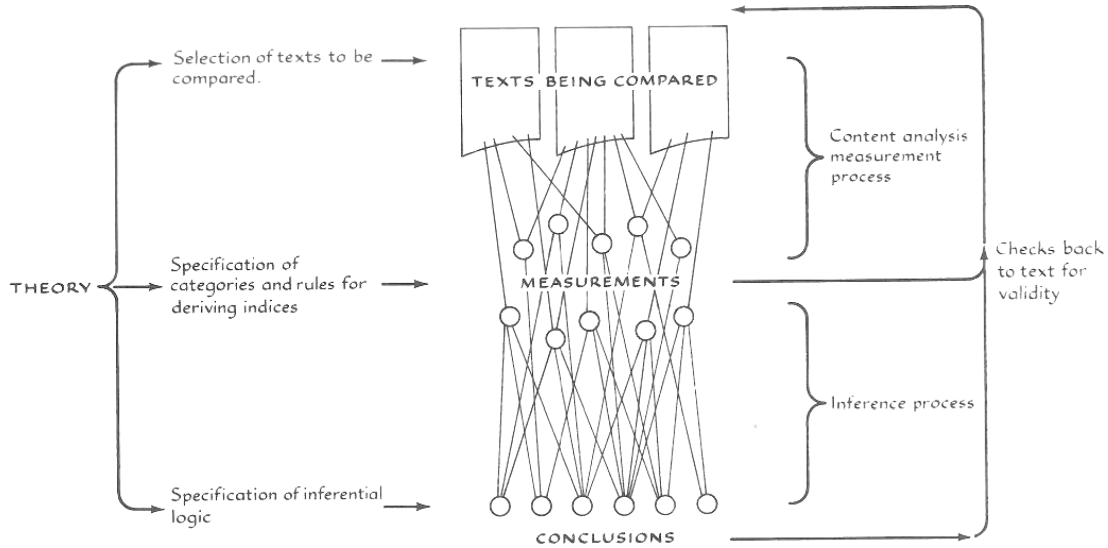


Table 1: Sample Dictionary for Computational Analysis (Popping 53)

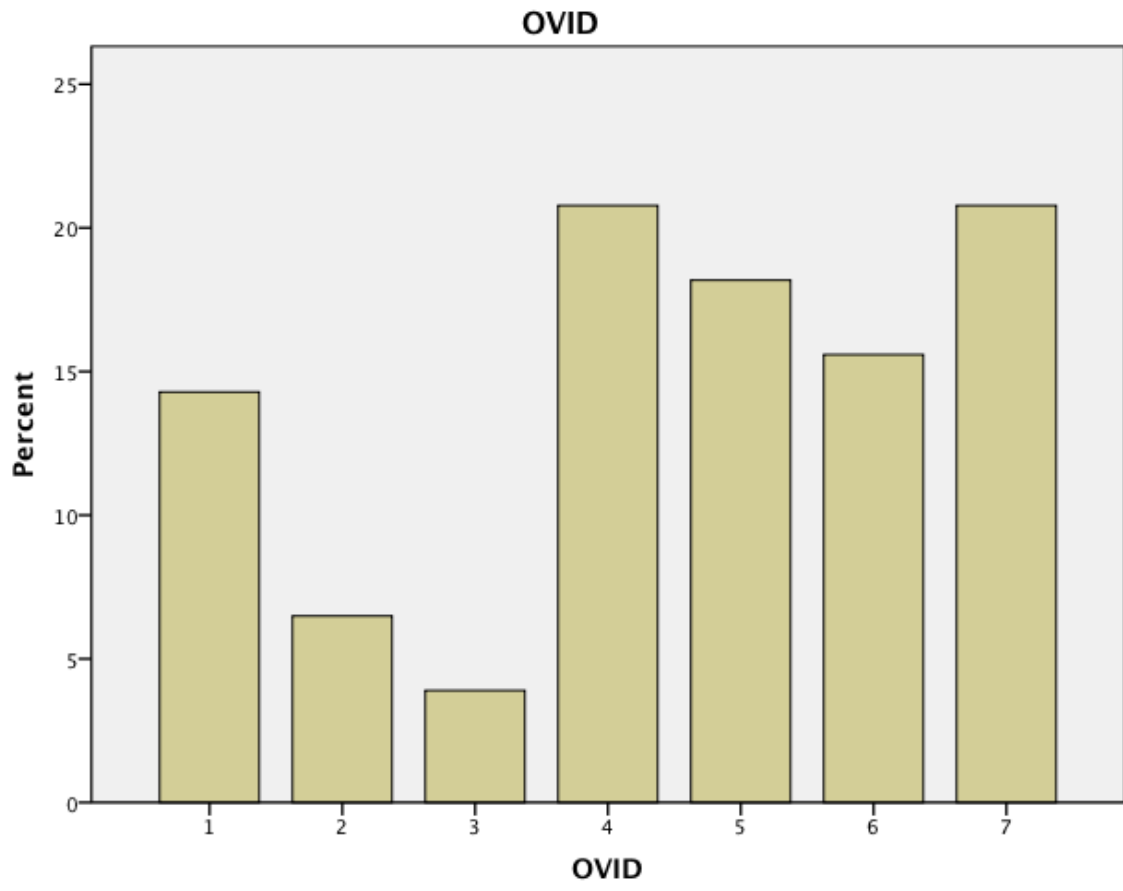
SELF	OTHER	FAIR	UNFAIR
'_I_'	'_he_'	'_cautious_'	'_angry_'
'_mine_'	'_her_'	'_fair_'	'_beat> head_'
'_me_'	'_him_'		'_brut>'
'_my_'	'_his_'		'_cause> crash_'
'_myself_'	'_opponent'		'_harm_'
'_our_'	'_she_'		'_hiss>'
'_we_'	'_their_'		'_hit>'
'_us_'	'_they_'		'_hook>'
	'_this boy_'		'_hurt>'
			'_intimidat>'
			'_kick_'
			'_kill>'
			'_knock> down'
			'_lying_'
			'_make> afraid'
			'_pushed_'
			'_unfair_'
			'_yell>'

Note, the underscore '_' should be read as a space in the search entry

Figure 2: Representation of Content Analysis Model (Stone et al. 15)

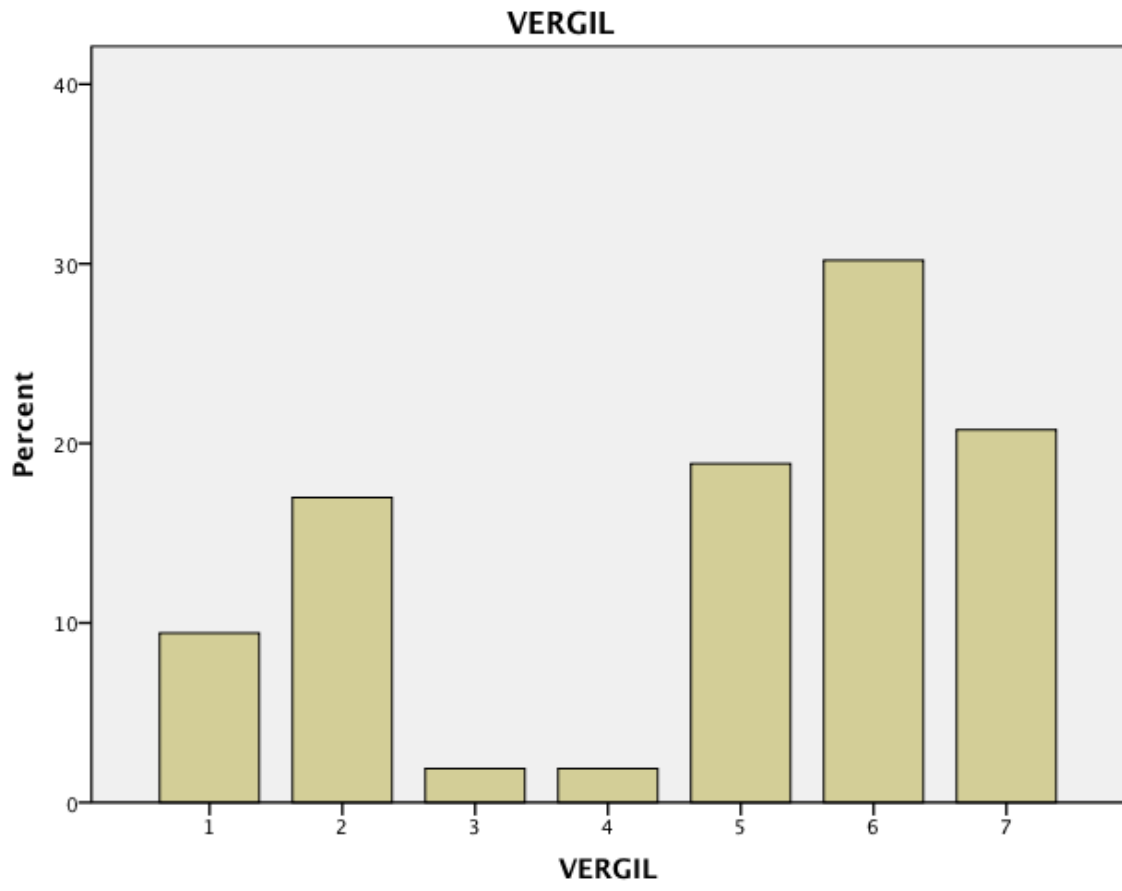
Appendix II: Frequency Analysis of *dulc-* in Ovid**OVID**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	14.3	14.3	14.3
	2	5	6.5	6.5	20.8
	3	3	3.9	3.9	24.7
	4	16	20.8	20.8	45.5
	5	14	18.2	18.2	63.6
	6	12	15.6	15.6	79.2
	7	16	20.8	20.8	100.0
	Total	77	100.0	100.0	



Appendix III: Frequency Analysis of *dulc-* in Virgil**VIRGIL**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	6.5	9.4	9.4
	2	9	11.7	17.0	26.4
	3	1	1.3	1.9	28.3
	4	1	1.3	1.9	30.2
	5	10	13.0	18.9	49.1
	6	16	20.8	30.2	79.2
	7	11	14.3	20.8	100.0
	Total	53	68.8	100.0	
Missing	System	24	31.2		
Total		77	100.0		



Appendix IV: Correlation Analysis on Ovid

Correlations

		OVIDTOTAL	OVID_INVERSION
OVIDTOTAL	Pearson Correlation	1	.063
	Sig. (2-tailed)		.645
	N	56	56
OVID_INVERSION	Pearson Correlation	.063	1
	Sig. (2-tailed)	.645	
	N	56	56

Appendix V: Correlation Analysis on Ovid and Virgil Combined

Correlations

		OVID_VIRGIL_ DEFINITION	OVID_VIRGIL_ INVERSION
OVID_VIRGIL_DEFINITIO	Pearson Correlation	1	-.091
N	Sig. (2-tailed)		.348
	N	109	109
OVID_VIRGIL_INVERSIO	Pearson Correlation	-.091	1
N	Sig. (2-tailed)	.348	
	N	109	109

Appendix VI: Occurrences of *dulc-* in Ovid and Virgil with encoding.

Title	Book	Poem	Verse	Latin	Abstraction	Inversion
Amores	1	8	104	lingua iuuet mentemque tegat – blandire noceque; inpia sub dulci melle venena latent.	0	0
Amores	2	19	26	pinguis amor nimiumque patens in taedia nobis vertitur et, stomacho dulcis ut esca, nocet.	0	0
ex Ponto	1	3	51	Non ager hic pomum, non dulces educat uuas, non salices ripa, robora monte uirent.	0	0.5
ex Ponto	3	5	17	Nam, quamquam sapor est adlata dulcis in unda, gratius ex ipso fonte bibuntur aquae.	0	0.5
ex Ponto	2	7	73	Est in aqua dulci non inuidiosa uoluptas: aequoreo bibitur cum sale mixta palus.	1	0.5
ex Ponto	4	10	63	Innata unda freto dulcis leuiorque marina est, quae proprium mixto de sale pondus habet.	1	0.5
Amores	2	4	25	haec quia dulce canit flectitque facillima vocem, oscula cantanti rapta dedisse velim; haec querulas habili percurrit pollice chordas – tam doctas quis non possit amare manus?	4	0
Amores	2	19	17	quas mihi blanditias, quam dulcia verba parabat oscula, di magni, qualia quotque dabat!	4	0
Amores	3	1	4	fons sacer in medio speluncaque pumice pendens, et latere ex omni dulce queruntur aves.	4	0
Fasti	2	0	256	stabat adhuc duris ficus densissima pomis: temptat eam rostro, non erat apta legi; immemor imperii sedisse sub arbore fertur, dum fierent tarda dulcia poma mora.	1	
Fasti	3	0	735	nomine ab auctoris ducunt libamina nomen libaque, quod sanctis pars datur inde focis; liba deo fiunt, sucis quia dulcibus idem gaudet, et a Baccho mella reperta ferunt.	1	

Fasti	1	0	192	risit, et 'o quam te fallunt tua saecula' dixit, 'qui stipe mel sumpta dulcius esse putas!	2	
ibis	0	0	208	Illae me lacrimae facient sine fine beatum: Dulcior hic risu tunc mihi fletus erit.	3	2
Ars Amatoria	2	0	152	Este procul, lites et amarae proelia linguae: Dulcibus est verbis mollis alendus amor.	4	2
Ars Amatoria	2	0	284	Utraque laudetur per carmina: carmina lector Commendet dulci qualiacumque sono; His ergo aut illis vigilatum carmen in ipsas Forsitan exigui muneris instar erit.	4	2
Ars Amatoria	2	0	724	Accedent questus, accedet amabile murmur, Et dulces gemitus aptaque verba ioco.	4	2
ex Ponto	1	2	117	Vox, precor, Augustas pro me tua molliat aures, auxilio trepidis quae solet esse reis, adsuetaque tibi doctae dulcedine linguae aequandi superis pectora flecte uiri.	4	0.5
ex Ponto	4	9	13	Atque, ego si fatis genitus melioribus essem et mea sincero curreret axe rota, quo nunc nostra manus per scriptum fungitur, esset lingua salutandi munere functa tui gratatusque darem cum dulcibus oscula uerbis nec minus ille meus quam tuus esset honor.	4	0.5
Amores	1	4	48	saepe mihi dominaeque meae properata voluptas veste sub iniecta dulce peregit opus.	5	0
Amores	2	8	21	Pro quibus officiis pretium mihi dulce repende concubitus hodie, fusca Cypassi, tuos!	5	0
Amores	2	16	30	Quod si Neptuni ventosa potentia vincat, et subventuros auferat unda deos, tu nostris niveos umeris inpone lacertos; corpore nos facili dulce feremus onus.	5	0
ex Ponto	1	3	35	Nescio qua natale solum dulcedine cunctos ducit et inmemores non sinit esse sui.	5	0.5

ex Ponto	4	9	22	Illa, confiteor, sic essem luce superbus ut caperet fastus uix domus ulla meos, dumque latus sancti cingit tibi turba senatus, consulis ante pedes ire iuberer eques et, quamquam cuperem semper tibi proximus esse, gauderem lateris non habuisse locum nec querulus, turba quamuis eliderer, essem, sed foret a populo tum mihi dulce premi.	5	0.5
ex Ponto	1	8	31	Nam modo uos animo, dulces, reminiscor, amici, nunc mihi cum cara coniuge nata subit, aque domo rursus pulchrae loca uertor ad Urbis cunctaque mens oculis peruidet illa suis.	6	0.5
ex Ponto	2	7	69	Tempus in agrorum cultu consumere dulce est: non patitur uerti barbarus hostis humum.	6	0.5
ex Ponto	3	5	13	Cumque nihil totiens lecta e dulcedine perdant, uiribus illa suis, non nouitate placent.	6	0.5
Amores	2	9b	26	deprecer – usque adeo dulce puella malum est.	7	0
ex Ponto	2	1	3	Nil fore dulce mihi Scythica regione putau: iam minus hic odio est quam fuit ante locus.	7	0.5
ex Ponto	2	4	16	Quod tu laudaras, populo placuisse putabam – hoc pretium curae dulce recentis erat – utque meus lima rasmus liber esset amici, non semel admonitu facta litura tuo est.	7	0.5
Fasti	1	0	444	intactae fueratis aves, solacia ruris, adsuetum silvis innocuumque genus, quae facitis nidos et plumis ova fovetis, et facili dulces editis ore modos; sed nihil ista iuuant, quia linguae crimen habetis, dique putant mentes vos aperire suas.	4	

Fasti	6	0	661	sic posita Tritonia cuspede dixit (possim utinam doctae verba referre deae): 'temporibus veterum tibicinis usus avorum magnus et in magno semper honore fuit: cantabat fanis, cantabat tibia ludis, cantabat maestis tibia funeribus; dulcis erat mercede labor.	4	
Ars Amatoria	1	0	594	Occidit Eurytion stulte data vina bibendo; Aptior est dulci mensa merumque ioco.	5	2
Ars Amatoria	2	0	480	Blanda truces animos fertur mollesse voluptas: Constiterant uno femina virque loco; Quid facerent, ipsi nullo didicere magistro: Arte Venus nulla dulce peregit opus.	5	2
Ars Amatoria	3	0	328	Disce etiam duplici genalia nablia palma Verrere: conveniunt dulcibus illa iocis.	5	2
Ars Amatoria	3	0	583	dicat, Multaque summis, multa minanter agat. Dulcia non ferimus: suco renovemur amaro; Saepe perit ventis obruta cumba suis; Hoc est, uxores quod non patiat amari: Conveniunt illas, cum voluere, viri; Adde forem, et duro dicat tibi ianitor ore 'Non potes,' exclusum te quoque tanget amor.	5	2
Ars Amatoria	3	0	798	Tu quoque, cui veneris sensum natura negavit, Dulcia mendaci gaudia finge sono.	5	2
Fasti	1	0	401	venerat et senior pando Silenus asello, quique ruber pavidas inguine terret aves. dulcia qui dignum nemus in convivia nacti gramine vestitis accubere toris: vina dabat Liber, tulerat sibi quisque coronam, miscendas parce rivus agebat aquas.	5	
Fasti	2	0	760	pone metum, veni' coniunx ait; illa revixit, deque viri collo dulce pendit onus.	6	
Fasti	1	0	188	omen' ait 'causa est, ut res sapor ille sequatur et peragat coeptum dulcis ut annus iter.	7	

Fasti	3	0	228	tela viris animique cadunt, gladiisque remotis dant soceri generis accipiuntque manus, laudatasque tenent natas, scutoque nepotem fert avus: hic scuti dulcior usus erat.	7	
Metamorphoses	5	0	450	fessa labore sitim conceperat, oraque nulli conluerant fontes, cum tectam stramine vidit forte casam parvasque fores pulsavit; at inde prodit anus divamque videt lymphamque roganti dulce dedit, tosta quod texerat ante polenta.	0	1.5
Metamorphoses	11	0	402	sed enim revocatus ab acri caede lupus perstat, dulcedine sanguinis asper, donec inhaerentem lacerae cervice iuvencae marmore mutavit: corpus praeterque colorem omnia servavit, lapidis color indicat illum iam non esse lupum, iam non debere timeri.	0	1.5
Metamorphoses	14	0	275	nec mora, misceri tosti iubet hordea grani mellaque vimque meri cum lacte coagula passo, quique sub hac lateant furtim dulcedine, sucos adicit.	0	1.5
Metamorphoses	14	0	606	lustratum genetrix divino corpus odore unxit et ambrosia cum dulci nectare mixta contigit os fecitque deum, quem turba Quirini nuncupat Indigetem temploque arisque recepit.	0	1.5
Metamorphoses	15	0	78	sunt fruges, sunt deducentia ramos pondere poma suo tumidaeque in vitibus uvae, sunt herbae dulces, sunt quae mitescere flamma mollirique queant; nec vobis lacteus umor eripitur, nec mella thymi redolentia florem: prodiga divitias alimentaue mitia tellus suggerit atque epulas sine caede et sanguine praebet.	0	1.5
Tristia	3	10	71	non hic pampinea dulcis latet uva sub umbra, nec cumulant altos fervida musta lacus.	0	1.5
Tristia	5	13	22	cana prius gelido desint absinthia Ponto, et careat dulci Trinacris Hybla thymo, inmemorem quam te quisquam convincat amici.	0	1.5

Metamorphoses	15	0	286	non et Scythicis Hypanis de montibus ortus, qui fuerat dulcis, salibus vitiatur amaris?	1	1.5
Fasti	3	0	566	nacta ratem comitesque fugae pede labitur aequo moenia respiciens, dulce sororis opus.	7	
Tristia	3	8	8	Nunc ego Triptolemi cuperem consistere curru, misit in ignotam quo rude semen humum; nunc ego Medae vellem frenare dracones, quos habuit fugiens arce, Corinthe, tua; nunc ego iactandas optarem sumere pennas, sive tuas, Perseu, Daedale, sive tuas: ut tenera nostris cedente volatibus aura aspicerem patriae dulce repente solum, desertaeque domus vultum, memoresque sodales, caraque praecipue coniugis ora meae.	2	1.5
Heroides	0	15	152	quin etiam rami positos lugere videntur frondibus, et nullae dulce queruntur aves; sola virum non ulta pie maestissima mater concinit Ismarium Daulias ales Ityn.	4	
Heroides	0	18	82	Alcyones solae, memores Ceycis amati, nescio quid visae sunt mihi dulce queri.	4	
Metamorphoses	1	0	709	arte nova vocisque deum dulcedine captum 'hoc mihi colloquium tecum' dixisse 'manebit,' atque ita disparibus calamis compagine cerae inter se iunctis nomen tenuisse puellae.	4	1.5
Metamorphoses	11	0	170	tum stamina docto pollice sollicitat, quorum dulcedine captus Pana iubet Tmolus citharae submittere cannas.	4	1.5
Metamorphoses	12	0	577	Haec postquam dulci Neleius edidit ore, a sermone senis repetito munere Bacchi surrexere toris: nox est data cetera somno.	4	1.5
Tristia	4	10	48	Ponticus heroo, Bassus quoque clarus iambis dulcia convictus membra fuere mei.	4	1.5
Heroides	0	13	142	arma dabit, dumque arma dabit, simul oscula sumet – hoc genus officii dulce duobus erit – producetque virum, dabit et mandata reverti et dicet: 'referas ista fac arma Iovi!	5	

Metamorphoses	5	0	308	intumuit numero stolidarum turba sororum perque tot Haemonias et per tot Achaidas urbes huc venit et tali committit proelia voce: “desinite indoctum vana dulcedine vulgus fallere; nobiscum, si qua est fiducia vobis, Thespiades, certate, deae.	5	1.5
<i>Heroides</i>	0	6	120	Nunc etiam peperit; gratare ambobus, Iason! dulce mihi gravidae fecerat auctor onus.	6	
<i>Heroides</i>	0	16	83	regna Iovis coniunx, virtutem filia iactat; ipse potens dubito fortis an esse velim. dulce Venus risit; 'nec te, Pari, munera tangant utraque suspensi plena timoris!	6	
Metamorphoses	6	0	500	lux erat, et generi dextram complexus euntis Pandion comitem lacrimis commendat abortis: 'hanc ego, care gener, quoniam pia causa coegit, et voluere ambae (voluisti tu quoque, Tereu) do tibi perque fidem cognataque pectora supplex, per superos oro, patrio ut tuearis amore et mihi sollicitae lenimen dulce senectae quam primum (omnis erit nobis mora longa) remittas; tu quoque quam primum (satis est procul esse sororem), si pietas ulla est, ad me, Philomela, redito!	6	1.5
Metamorphoses	9	0	339	venerat huc Dryope fatorum nescia, quoque indignere magis, nymphis latura coronas, inque sinu puerum, qui nondum impleverat annum, dulce ferebat onus tepidique ope lactis alebat.	6	1.5

Metamorphoses	13	0	795	senserunt undae; latitans ego rupe meique Acidis in gremio residens procul auribus hausi talia dicta meis auditaque mente notavi: "Candidior folio nivei Galatea ligustri, floridior pratis, longa procerior alno, splendidior vitro, tenero lascivior haedo, levior adsiduo detritis aequore conchis, solibus hibernis, aestiva gratior umbra, mobiliior damma, platano conspectior alta, lucidior glacie, matura dulcior uva, mollior et cycni plumis et lacta coacto, et, si non fugias, riguo formosior horto; "Saevior indomitis eadem Galatea iuvenis, durior annosa quercu, fallacior undis, lentior et salicis virgis et vitibus albis, his immobilior scopulis, violentior amne, laudato pavone superbior, acrior igni, asperior tribulis, feta truculentior ursa, surdior aequoribus, calcato inimitior hydro,	6	1.5
Tristia	1	3	64	uxor in aeternum vivo mihi viva negatur, et domus et fidae dulcia membra domus, quosque ego dilexi fraterno more sodales, o mihi Thesea pectora iuncta fide!	6	1.5
Tristia	3	7	3	aut illam invenies dulci cum matre sedentem, aut inter libros Pieridasque suas.	6	1.5
Tristia	5	4	29	nec patriam magis ille suam desiderat et quae plurima cum patria sentit abesse sibi, quam vultus oculosque tuos, o dulcior illo melle, quod in ceris Attica ponit apis.	6	1.5
Heroides	0	3	122	Sed tibi pro tutis insignia facta placebant, partaque bellando gloria dulcis erat.	7	
Heroides	0	13	122	semper in his apte narrantia verba resistunt; promptior est dulci lingua referre mora.	7	
Heroides	0	18	209	illic me claudat Boreas, ubi dulce morari est!	7	

Metamorphoses	4	0	284	te quoque, nunc adamas, quondam fidissime parvo, Celmi, Iovi largoque satos Curetas ab imbri et Crocon in parvos versum cum Smilace flores praetereo dulcique animos novitate tenebo.	7	1.5
Metamorphoses	7	0	752	haec mihi confesso, laesum prius ulta pudorem, redditur et dulces concorditer exigit annos; dat mihi praeterea, tamquam se parva dedisset dona, canem munus; quem cum sua traderet illi Cynthia, "currendo superabit" dixerat "omnes.	7	1.5
Metamorphoses	9	0	558	nec nos aut durus pater aut reverentia famae aut timor impedit: tantum sit causa timendi, dulcia fraterno sub nomina furta tegemus.	7	1.5
Tristia	3	4b	54	at longe patria est, longe carissima coniunx, quicquid et haec nobis post duo dulce fuit.	7	1.5
Tristia	5	1	4	Hunc quoque de Getico, nostri studiose, libellum litore praemissis quattuor adde meis; hic quoque talis erit, qualis fortuna poetae: invenies toto carmine dulce nihil.	7	1.5
Tristia	5	7	3	si tibi contingit cum dulci vita salute, candida fortunae pars manet una meae.	7	1.5
Fasti	5	0	653	saepe tamen patriae dulci tanguntur amore, atque aliquis moriens hoc breve mandat opus: "mittite me in Tiberim, Tiberinis vectus ut undis litus ad Inachium pulvis inanis eam.	7	
<i>Eclogues</i>	0	1	3	MELIBOEVVS TITYRVVS {M.} Tityre, tu patulae recubans sub tegmine fagi siluestrem tenui Musam meditaris auena; nos patriae finis et dulcia linquimus arua.	2	0
<i>Eclogues</i>	0	3	82	{M.} Dulce satis umor, depulsis arbutus haedis, lenta salix feto pecori, mihi solus Amyntas.	5	0

<i>Eclogues</i>	0	3	110	{P.} Non nostrum inter uos tantas componere lites: et uitula tu dignus et hic, et quisquis amores aut metuet dulcis aut experietur amarus.	7	0
<i>Eclogues</i>	0	5	47	{ME.} Tale tuum carmen nobis, diuine poeta, quale sopor fessis in gramine, quale per aestum dulcis aquae saliente sitim restinguere riuo.	2	0
<i>Eclogues</i>	0	7	37	{C.} Nerine Galatea, thymo mihi dulcior Hyblae, candidior cycnis, hedera formosior alba, cum primum pasti repetent praesepia tauri,	6	0
<i>Georgics</i>	1	0	295	interea longum cantu solata laborem arguto coniunx percurrit pectine telas, aut dulcis musti Volcano decoquit umorem et foliis undam trepidi despumat aëni.	1	0
<i>Georgics</i>	1	0	342	tum pingues agni et tum mollissima uina, tum somni dulces densaeque in montibus umbrae.	5	0
<i>Georgics</i>	1	0	384	iam uariae pelagi uolucres et quae Asia circum dulcibus in stagnis rimantur prata Caystri – certatim largos umeris infundere rores, nunc caput obiectare fretis, nunc currere in undas et studio incassum uideas gestire lauandi.	2	0
<i>Georgics</i>	1	0	412	tum liquidas corui presso ter gutture uoces aut quater ingeminant, et saepe cubilibus altis nescio qua praeter solitum dulcedine laeti inter se in foliis strepitant; iuuat imbribus actis progeniem paruam dulcisque reuisere nidos.	5	0

<i>Georgics</i>	2	0	184	at quae pinguis humus dulcique uligine laeta, quique frequens herbis et fertilis ubere campus, qualem saepe caua montis conualle solemus despicere (huc summis liquuntur rupibus amnes felicemque trahunt limum), quique editus Austro et filicem curuis inuisam pascit aratris: hic tibi praeualidas olim multoque fluentis sufficiet Baccho uitis, hic fertilis uuae, hic laticis, qualem pateris libamus et auro, inflauit cum pinguis ebur Tyrrhenus ad aras,	2	0
<i>Georgics</i>	2	0	216	nam ieiuna quidem cliuosi glarea ruris uix humilis apibus casias roremque ministrat; et tofus scaber et nigris exesa chelydris creta negant alios aequae serpentibus agros dulcem ferre cibum et curuas praebere latebras.	1	0
<i>Georgics</i>	2	0	243	tu spisso uimine qualos colaque prelorum fumosis deripe tectis; huc ager ille malus dulcesque a fontibus undae ad plenum calcentur: aqua eluctabitur omnis scilicet et grandes ibunt per uimina guttae; at sapor indicium faciet manifestus et ora tristia temptantum sensu torquebit amaro.	2	0
<i>Georgics</i>	2	0	475	Me uero primum dulces ante omnia Musae, quarum sacra fero ingenti percussus amore, accipiant caelique uias et sidera monstrent, defectus solis uarios lunaeque labores; unde tremor terris, qua ui maria alta tumescant obcibus ruptis rursusque in se ipsa residant, quid tantum Oceano properent se tingere soles hiberni, uel quae tardis mora noctibus obstet.	6	0

<i>Georgics</i>	2	0	511	sollicitant alii remis freta caeca, ruuntque in ferrum, penetrant aulas et limina regum; hic petit excidiis urbem miserosque penatis, ut gemma bibat et Sarrano dormiat ostro; condit opes alius defossoque incubat auro; hic stupet attonitus rostris, hunc plausus hiantem per cuneos geminatus enim plebisque patrumque corripuit; gaudent perfusi sanguine fratrum, exsilioque domos et dulcia limina mutant atque alio patriam quaerunt sub sole iacentem.	6	0
<i>Georgics</i>	2	0	523	interea dulces pendent circum oscula nati, casta pudicitiam seruat domus, ubera uaccae lactea demittunt, pinguesque in gramine laeto inter se aduersis luctantur cornibus haedi.	6	0
<i>Georgics</i>	3	0	178	interea pubi indomitae non gramina tantum nec uescas salicum frondes uluamque palustrem, sed frumenta manu carpes sata; nec tibi fetae more patrum niuea implebunt multraria uaccae, sed tota in dulcis consument ubera natos.	6	0
<i>Georgics</i>	3	0	217	carpit enim uiris paulatim uritque uidendo femina, nec nemorum patitur meminisse nec herbae dulcibus illa quidem inlecebris, et saepe superbos cornibus inter se subigit decernere amantis.	4	0
<i>Georgics</i>	3	0	291	nec sum animi dubius uerbis ea uincere magnum quam sit et angustis hunc addere rebus honorem; sed me Parnasi deserta per ardua dulcis raptat amor; iuuat ire iugis, qua nulla priorum Castaliam molli deuertitur orbita cliuo.	7	0

<i>Georgics</i>	3	0	445	turpis ouis temptat scabies, ubi frigidus imber altius ad uiuum persedit et horrida cano bruma gelu, uel cum tonsis inlotus adhaesit sudor, et hirsuti secuerunt corpora uepres. dulcibus idcirco fluuiis pecus omne magistri perfundunt, udisque aries in gurgite uillis mersatur, missusque secundo defluit amni; aut tonsum tristi contingunt corpus amurca et spumas miscent argenti uiuaque sulpura Idaeasque pices et pinguis unguine ceras scillamque elleborosque grauis nigrumque bitumen.	2	0
<i>Georgics</i>	3	0	495	hinc laetis uituli uulgo moriuntur in herbis et dulcis animas plena ad praesepia reddunt; hinc canibus blandis rabies uenit, et quatit aegros tussis anhela sues ac faucibus angit obesis.	7	0
<i>Georgics</i>	4	0	17	absint et picti squalentia terga lacerti pinguibus a stabulis, meropesque aliaeque uolucres et manibus Procne pectus signata cruentis; omnia nam late uastant ipsasque uolantis ore ferunt dulcem nidis immitibus escam.	1	0
<i>Georgics</i>	4	0	55	hinc nescio qua dulcedine laetae progeniem nidosque fouent, hinc arte recentis excudunt ceras et mella tenacia fingunt.	5	0
<i>Georgics</i>	4	0	61	hinc ubi iam emissum caueis ad sidera caeli nare per aestatem liquidam suspexeris agmen obscuramque trahi uento mirabere nubem, contemplator: aquas dulcis et frondea semper tectata petunt.	2	0
<i>Georgics</i>	4	0	101	haec potior suboles, hinc caeli tempore certo dulcia mella premes, nec tantum dulcia quantum et liquida et durum Bacchi domitura saporem.	1	0
<i>Georgics</i>	4	0	346	inter quas curam Clymene narrabat inanem Volcani, Martisque dolos et dulcia furta, aque Chao densos diuum numerabat amores.	5	0
<i>Georgics</i>	4	0	417	Haec ait et liquidum ambrosiae defundit odorem, quo totum nati corpus perduxit; at illi dulcis compositis spirauit crinibus aura atque habilis membris uenit uigor.	3	0

<i>Georgics</i>	4	0	465	ipse caua solans aegrum testudine amorem te, dulcis coniunx, te solo in litore secum, te ueniente die, te decedente canebat.	6	0
<i>Georgics</i>	4	0	563	illo Virgilium me tempore dulcis alebat Parthenope studiis florentem ignobilis oti, carmina qui lusi pastorum audaxque iuuenta, Tityre, te patulae cecini sub tegmine fagi.	7	0
<i>Aeneid</i>	1	0	167	fronte sub aduersa scopulis pendentibus antrum; intus aquae dulces uiuoque sedilia saxo, Nympharum domus.	2	0
<i>Aeneid</i>	1	0	433	hic portus alii effodiunt; hic alta theatris fundamenta locant alii, immanisque columnas rupibus excidunt, scaenis decora apta futuris: qualis apes aestate noua per florea rura exercet sub sole labor, cum gentis adultos educunt fetus, aut cum liquentia mella stipant et dulci distendunt nectare cellas, aut onera accipiunt uenientum, aut agmine facto ignauum fucos pecus a praesepibus arcent; feruet opus redolentque thymo fraglantia mella.	1	0
<i>Aeneid</i>	4	0	33	Anna refert: 'o luce magis dilecta sorori, solane perpetua maerens carpere iuuenta nec dulcis natos Veneris nec praemia noris?	6	0
<i>Aeneid</i>	2	0	138	nec mihi iam patriam antiquam spes ulla uidendi nec dulcis natos exoptatumque parentem, quos illi fors et poenas ob nostra reposcent effugia, et culpam hanc miserorum morte piabunt.	6	0
<i>Aeneid</i>	3	0	140	linquebant dulcis animas aut aegra trahebant corpora; tum sterilis exurere Sirius agros, arebant herbae et uictum seges aegra negabat.	7	0
<i>Aeneid</i>	4	0	185	nocte uolat caeli medio terraeque per umbram stridens, nec dulci declinat lumina somno; luce sedet custos aut summi culmine tecti turribus aut altis, et magnas territat urbes, tam ficti prauique tenax quam nuntia ueri.	5	0

<i>Aeneid</i>	5	0	214	qualis spelunca subito commota columba, cui domus et dulces latebroso in pumice nidi, fertur in arua uolans plausumque exterrita pennis dat tecto ingentem, mox aëre lapsa quieto radit iter liquidum celeris neque commouet alas: sic Mnestheus, sic ipsa fuga secat ultima Pristis aequora, sic illam fert impetus ipse uolantem.	6	0
<i>Aeneid</i>	4	0	281	ardet abire fuga dulcisque relinquere terras, attonitus tanto monitu imperioque deorum.	2	0
<i>Aeneid</i>	4	0	318	per ego has lacrimas dextramque tuam te (quando aliud mihi iam miserae nihil ipsa reliqui), per conubia nostra, per inceptos hymenaeos, si bene quid de te merui, fuit aut tibi quicquam dulce meum, miserere domus labentis et istam, oro, si quis adhuc precibus locus, exue mentem.	6	0
<i>Aeneid</i>	4	0	342	me si fata meis paterentur ducere uitam auspiciis et sponte mea componere curas, urbem Troianam primum dulcisque meorum reliquias colerem, Priami tecta alta manerent, et recidiua manu posuissem Pergama uictis.	5	0
<i>Aeneid</i>	6	0	428	Continuo auditaë uoces uagitus et ingens infantumque animae flentes, in limine primo quos dulcis uitae exsortis et ab ubere raptos abstulit atra dies et funere mersit acerbo; hos iuxta falso damnati crimine mortis.	7	0
<i>Aeneid</i>	6	0	455	inter quas Phoenissa recens a uulnere Dido errabat silua in magna; quam Troius heros ut primum iuxta stetit agnouitque per umbras obscuram, qualem primo qui surgere mense aut uidet aut uidisse putat per nubila lunam, demisit lacrimas dulcique adfatus amore est: 'infelix Dido, uerus mihi nuntius ergo uenerat extinctam ferroque extrema secutam?	7	0
<i>Aeneid</i>	4	0	493	testor, cara, deos et te, germana, tuumque dulce caput, magicas inuitam accingier artis.	7	0
<i>Aeneid</i>	6	0	522	tum me confectum curis somnoque grauatum infelix habuit thalamus, pressitque iacentem dulcis et alta quies placidaeque simillima morti.	5	0

<i>Aeneid</i>	4	0	651	hic, postquam Iliacas uestis notumque cubile conspexit, paulum lacrimis et mente morata incubuitque toro dixitque nouissima uerba: 'dulces exuuiae, dum fata deusque sinebat, accipite hanc animam meque his exsoluite curis.	6	0
<i>Aeneid</i>	1	0	659	At Cytherea nouas artis, noua pectore uersat consilia, ut faciem mutatus et ora Cupido pro dulci Ascanio ueniat, donisque furentem incendat reginam atque ossibus implicet ignem.	6	0
<i>Aeneid</i>	1	0	687	tu faciem illius noctem non amplius unam falle dolo et notos pueri puer indue uultus, ut, cum te gremio accipiet laetissima Dido regalis inter mensas laticemque Lyaeum, cum dabit amplexus atque oscula dulcia figet, occultum inspires ignem fallasque ueneno.	5	0
<i>Aeneid</i>	1	0	694	at Venus Ascanio placidam per membra quietem inrigat, et fotum gremio dea tollit in altos Idaliae lucos, ubi mollis amaracus illum floribus et dulci aspirans complectitur umbra.	7	0
<i>Aeneid</i>	2	0	777	tum sic adfari et curas his demere dictis: 'quid tantum insano iuuat indulgere dolori, o dulcis coniunx?	6	0
<i>Aeneid</i>	8	0	568	haeret inexpletus lacrimans ac talia fatur: 'o mihi praeteritos referat si Iuppiter annos, qualis eram cum primam aciem Praeneste sub ipsa strauī scutorumque incendi uictor acruos et regem hac Erulum dextra sub Tartara misi, nascenti cui tris animas Feronia mater (horrendum dictu) dederat, terna arma mouenda – ter leto sternendus erat; cui tunc tamen omnis abstulit haec animas dextra et totidem exuit armis: non ego nunc dulci amplexu diuellerer usquam, nate, tuo, neque finitimo Mezentius umquam huic capiti insultans tot ferro saeua dedisset funera, tam multis uiduasset ciuibus urbem.	5	0
<i>Aeneid</i>	10	0	782	sternitur infelix alieno uulnere, caelumque aspicit et dulcis moriens reminiscitur Argos.	6	0

<i>Aeneid</i>	11	0	155	haud ignarus eram quantum noua gloria in armis et praedulce decus primo certamine posset.	7	0
<i>Aeneid</i>	11	0	538	neque enim nouus iste Dianae uenit amor subitaque animum dulcedine mouit.	5	0
<i>Aeneid</i>	12	0	802	desine iam tandem precibusque inflectere nostris, ne te tantus edit tacitam dolor et mihi curae saepe tuo dulci tristes ex ore recurrent.	6	0
<i>Aeneid</i>	12	0	882	aut quicquam mihi dulce meorum te sine, frater, erit?	7	0

Bibliography

- Abbott, Elizabeth. *Sugar : A Bittersweet History*. Toronto: Penguin Canada, 2008. Print.
- Bakhtin, M. M., and Michael Holquist. *The Dialogic Imagination : Four Essays*. University of Texas Press Slavic Series. Austin: University of Texas Press, 1981. Print.
- Balsdon, John Percy, and Miriam T. Griffin. "Tullius Cicero (1), Marcus, the Famous Orator Cicero." *The Oxford Classical Dictionary*. Eds. Hornblower, Simon and Antony Spawforth. 3 ed. Oxford: Oxford University Press, 1996. 1558-60. Print.
- Berelson, Bernard. *Content Analysis in Communication Research*. Foundations of Communication Research. Glencoe, Ill.: Free Press, 1952. Print.
- Courtney, Edward, and Joachim Latacz. "Epic." *Brill's New Pauly Encyclopedia of the Ancient World*. Eds. Cancik, Hubert and Helmuth Schneider. Leiden: Brill, 2004. 1039-57. Vol. 4. Print.
- Dalby, Andrew. *Dangerous Tastes : The Story of Spices*. California Studies in Food and Culture. Berkeley: University of California Press, 2000. Print.
- Dalby, Andrew. *Food in the Ancient World from A to Z*. The Ancient World from A to Z. London ; New York: Routledge, 2003. Print.
- Diederich, Paul Bernard. *The Frequency of Latin Words and Their Endings*. Chicago, Illinois: University of Chicago Press, 1939. Print.
- Dovring, Karin. "Quantitative Semantics in 18th Century Sweden." *The Public Opinion Quarterly* 18.4 (1954): 389-94. Print.
- Ellis, Allan B., and F. Andrè Favat. "From Computer to Criticism: An Application of Automatic Content Analysis to the Study of Literature." *The General Inquirer: A Computer Approach to Content Analysis*. Cambridge, MA: The M.I.T. Press, 1966. 628-38. Print.
- Festinger, Leon, and Daniel Katz. *Research Methods in the Behavioral Sciences*. The Dryden Press Publications in Interpersonal Relations. New York: Dryden Press, 1953. Print.
- Fowler, Don P, and Peta G. Fowler. "Virgil." *The Oxford Classical Dictionary*. Eds. Hornblower, Simon and Antony Spawforth. 3 ed. Oxford: Oxford University Press, 1996. 1602-07. Print.
- Friedman, R.S., and F.P. Deek. "Innovation and Education in the Digital Age: Reconciling the Roles of Pedagogy, Technology, and the Business of Learning." *IEEE Transactions on Engineering Management* 50.4 (2003): 403-12. Print.
- Glei, Reinhold F. "Didactic Poetry." *Brill's New Pauly Encyclopedia of the Ancient World*. Eds. Cancik, Hubert and Helmuth Schneider. Leiden: Brill, 2004. 379-85. Vol. 4. Print.
- Hinds, Stephen E. "Ovid." *The Oxford Classical Dictionary*. Eds. Hornblower, Simon and Antony Spawforth. 3 ed. Oxford: Oxford University Press, 1996. 1084-87. Print.
- Jaschik, Scott. "Disappearing Languages at Albany." *Inside Higher Ed* 10/4/2010 2010. Print.
- Joeston, Melvin, Mary E. Castellion, and John L. Hogg, eds. *The World of Chemistry: Essentials*. 4 ed. Belmont, CA: Thomson Brooks/Cole, 2007. Print.
- Keisch, Bernard. "Dating Works of Art through Their Natural Radioactivity:

- Improvements and Applications." *Science* 160.3826 (1968): 413-15. Print.
- Lyons, John. *Semantics*. Cambridge ; New York: Cambridge University Press, 1977. Print.
- Oxford English Dictionary. "Sweet, Adj. And Adv.". Oxford University Press. Print.
- Pfaffenberger, Bryan. *Microcomputer Applications in Qualitative Research*. 1988. *Qualitative research methods v.14*. <<http://pid.emory.edu/90h38>>.
- Popping, R. *Computer-Assisted Text Analysis*. New Technologies for Social Research. Thousand Oaks, Calif. ; London: SAGE, 2000. Print.
- Popping, R. *Computer-Assisted Text Analysis*. 2000. *New technologies for social research*. <<http://pid.emory.edu/90798>>.
- Spoth, Friedrich. "Latin Elegy." *Brill's New Pauly Encyclopedia of the Ancient World*. Eds. Cancik, Hubert and Helmuth Schneider. Leiden: Brill, 2004. 903-06. Vol. 4. Print.
- Stanzel, Karl-Heinz. "Latin Bucolics." *Brill's New Pauly Encyclopedia of the Ancient World*. Eds. Cancik, Hubert and Helmuth Schneider. Leiden: Brill, 2003. 804-06. Vol. 2. Print.
- Stone, Philip J., John Kirsh, and Cambridge Computer Associates. *The General Inquirer; a Computer Approach to Content Analysis*. Cambridge, Mass.: M.I.T. Press, 1966. Print.
- Wood, Michael. "Alternatives and Options in Computer Content Analysis." *Social Science Research* 9.3 (1980): 273-86. Print.