CONSTRUCTING A TECHNICAL WRITING PERSPECTIVE: SMEATON AND HIS LIGHTHOUSE

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CHAPTER I

INTRODUCTION

Smeaton and the Edystone

John Smeaton (b. 1724 - d. 1792) was considered a natural born engineer by his collegues. He was deeply committed to the civil engineering profession -- a profession he helped establish through his Smeatonian society which later evolved into the English Society of Civil Engineers (1, ix-xii). Smeaton's only book length work, A Narrative of the Building and a Description of the Construction of the Edystone Lighthouse with Stone: To Which is Subjoined an Appendix, giving some Account of the Lighthouse on Spurn Point, built upon Sand, is Smeaton's account of not only how he constructed a lighthouse, but is also an account of the history of lighthouses and the procedures and methods he used to arrive at and implement his lighthouse's design (2).

However, before we can discuss the Edystone from a technical writing standpoint, we must first construct a definition for historic technical writing itself.

A Definition of Technical Writing from an Historical Viewpoint

Many technical writers agree that there is a need to identify and analyze the technical writing of the past (3, 8). And, to many, this task may seem as simple as reviewing the style and content of a particular work and presenting the results. This is not the case. What these people forget is that "technical writing" is a new label, even if certain individuals unwittingly practiced something akin to the discipline centuries ago (4). These people also forget that with the modern identification of this term as a particular classification of writing, all of us have constructed a modern perspective and expectation of what a piece of technical writing should do, what elements are tolerable, and what elements are not.

Now the problem with this modernistic perspective is that it places modern constraints on the perception of technical writing texts. This constraining process, caused by our natural inclination to define the boundaries of our technical writing label, leads to a calcifying process that determines which texts are technical writing and which are not. This determining process becomes even more difficult with texts from those periods before "technical writing" had a meaning since these texts were written outside the restrictions of the present day term "technical writing."

For example, is Aristotle's Poetics literature, philosophy, literary criticism, or technical writing? If the answer to the question is yes, possibly all four, then that is the crux of my argument -- there is no such thing as a "work of technical writing" prior to the invention of the term, and even now, there are no examples of texts that are exclusively technical writing since the term itself is simply an attempt to partition the disorderly process called "writing" into something more concrete and tangible.

It follows that if there is no such thing as technical writing prior to the invention of the term, then a discussion of the history of technical writing before this point is also a nebulous undertaking. Indeed, establishing a general definition for technical writing history becomes nearly impossible (5, 25).

So how can a person discuss technical writing from an historical standpoint? First, he/she must develop a technical writing perspective that does not treat technical literature as a category of writing but as a collection of techniques and devices used to present information to a given audience (I am not abandoning the devices we use today to segregate technical writing from other writing. I am only abandoning the term "technical writing" as a class distinction and, therefore, I also abandon the necessity of including or excluding works in order to build an arbitrary canon of technical writing touchstones). By using a

critical perspective that is not text sensitive, every text can speak for itself. There is no longer any justifying process that determines whether a text is or is not technical writing, and there is no need to make judgmental opinions as to the quality of the writing since each text will contain, to a varying degree, some of the common technical writing techniques. Since all works are open to interpretation using this perspective, technical writing becomes a straight forward evolution of writing in general and that to look at the history of technical writing is simply to look at the history of writing itself.

The second step in preparing to discuss an historical work from a technical writing viewpoint is to develop an historical perspective for the period in which the work was written. This perspective should contain information about whether writing was viewed as an artistic mode of expression or, as in the middle ages, as literal truth. This historical perspective must also address the writer and the audience. In all writing, there is an audience with a need or at least an interest and a writer with some purpose for writing the things he or she does. A complete historical perspective must analyze the author's purpose, including his/her intentions, since these ultimately affect the presentation of the work and, therefore, the message. In terms of audience, the perspective must address the expertise of the readers as well as their view of the world

(what constituted the understanding and attitudes of the medieval lay reader are certainly not the same as what constitutes the understanding and attitudes of a lay reader of today). In addition, the perspective must analyze the relationship between the writer and the audience since audience need is not always the primary motivation in a work where a writer can "maintain" an audience by generating a larger awareness and greater interest of which the reader was not previously conscious.

With this outline of how to approach an historical analysis of a work from a technical writing viewpoint, let's exemplify the process by building an historical perspective for Smeaton's Edystone, analyzing the organization and methods of development Smeaton uses, and analyzing Smeaton's style through the use of readability formulas.

CHAPTER II

AN HISTORICAL PERSPECTIVE OF 18TH-CENTURY ENGLAND

18th-Century Logic and Rhetoric

If there is a single characteristic that describes the late 17th and the entire 18th century, it is the characteristic of change -- a change in government from Cromwell's Interegnum to the ascension of Charles the II, a change in economic structure from an agrarian economy to an industrial one, a change from a two class society of commoner and noble to a stratified society with a powerful middle class. This was the era of the new science, the age of Newton and the Royal Society, a time when science promised to unlock the secrets of Nature for the benefit of humankind (6, 840-855). In addition to these sweeping social and economic changes, the face of thought and expression was also changing on two different fronts -- 18th-century logic and 18th-century rhetoric.

Of most profound effect on logic was Locke's An Essay Concerning Human Understanding which altered the perception of logic and reasoning from Aristotle's syllogisms as the method of proof and from the topics as

the generative source of worthy subjects to direct analysis and experimentation of subjects as conceived by scientific inquiry. By opting for a scientific method of reasoning, Locke freed the thinkers of the 18th century from Aristotelean rhetoric and thereby ushered in a new era where social and scientific progress was not limited by an external system, but by what the individual mind could conceive as possible. It followed that if Locke could change the heuristic approach that thinkers used to arrive at the truth, then the way this truth was presented to others must also require changing. So as Locke's Essay became required reading at more and more universities in the early 1700's, so too did rhetoric change -- slowly, but certainly as much.

Through the 18th century, there were no less than four different views of rhetoric: the classical, the stylistic, the elocutionary, and the "new" rhetoric (7, 695).

The classical school of the 18th century, as presented in the lectures of Ward and the works of Holmes, identified strictly with the rhetoric of the ancients, notably Aristotle's Rhetoric and Topics, Cicero's De Oratore, and Quintillian's Imitatio Oratoria. The proponents of the classical school emphasized the five traditional elements of rhetoric: imitation, arrangement, style, memory, and delivery.

The stylistic school of rhetoric existed concurrently with the classical school since the perception of what rhetoric actually was produced two camps of followers. In one camp there were the traditionalists who believed that rhetoric was an all encompassing system controlled by the five elements. In the other camp, as supported by John Stirling's A System of Rhetoric, rhetoric became the stylistic means to a particular end -- rhetoric became the study of figures and tropes and how writers and speakers properly or improperly employed them.

From the stylistic school's concern with the proper use of figures and tropes, there arose the elocutionary school of the mid-18th century which emphasized the fifth element of classical rhetoric -- delivery. In this school, the quality, tone, and presentation of information and the persuasiveness of the spoken word were all important. The elocutionist's principle proponent, Thomas Sheridan, wanted to develop a rhetoric that combined pronunciation and phonetics, grammar, voice quality, diction, and gesture and with this rhetoric, normalize all English speakers so that their speech and dialect were the same.

It is important to note that these three schools of rhetoric (classical, stylistic, and elocutionary) have as their root one or more of the five traditional rhetorical elements listed in Cicero's De Oratore and that all three of them have as their end persuasion -- a distinctly

unscientific end in terms of Locke. It wasn't until the end of the 18th century that a "new" rhetoric was developed out of Locke's Essay. This new rhetoric grew to be the general theory of rhetoric in England through the lectures of Adam Smith and then later in the essays of George Campbell and Hugh Blair. Discarded were the topics and the enthymeme. Rhetorical devices for exciting emotions were also eliminated as were elaborate stylistic arguments designed to persuade. With the new system, rhetoric was no longer used to persuade an audience but was used to communicate with them. The single most important principle that the new rhetoric derived from Locke was this principle of clear communication by employing clarity and simplicity in language:

> When a man speaks to another, it is, that he may be understood; and the end of Speech is, that those Sounds, as such, may make known his Ideas to the Hearer . . . . And let me add that unless a Man's Word excite the same Ideas in the Hearer, which he makes them stand for in speaking, he does not speak intelligibly. (8, 405)

As Adam Smith stated in his lectures, "the only acceptable modern style for a rhetoric committed to the goal of communication is the plain style (7, 549)." Blair called

this principle "perpescuity" and broke it down into three components: purity, propriety, and precision. By purity, Blair maintained that the writer should use the idiom of spoken language for the audience that would read the work. By propriety, he meant that the writer must choose the words that best carry the ideas being represented. By precision, he meant that the writing must express the meaning and nothing more than the meaning (9, 68 - 69). Blair's major treatise, Lectures on Rhetoric and Belles Lettres, is of special importance when considering Smeaton's work since its popularity as a style manual for the late 18th century (Blair's work was published in 1783 and Smeaton's ten years later in 1793) makes it the most influential rhetorical source for a beginning author confronted with the task of writing a major work (10, 16).

Smeaton, and the 18th-Century Audience

Even though the 18th century saw the rise of the middle class, understanding the constituent parts of an 18th-century audience is as problematic as a broad audience analysis is today. What can be said, as outlined by Pat Rogers, is that "the 18th century reading public was never exactly homogeneous, and it became less so as time went on; but it represented a fairly unified body of taste compared to that enjoyed by a modern writer (10, 14)." According to

Rogers, 18th-century readers also shared educational experience, and most of them had read the same classical texts and had some exposure to rhetorical training (10, 14). In addition, a great deal of 18th-century literature was governed by the opinions of the ruling class (10, 15). Therefore, Smeaton, being a Royal Society member and well educated himself, for the most part knew his readers well and stood a better chance at really knowing the limits of his audience than a contemporary writer would stand reaching a contemporary general readership of today.

The importance of ruling class influence on the literature of the 18th century cannot be overemphasized when dealing with Smeaton. Indeed the beginning of the Edystone is a dedication to the king where Smeaton states:

> From the ambition natural to man, all authors are desirous, that their works should be placed in the most favourable point of view. This motive alone would have urged me to solicit permission to lay mine at the feet of my Sovereign; a Sovereign whose reign has been marked by the most rapid and distinguished progress, in the arts, in commerce, and in the most sublime as well as the most useful discoveries, altogether arising from YOUR MAJESTY'S immediate protection and encouragement (2, iv).

In this, the first paragraph of the Edystone, Smeaton, conscious of his audiences, seeks approval from the ruling class and he is not slow in pointing out the great interest the king expressed in the project when Smeaton had just completed his lighthouse nearly three decades before.

This concern with approval leads Smeaton to directly address his readers on the subject of writing both in the dedication and in the preface. From this address, some of Smeaton's purpose for writing the Edystone becomes clear. In the dedication he states: ". . . I humbly submit to YOUR MAJESTY, a plain account of the construction of a plain and simple building, that has nevertheless been acknowledged to be itself, curious, difficult, and useful; and as such, I trust, worthy of observation (2, v)." In the preface he also states: "I do not apprehend it to be the nature of a commentary that the style should be polished; only that it should explain the subject, in the most easy and familiar manner (2, vi)."

The ideas of a plain account, observation, a belief in subject over presentation, and the following statement from the preface are undeniable references to Locke and today's technical writing goals:

> I can say with great truth, that I have taken much pains, and have left nothing undone, that appeared necessary to the full information of my reader upon

> the subject: and I hope, that however I may be defective otherwise, I have not fallen short of an explanation, to those whose leisure and patience, may give them leave to go regularly through the detail (2, vii).

Smeaton's primary goal lies with the communication itself, not with the artifice of writing. His goal is sending a clear message that his readers can understand. Given this fact, I now explore the Edystone itself to see how Smeaton delivers his message. I analyze the work from two different perspectives used today to analyze a technical writing work: form and readability.

CHAPTER III

FORM AND STRUCTURE IN THE EDYSTONE

Technical Writing and the Importance of Form

In many contemporary technical writing textbooks, there is, invariably, a discussion of the different formal structures an author can use when presenting information to an audience. Since these structures are a part of today's technical writing methodology, I examine how historical works use form and how these forms differ or agree with contemporary forms. By doing this I can trace the evolution of these forms from the past to the present and perhaps extrapolate the way these forms may change in the future.

Form and organization are also important because both work for the author and the audience -- they can be part of an implied relationship between the two. For the author, form and organization are structural devices, frames onto which the author can build to insure a logical presentation. For an audience reading for understanding, form and organization are subconscious elements,

indistinguishable from style, that help the reader move from point to point in a direct progression.

Smeaton employs an overall organization for the Edystone and he also uses various formal methods of development in the text. The next four sections discuss first, the overall organization of the Edystone, second, Smeaton's use of digression to interrupt his standard presentation, third, Smeaton's use expanded definition as a method of development, and fourth, Smeaton's use of process narrative as a method of development.

The Overall Organization of the Edystone

The second edition of the Edystone, which I consulted for this thesis, is located on microfilm at the University of North Texas main library. The edition was published in 1793 one year after Smeaton's death. This edition is broken down into the following structural components:

- Prefatory matter consisting of the note to the king and the preface

- The introduction which discusses the history of lighthouses from the ancients to Smeaton's day

- Book I which gives a general account of the Edystone rocks and the history of the two previous lighthouses that were built there.

- Book II which discusses the events prior to beginning the actual construction of the lighthouse (he discusses the events that transpired from the destruction of the previous lighthouse to his being asked to construct the new lighthouse as well as his initial design plans.)

- Book III which discusses the construction phase from 1756 to June, 1757 (primarily preparing the rocks for the construction of the building and his experiments on water cements).

- Book IV which discusses the construction of the actual lighthouse from beginning to end.

Although Smeaton states that he is not writing a diary of the events leading up to the completion of the lighthouse, time and chronology play an important role in the organization of the work. The introduction moves through the complete history of lighthouses from the Colossus of Rhodes to French lighthouses built in the early 1700s. Book I starts with a definition of the Edystone rocks and

their historical effects on shipping, and then proceeds in the next three chapters to discuss Winstanley's lighthouse and its destruction and Rudyerd's lighthouse and its destruction.

In Book II, Smeaton discusses the historical events leading up to the proprietors receiving parliamentary approval for constructing a new lighthouse and his being selected by the proprietors to build it. In addition, Smeaton also discusses his first trip out to the rocks in 1756 and he even gives a month and day to some of the events (Smeaton lands on the rocks for the first time on October 10, 1756). After performing a survey, Smeaton gets approval from the proprietors to use his design plans for the lighthouse.

In Book III, Smeaton even places dates in the headings of his chapters as well as in the text to show the movement of time as the preparations for the actual construction of the lighthouse approach completion.

In Book IV, Smeaton again uses dates to divide the chapters that deal with the actual construction of the lighthouse. In addition, in chapter 4 of Book IV, he discusses his subsequent visits to the lighthouse after its completion on August 24, 1759. He lists his last visit in the text as 1787.

Smeaton's use of a chronological development serves to make the reader aware of the construction process. As

readers, we are there from the beginning to the end and we can watch the progress of the construction just as Smeaton must have watched it. Also of interest is the fact that Smeaton's overall organization is not exactly straightforward. From time to time he suspends the chronological development and discusses items of personal interest to him that do not deal with the construction of the lighthouse. These digressions are the subject of the next section.

Smeaton's Use of Digression

Along the chronological organization of the Edystone, Smeaton inserts a number of digressions that disrupt this linear development. Commonly these interruptions run no more than a paragraph or two although some run several pages. Smeaton uses two different types of digression through out the Edystone. I define these types as the deductive aside and the anecdote.

The Deductive Aside. The deductive aside is a special type of digression that takes the reader out of the normal development (in Smeaton's case, chronological) and discusses a scientific or natural phenomenon that is a side or unrelated issue to the major issue of the presentation. For example, when Smeaton visits the Portland lighthouse

(Book II chapter III) he becomes curious about the beach upon which the lighthouse stands. He puzzles over the great wall of loose stones that pile up on the shore as far as the eye can see and even goes as far as to make a hypothesis about how the beach might have been formed by the action of the tide on the rocky shoreline. Smeaton does this to "excite more able naturalists to examine minutely into the history of it [the Portland beach]" (2, 64 - 65).

The Anecdote. The anecdote is a digression that is wholly removed from scientific inquiry. It is more properly a retelling of a story overheard that is amusing, ethical, or interesting. In Smeaton, such anecdotes, which he normally introduces as anecdotes, are sometimes presented in a footnote or are inserted directly into the text. For example, Smeaton inserts the following anecdote, concerning the capture of the workers upon the Edystone rocks by the French during Rudyerd's construction of the second lighthouse, directly into the text:

> The following anecdote has been related to me . . . I cannot doubt of its having some foundation of truth . . . . Lewis the XIV being at war with England, during the preceding with this building, a French privateer took the men at work upon the Edystone rock, together

> with their tools, and carried them to France; and the captain was in expectation of a reward for the achievement. While the captives lay in prison, the transaction reached the ears of that monarch: He immediately ordered them released, and the captors to be put in their place; declaring, that though he was at war with England, he was not at war with mankind; he therefore directed the men to be sent back to their work with presents; observing that the Edystone Lighthouse was so situated, as to be of equal service to all nations having occasions to navigate the channel that divides France from England. (2, 33)

These digressions do not aid Smeaton in accomplishing his purpose: explaining how he constructed a plain and simple building. However, these digressions do serve a useful purpose since they break up the technical and historical information he presents into smaller chunks. By inserting passages of general interest, Smeaton allows his readers to "relax" before digesting more facts.

Smeaton's Use of Expanded Definition

The expanded or extended definition is a common and useful technical writing method of development whose properties allow a writer to extrapolate meaning through a

variety of devices. By defining a term in detail, a writer makes his or her own particular emphasis absolutely clear to the reader.

The expanded definition is an old form sometimes consisting of other rhetorical forms. The eight common elements used to create an expanded definition are as follows (11):

- Etymology
- History and Background
- Example
- Graphic Illustration
- Analysis of Parts
- Comparison and Contrast
- Basic Operating Principle (for mechanical objects)
- Special Materials or Conditional Requirements

Smeaton makes use of the expanded definition when discussing information of which the reader may have little or no knowledge. In the following example, Smeaton defines the Edystone rocks, the whole reason why he undertakes the construction of the lighthouse. When Smeaton discusses the rocks, his definition uses eight of the eight common methods of defining. Smeaton's states the purpose of his definition from the very beginning:

> The subject I have before me, will I conceive be rendered more perspicuous, by beginning with a general description of the Edystone Rocks, as they exist in nature, independently of any building; as this will at once explain the source and reason of those difficulties, that must necessarily arise in the construction of an edifice upon them. (2, 9)

By first preparing his reader for his definition, Smeaton draws a clear boundary around the information he will discuss as well as setting reader expectations as to the relationship between the general information he will give and to what ends this information should be applied.

For analytical purposes, I will show how Smeaton defines in his discussion.

Etymology. Smeaton states that the Edystone rocks got their name "from the great variety of contrary sets of the tide or current" (2, 9). An eddy is a current at variance with a main tide so it is no surprise that Smeaton begins his discussion with the tide and the currents that make the Edystone rocks a difficult and dangerous place for his undertaking.

History and Background. As far as background information on the rocks, Smeaton relies on a detailed

description of the rocks' bearing and distance from the mainland as well as discussing how the rocks have been fatal to shipping in the past. Smeaton, by discussing how the rocks have been fatal to shipping in the past, also stresses the importance of building the lighthouse when he states that

> . . . many rich ships and other vessels, have in former times been actually lost upon these rocks, particularly such as were homeward bound from foreign parts, it being even now a common thing in foggy and thick hazy weather, for homeward-bound ships, from long foreign voyages, to make the Edystone Lighthouse, as the first point of land of Great Britian; so that in the night, and nearly at high water, when the whole ranges of these rocks are covered, the most careful mariner might run his ship upon them, if nothing was placed there by way of warning. (2, 9 - 10)

Example. Smeaton's examples consist mainly of discussions of how different sets of tides and winds create different sets of work situations on the Edystone rocks and how these situations hinder or help the construction process of the lighthouse. For example, when Smeaton discusses the wind and the location of the rocks, he talks

about how they affect the possible mooring position for boats:

> No man would however think of mooring his vessel to the south of the rocks; because, if it broke loose with a hard gale at south, he would be intercepted by the rocks in his passage home; or if moored to the west or east, if broke loose by hard gales from those quarters respectively, he would inevitably be driven upon the rocks, and the more perilous would be his situation, by being in the drift of the channel's tide; but on all northern points, the land being in sight, no very heavy seas can ever come from this quarter . . . (2, 11)

Graphic Illustration. Smeaton relegates no less than nine plates to either the location, general layout, elevation, or declivity of the Edystone rocks. He not only references these plates during his definition, but he also relates the illustrations to the job he has to do. For example, when discussing the elevation of the House Rock (the largest of the Edystone rocks upon which Smeaton will construct the lighthouse), Smeaton states: "A still further circumstance, that even yet increases the difficulty of working upon the rock in moderate weather, will be apprehended from considering the particular plan and

elevation No. 7 of the House Rock. . ." (2, 10). Later in this passage he states that the step in the rock, clearly shown in the plate, causes the sea to fly up to the height of 30 to 40 feet. By relating this information to the reader, Smeaton makes clear the difficulties involved in constructing the lighthouse and the dangerousness of the rocks themselves.

Analysis of Parts. Smeaton discusses the different rocks that make up the Edystone rocks. In particular he mentions the House Rock, the rock upon which the two previous lighthouses were constructed, and the Sugar Loaf, a round submerged rock that blocks the approach to the rocks from the Northeast. From this discussion, Smeaton presents the Edystone rocks not as a single entity that he must overcome, but as a group of items, each with its own peculiarities that have some effect on the whole of Smeaton's project.

Comparison and Contrast. When Smeaton discusses the component matter and substance of the Edystone rocks, he compares them to more familiar land-based stones stating that the Edystone rocks are "of the kind that in Cornwall they call a Killas or hard slate; but the substance thereof appears to be the same nearly, as the Moor-Stone or Granite of that county. . ." (2, 12). In addition, he

discusses how the rock is not like these traditional land-based rocks. "Instead of being composed of grains or small fragments, united by a strong cement, interspersed with a shining talky substance. . . it [the Edystone rocks] is composed of the like matter formed into Laminae" (2, 12).

Basic Operating Principle (for mechanical objects). Even though Smeaton is not dealing with a mechanical object, his discussion of the way the ocean interacts with the rocks to produce the dangerous effects that he must overcome to construct the lighthouse represents a kind of operating principle. By understanding how these tides interact, Smeaton is able to predict the times and conditions under which he can work on the rocks to construct the building.

Special Materials or Conditional Requirements. In relation to the basic operating principles of wind, water, and the rocks themselves, Smeaton mentions some of the equipment (special chains, floats, and anchors) that he must use when approaching the rocks to maintain a safe position. When discussing the component matter and substance of the rocks, Smeaton discusses how these rocks split easily along the grain and the difficulties that this

fact produces when preparing the house rock for the foundation of his lighthouse.

Smeaton's Use of Process Narrative

There are three perspectives a writer may take when dealing with processes: instruction, which is reader oriented; process analysis, which is subject oriented; and process narrative, which is writer oriented. From these differences in orientation, a writer might choose one method over another. If the orientation is on the audience, then the writer must seek to instruct a reader to achieve a predetermined goal or completion. If the orientation is on the process itself, then the writer acts strictly as a recorder of events -- the process itself determining completion. If the orientation is on the writer, then the writer must seek some approval of the steps he or she performed and through this approval of the steps, an approval of the final interpretations made at the end of the narrative. Process narrative is important to scientific inquiry and the relationship between writer and audience. It provides a step by step framework that the audience can examine. If any step the writer performed is questionable, then the final recommendation or the interpretation of data must also be questionable.

Common forms that would normally be process narratives, such as laboratory or recommendation reports (in the case of Smeaton, he is recommending the best water cement), often use the following divisions (12, 20-21):

- Problem statement
- Need for solution
- Summary of interpretation
- Standards used in interpreting
- Method of collecting data
- The data themselves
- Key data mentioned again
- Conclusion/Recommendation

Using these eight divisions as a reference, I will now analyze Smeaton's use of process narrative in the portion of the Edystone where he discusses his experiments with water cements.

Problem Statement. As with the extended definition, Smeaton uses his problem statement in conjunction with his summary of interpretation to establish a plan of development for the narrative. Smeaton's problem is a simple one. He states that although he is fairly expert in the use of land-based mortar and cements, he must discover the best water-based cement possible. In

addition, he must also discover how to treat the cement for strength and hardness, and how best to use it (2, 102 - 103).

Need for a Solution. Smeaton attempts to keep his audience close to the problem at hand. He tells his audience that there are several views among his stone masons as to what will weaken cements used in water works. In particular, Smeaton stresses his concern that fresh water will make better water cement than sea water, "as the necessity of carrying out or not from the land all the water we should have occasion for in this building was a matter of moment, the full investigation of this question became very material" (2, 103).

Summary of Interpretation. Smeaton presents four questions he will resolve in his narrative. These questions are

- Is there a difference in the hardness of the mortar resulting from the completeness or incompleteness of the burning process of the lime?

- What difference is there in mortar made from fresh water or from sea water?

- Do different limestones impart different qualities to the mortar?

- Does Tarras Mortar, after being beaten once, become better after being beaten again (2, 104 - 105)?

Standards Used in Interpreting. Smeaton's primary concern is finding a mortar that will withstand the elements with some degree of permanence. Therefore, he bases his experiment along two lines: solubility in water and hardness in setting. Because he arrives at his results from a visual inspection of the data, he must impart to his audience that his choice is the right choice. To accomplish this, he discusses the amount of time he spends running the experiments -- some tests running a month or more (2, 106).

Method of Collecting Data. Smeaton presents a very detailed account of how he collected the data and about how he generally conducted the experiments.

> Before I proceed further, it will be necessary to explain the mode in which I compounded and made up my mortar for trials. I took as much of the ingredients, as altogether would ultimately form a

> ball of about two inches in diameter. This ball, lying upon a plate till it was set and would not yield to the pressure of the fingers, was then put into a flat pot filled with water so as to be covered by water; and what happened to the ball in this state, was the criterion by which I judged the validity of the composition for our purposes (2, 104).

In addition to the detail in which Smeaton describes how he collected data, he also develops some initial credibility for his experiments by talking about how he discussed cements with masons and other experts who used cements as a matter of course.

The Data Themselves. Smeaton's discourse is mostly a linear progression from a good water cement to a better cement to a best cement, with very brief references to trials that did not work as well. He then presents his experimental data in tabular form in the text. Because Smeaton draws a direct correlation to the hardness of a limestone based on the clay residuals found in the particular limestone used to produce the mortar, his charts present information like the color of the residue (red making the strongest and best water cements) and the

reduction in clay residue after the limestone is burned rather than dissolved in nitric acid (2, 117).

Key Data Mentioned Again. Since Smeaton wrote the Edystone some 30 years after completing the work, and since, at the time he built the lighthouse, there was no one to dispute his findings, he is in an unique position to justify his choice with proof that literally stands the test of time. He entitles the last 10 pages of his experiments with water cements "The Limes I have since examined are as follows:" In this section, he discusses other limestones he has tried during his 30 years of service as a civil engineer. The presentation is one of reaffirmation of the recommendations he made for the Edystone lighthouse.

Conclusion/Recommendation. Smeaton's recommendation is direct and to the point:

> In short, I have yet found no treatment of pure calcerous lime, that rendered it more fit to set in Water than it is by nature, except what is to be derived from the admixture of Tarras, Puzzolana, or some ferruginous substance of a similar nature. (2, 120)

Not only is this conclusion a restatement of Smeaton's experimental data, it is rhetorically a proposition carrying great weight to the reader since it appears at the end of the section dealing with his 30 years of additional experience working with both dry land construction and water works.

Comments on Smeaton and Form

It would appear from the preceding analysis of Smeaton's use of expanded definition and process narrative that the technical writing forms he uses have changed little if any in two hundred years. I suggest that these forms will not change no matter how far back we go in examining texts. As a structural tool, form is a constant in writing, a device that, like Smeaton's water cements, becomes more rigid with time and more transparent to the audience. These forms reach out to a reader subconsciously, and as stated previously, organize information in an expected manner, satisfying through tradition an audience's expectation and needs.

CHAPTER IV

SMEATON AND STYLE

A Readability Analysis of Smeaton's Style

For my analysis of Smeaton's style, I ran passages from the Edystone through a series of programs (see Appendix A for program listings and specifications) to generate the readability data presented in this chapter. Three of the programs, the style, Fry graph, and composite graph programs, were adapted from Michael R. Schulyer's general readability program listed in the the Journal of Reading, (13, 560 - 561) and from Joseph C. Kretschmer's Rix program given in the Journal of Reading, (14, 490 - 499). I developed the other three programs (Dentry, Dprint, and Dupdate) and the custom modifications in the style programs to simplify data entry and prevent errors that might skew the results.

The programs were run on an Apple IIe microcomputer with 64K and additional 64K bank switch on its 80 column card. The graphs were generated on an Epson FX-85 using a Grappler II+ printer interface card.

The Dentry program allows 25 lines of data to be entered into a file which will then be accessed by the style program to generate the readability values. The original style program required that the sample be keyed in line by line every time before running the readability scores. By creating a file to hold the entry, I could run the scores over and over without having to rekey.

The Dprint program prints the 25 lines entered or updated using the Dentry or Dupdate program. By using Dentry, Dupdate, and Dprint, I entered the data into the file with no data entry errors.

The Dupdate program allows me to change any single line of data entered using the Dentry program. I developed this program so that I would not have to rekey an entire sample using Dentry if I made a mistake entering the original sample.

The style program generates the readability values for different readability formulas, generates the values used by the program that generates the Fry graph, and generates the values used by the composite graph program.

The style program generates values for the following nine readability formulas: the Fog index, Flesch reading ease and its associated grade level, the Powers reading ease, the Holmquist grade, Devereaux's ARI index, the Flesch-Kincaid grade level, the Coleman score, the Dale-Chall score, and the Rix grade level. The actual

calculations the program uses to compute these formulas are presented in Appendix B. All the values the programs calculate are reading grade levels with the exception of the Flesch reading ease score which is a number between 1 and 100 with 100 being the most readable and 1 being the least readable -- for this reason, the Flesch grade level is presented along with the Flesch reading ease score.

In general, the formulas are of three types: word sensitive, word length sensitive, or syllable sensitive. The table below shows how the formulas fit into these three categories:

Word Sensitive	Word Length Sensitive	Syllable Sensitive
Fog	ARI	Fog
Powers	Rix	Flesch
Holmquist		Flesch-Kincaid
Flesch-Kincaid		
Coleman		
Dale-Chall		

For the purpose of this analysis, I have selected four passages: one from the note to the king, one from the preface, one from Smeaton's experiments with water cements, and one from the digression concerning Dr. Spry. The actual data entered into the style program is presented in Appendix C.

There are several general assumptions we can make about Smeaton's style based on the points made earlier in Chapter 1 and Chapter 2. First, Smeaton stands firm with

the school of writing (rhetoric) that believes writing's end is communication. Second, the communication in Edystone has more than one purpose. Smeaton tries to earn acceptance from the ruling class in one section, tries to explain the construction of a plain and simple building in another, and tries to entertain us with his various anecdotes in others. If the readability scores show a measurable change from passage to passage, then these scores will indicate stylistic shifts in the Edystone. Stylistic shifts that may be attributable to his changing purposes.

Readability Analysis of a Note to the King. The note to the king is the first writing in the Edystone. Such as it is, the note is a dedication to the king of England in which Smeaton expresses his hopes that the King will find the work worthy. Smeaton also apologies for the length of time that has elapsed from his building the lighthouse to the actual writing of the work. He notes later in the passage that because the building still stands some 30 years after its construction, then this fact lends authority to his written work. In addition to these comments, Smeaton also states that the work is merely "a plain account of the construction of a plain and simple building" (2, v). The purpose of this passage is made clear by Smeaton's first sentence:

From the ambition natural to man, all authors are desirous, that their works should be placed in the most favourable point of view. This motive alone would have urged me to solicit permission to lay mine at the feet of my Sovereign . . ." (2, iv)

The readability data for this passage are presented below:

Words	251
3-Syllable words	36
Sentences	5
Syllables	378.1
Syllables per 100 words	150.6
Sentences per 100 words	2.0
Fog reading level	25.8
Flesch reading ease	28.4
Flesch grade level	COLLEGE
Powers reading ease	8.6
Holmquist	11.5
ARI	10.4
Flesch-Kincaid	21.8
Coleman	11.2
Dale-Chall score	COLLEGE
Rix grade level	13.0

The most striking items in this sample are the number of syllables (75.6 per sentence), the number of 3+ syllable words in the passage (14.9 percent of the total words used), and the word to sentence ratio (50 words per sentence). A good example of why these scores are so high can be found in the second sentence in the passage:

> This motive alone would have urged me to solicit permission to lay mine at the feet of my sovereign; a sovereign whose reign has been marked by the most rapid and distinguished progress, in the arts, in commerce, and in the most sublime as well as the most useful discoveries, altogether arising from your majesty's immediate protection and encouragement. (2, iv)

The sentence contains 59 words, 12 of which contain three syllables or more. The phrase "majesty's immediate protection and encouragement" by itself contains 15 syllables in 5 words.

Readability Analysis of the Preface. The preface appears right after the Note to the King and is Smeaton's first authorial comments to his general readership. In this passage, Smeaton discusses the difficulties he encountered when writing the Edystone. In addition,

Smeaton makes comments about the nature of writing, the type and quality of the paper used in the printing of the work and the printing of his graphics. He also discusses the artist's responsibility to a subject when he states that "the artist must write for himself; as only he can feel the force of his subject, so as to give it energy (2, vi)." This preface is especially important in light of a technical writing perspective since Smeaton discusses what he attempts to do from a communication standpoint:

> I can say with great truth, that I have taken much pains, and have left nothing undone, that appeared necessary to the full information of my reader upon the subject: and I hope, that however I may be defective otherwise, I have not fallen short of an explanation, to those whose leisure, and patience, may give them leave to go regularly through the detail (2, v).

And at the end of the preface he also adds: "I do not apprehend it to be the nature of a commentary that the style should be polished; only that it should explain the subject, in the most easy and familiar manner (2, vi)."

The readability scores for this passage are presented on the next page::

Words	277
3-Syllable words	27
Sentences	9
Syllables	373.6
Syllables per 100 words	134.9
Sentences per 100 words	3.2
Fog reading level	16.2
Flesch reading ease	61.5
Flesch grade level	7.5
Powers reading ease	6.3
Holmquist	8.6
ARI	6.0
Flesch-Kincaid	12.3
Coleman	7.9
Dale-Chall score	7.5
Rix grade level	11.0

In this passage, the percentage of 3+ syllable words is 9.8 percent and the number of syllables per sentence is 41.5. The word to sentence ratio is 31.2. The longest sentence in the sample is presented below:

> As I speak, and even write a <u>provincial language</u>, and, as I have already mentioned, was not bred to letters, I am greatly obliged to my friends in the

> country, for perusing and abundantly correcting my manuscript: and last of all, to my friend Doctor Blagden who has been so obliging as to overlook the greatest part, as in justice to him I must observe I was obliged to send several sheets to the press without his seeing them (2, 6).

Even though the sentence has 79 words, only six of them are three or more syllables. The words that contain less then three syllables are almost exclusively one syllable words as in the phrase "and last of all, to my friend Dr. Blagden who has been so obliging as to overlook the greatest part. . ." where 14 out 20 words have fewer than five letters in them.

Readability Analysis of Experiments with Water Cements. The passage on Smeaton's experiments with water cements occurs after the section where he discusses completing the first year's work on the rocks (this first year is spent preparing the House Rock for the foundation of the lighthouse) and before the beginning of the actual construction of the lighthouse in the second building season. The section on water cements contains a discussion of Smeaton's experimental methods and the results of his tests. At the beginning of this section on the Edystone, Smeaton poses four questions:

- Is there a difference in the hardness of the mortar resulting from the completeness or incompleteness of the burning process of the lime?

- What difference is there in mortar made from fresh water or from sea water?

- Do different limestones impart different qualities to the mortar?

- Does Tarras Mortar, after being beaten once, become better after being beaten again (2, 104 - 105)?

His purpose throughout this section is to answer these four questions and thereby recommend the best water cement for the lighthouse.

The readability scores for this passage are presented below:

Words	342
3-Syllable words	31
Sentences	7
Syllables	454.6
Syllables per 100 words	132.9
Sentences per 100 words	2.0

Fog reading level	23.2
Flesch reading ease	44.8
Flesch grade level	11.5
Powers reading ease	7.6
Holmquist	9.3
ARI	9.2
Flesch-Kincaid	19.1
Coleman	7.9
Dale-Chall score	9.5
Rix grade level	13.0

The 3+ syllable word percentage is 9.1 percent, but the number of syllables per sentence is 64.9. The word to sentence ratio is 48.9 words per sentence.

Because this passage deals with the process by which Smeaton arrives at his result (the best water cement), information is presented specifically step by step. Stylistically, the passage's readability scores are high primarily because of the length of sentences. However, four of the seven sentences in the passage are compounded with a coordinate conjunction as in the following sentence: "This ball lying upon a plate til it was set and would not yield to the fingers was then put into a flat pot filled with water so as to be covered by the water and what happened to the ball in this state was the criterion by which I judged of the validity of the composition for our purposes

emphasis added (2, 104)." This sentence, treated as a single 60 word sentence in the readability analysis, can easily be broken apart by a reader into two shorter sentences (A, the ball lying upon the plate, and then B, what happened to the ball). Also troublesome is Smeaton's tendency to use different types of punctuation within sentences in a passage -- punctuation that does not count in the readability analysis. If we were to treat simple coordination as indicating a new sentence, the net effect would be a substantial lowering of the readability scores.

Readability Analysis of the Dr. Spry Digression.

This passage about Dr. Spry begins after Smeaton's discussion of the destruction of Rudyerd's lighthouse and before his discussion of the events that took place prior to his being selected by the proprietors to construct a new lighthouse upon the rocks. The passage begins with the phrase "We will now return to . . ." (2, 34) totally taking us out of the chronological development Smeaton has been using. The passage then continues discussing how the light keeper dies after swallowing melted lead and how Dr. Spry, after discovering this lead in the light keeper's stomach, conducts experiments on live animals to see if and how they could survive the ordeal. The passage also discuss how Dr. Spry is subsequently charged with cruelty to animals. Smeaton ends this digression on a moral note saying that

"such however was Dr. Spry's lot, that in establishing his abilities in his profession, he was then by some stigmatized with the imputation of inhumanity (2, 35)." From what was stated earlier in Chapter 2, Smeaton's tendency to place his digressions between passages containing technical information acts as a buffer, breaking up his chronological development into shorter chunks.

The readability scores for this passage are presented below:

Words	346
3-Syllable words	33
Sentences	5
Syllables	490.9
Syllables per 100 words	141.9
Sentences per 100 words	1.4
Fog reading level	31.5
Flesch reading ease	16.6
Flesch grade level	COLLEGE
Powers reading ease	9.6
Holmquist	11.0
ARI	13.5
Flesch-Kincaid	28.1
Coleman	9.7
Dale-Chall score	11.5

Rix grade level 13.0

The 3+ syllable word percentage is 9.6 percent, the number of syllables per sentence is 96.2 and the word to sentence ratio is quite high at 69.2 words per sentence.

The primary reason for the high readability scores of this passage is the length of the sentences. For example, the second sentence in the passage reads:

> His name was Henry Hall of Stonehouse near Plymouth, and though aged 94 years, being in good constitution, he was remarkably active considering his time of life: he had invariably told the surgeon who attended him (Mr. Spry, now Dr. Spry of Plymouth, who constantly administered the proper remedies to such burns and hurts as could be perceived) that if he would do anything effectual to his recovery, he must relieve his stomach from the lead, which he was sure was within him: and this he not only told Dr. Spry, but those about him, though in a very hoarse voice; and he also said the same thing to Mr. Jessop, who went to see him several times during his illness, and who gave me this information (2, 34).

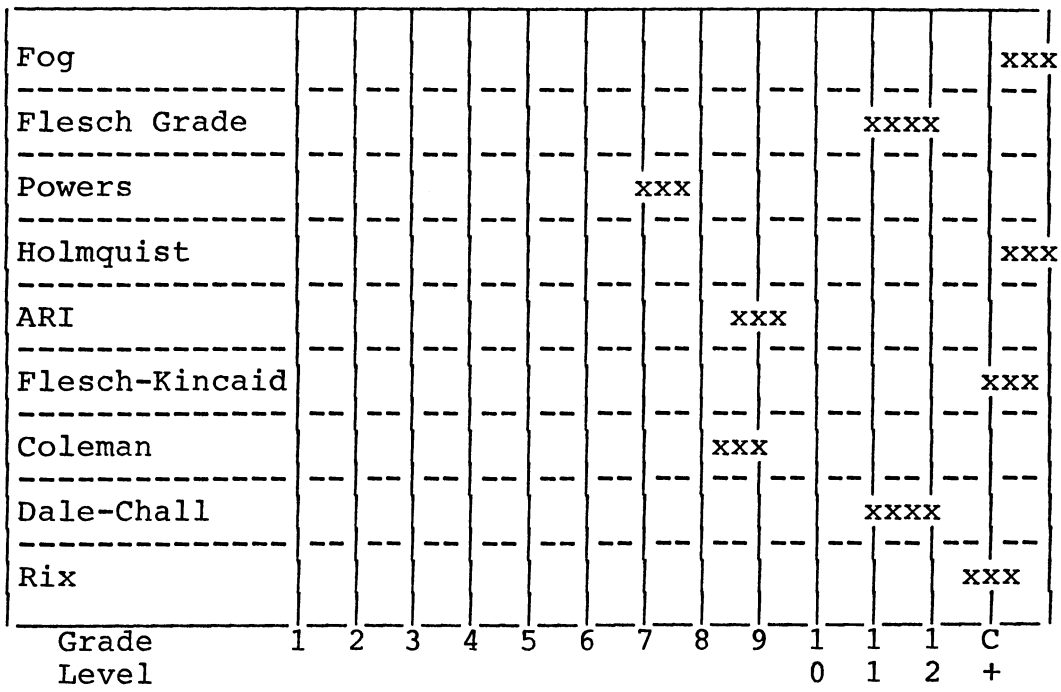
This one sentence contains 127 words -- 36.7 percent of the total words in the sample.

Comments on Smeaton and Readability

Readability formulas are, at best, only indicators as to the readability of a passage (15). However, given the fact that all the passages come from the same text, and given the fact that a consistent application of the formulas was used in this study (a consistency that can be achieved only by computer scoring), the results indicate that Smeaton's style does change from passage to passage. In the note to the king, where Smeaton attempts to garner ruling class acceptance of his work, the readability scores are very high. When he makes comments to his general readership in the preface, the readability grade levels come down. When he discusses experiments and experimental results, the scores show a better readability index than when he digresses and discusses information not germane to his specific purpose -- the construction of a plain and simple building.

The chart on the following page shows the readability values combined for all passages. Those readability formulas yielding the highest results, Fog (average = 22.9) and Kincaid (average = 19.1) are syllable sensitive formulas. The Holmquist formula yields a grade of 22.2; however, this formula arrives at its results using the Dale-Chall word list which was compiled in 1948 and is probably not a good measure of an 18th-century reader's

vocabulary since words on the list like "television" would be unfamiliar to an 18th-century reader just as a 1948 reader would have trouble with an 18th-century vocabulary. Those yielding the lowest values, Powers (average = 7.8) and Coleman (average = 9.1), are word length or letter sensitive formulas (although the Rix formula is also word length sensitive but yields a college rating). It appears from this summary data that Smeaton scores as he does due to the number of polysyllabic words he uses.



The table presented below shows all the readability values for each of the four samples used in this readability analysis.

	Sample 1	Sample 2	Sample 3	Sample 4
Fog	25.8	16.2	23.2	31.5
Flesch Grade	College	7.5	11.5	College
Powers	8.6	6.3	7.6	9.6
Holmquist	11.5	8.6	9.3	11.0
ARI	10.4	6.0	9.2	13.5
Flesch-Kincaid	21.8	12.3	19.1	28.1
Coleman	11.2	7.9	7.9	9.7
Dale-Chall	College	7.5	9.5	11.5
Rix	13.0	11.0	13.0	13.0

Although there appears to be little relationship between formulas from the data, the bit of conclusive evidence -- the fact that all the formulas shift in the same direction (more readable or less readable) from sample to sample -- supports the claim that Smeaton's style does fluctuate.

CHAPTER V

SUMMARY OF CONCLUSIONS

By constructing an historical perspective for the Edystone, several facts about Smeaton have become clear. First, Smeaton's general goal is not unlike a contemporary technical writer's goals -- he wants to communicate information clearly and effectively. Second, Smeaton's specific purpose in writing the Edystone is to describe the construction of a plain and simple building. Third, Smeaton generally uses a chronological development when presenting his information (from the Colossus of Rhodes to the completion and subsequent revisits to the lighthouse in 1787); however, he interrupts this development by digressing with deductive asides and anecdotes. These digressions serve to breakup the linear presentation into smaller chunks. Fourth, Smeaton uses technical writing methods of development (definition and process narrative) in the Edystone. These forms appear to have changed little if any in the 200 years from the publication of the Edystone to today. Fifth, the readability analysis indicates that Smeaton's style changes from passage to passage and that Smeaton uses long sentences and many polysyllabic words.

WORKS CITED

1. Banks, Sir Joseph, general ed. Reports of the Late John Smeaton, F.R.S. made on Various ocassions, in the course of his employment as a Civil Engineer. London: Longram, Hurst, Rees, Orme, and Brown, 1812.

2. From now on I will refer to Smeaton's work as the Edystone. I retain Smeaton's original spelling of Edystone (one "d" instead of two) through out the thesis. The citation for the Smeaton's work is presented below:

Smeaton, John. A Narrative of the Building and a Description of the Construction of the Edystone Lighthouse with Stone: To Which is Subjoined an Appendix, giving some Account of the Lighthouse on Spurn Point, built upon Sand. 2nd ed. London: G. Vicol Pall-Mall, 1793.

Smeaton published and presented the first edition to the Royal Society in 1791. After his death in 1792, Sir Joseph Banks purchased all of Smeaton's papers from his executors and representatives. The Society of Civil Engineers decided to bind all of Smeaton's reports into several volumes in 1794 (see citation number 1 above). It is unknown whether Smeaton, his executors, or Sir Joseph Banks had the Edystone reprinted in 1793. It is known that Smeaton had very few copies of the first edition printed and that with his death there was a renewed interest in his work.

3. Gresham, Stephen L. "When Technical Communication Focuses on the Past." Tech Comm 25.3 (1978): 8 - 9, 11

4. The Oxford English Dictionary states that the first use of the word technical was in 1656 in

a sermon. However, this usage would be inconsistent with many contemporary definitions of technical writing. For example, W. Earl British proposes, in "What's Technical Writing?" in The Practical Craft: Readings for Business and Technical Writing. pg. 10, that the primary characteristic of technical writing is the effort of an author to convey one meaning and only one meaning. The Barnhart Dictionary of Etymology lists the word "technical" as first being defined as "having to do with an art, science, disipline, or profession, especially the mechanical arts," in Chambers Cyclopedic in 1727. However, it is unknown when the word writing was appended to technical. For example, according to the Oxford English Dictionary, education was appended to technical in 1868. Robert J. Connors proposes, in "The Rise of Technical Writing Instruction in America" in the Journal of Technical Writing and Communication. 12(1982), 329-52, that systematic instruction in technical writing began with Mills and Walter's work Technical Writing published in 1954.

5. Moran, Michael. "The History of Technical and Scientific Writing." Research in Technical Communication: A Bibliographic Sourcebook. Michael Moran and Debra Journet, eds. US: Greenwood, 1985. 25 - 38.

6. Abrams, M. H., general ed. The Norton Anthology of English Literature. Major Authors 3d ed. NY: W. W. Norton and Company, 1975.

7. Howell, Wilbur Samuel. Eighteenth Century British Logic and Rhetoric. Princeton: Princeton UP, 1971.

8. Locke, John. An Essay Concerning Human Understanding. Peter H. Nidditch, ed. London: Oxford UP, 1975.

9. Golden, James L. and Edmund P. Corbett, eds. The Rhetoric of Blair, Campbell, and Whately. NY: Holt, Rinehart, and Winston, 1968

10. Rogers, Pat. The Eighteenth Century. NY: Hawkins and Meier Publishers Inc, 1978.

11. An assimilation of these methods for expanding a term can be found in works like John Lannon's Technical Writing 2nd ed. pg. 94 - 97 and Pickett/Laster's Technical English: Writing, Reading, and Speaking pg. 91. See also Brusaw, Alred, and Oliu's Handbook of Technical Writing 3d ed. pg. 155 - 157.

12. For more information on the methods for developing process narratives like a lab/recommendation report, see Warren's Technical Communication: An Outline pg. 20 - 21 and Brinegan and Skites Technical Writing: A Guide with Models pg. 111 - 114. Brusaw, Alred, and Oliu's Handbook of Technical Writing 3d ed. pg. 340 - 343 also has an excellent discussion of these methods.

13. Schulyer, Michael R. "A Readability Formula Program for Use on Microcomputers." Journal of Reading. 25.6 (1982): 560 - 591.

14. Kretschmer, Joseph C. "Computerizing and Comparing the Rix Readability Index." Journal of Reading. 27.6 (1984): 490 - 499.

15. Opinions vary widely as to the practical use of readability formulas. For example, Jack Selzer, in "What Constitutes a 'Readable' Technical Style?" New Essays in Technical and Scientific Communication(pg. 71 - 89), states that formulas that use traditional sentence units (syllables, word length, etc.) as measures are unreliable. In the same book, Thomas Huckin, in his essay "A Cognitive Approach to Readability" (pg. 90 - 105), states that "readability formulas often seem to have a certain measure of predictive validity" and that if they do have this limited usefulness, then they can be used with cognitive psychology to provide an "early warning check" on written documents. Jo Allen, in her article "A Readability Review: Important Trends since 1979" Teaching English in the Two-Year College (October, 1985, pg. 214 - 220), states that readability formulas form the basis for audience analysis -- that writing that corresponds to a set grade level "is an important step in making information useable for readers."

APPENDIXES

APPENDIX A

COMPUTER PROGRAMMING TOOLS

The style, Fry graph, and composite programs used to generate the readability values and graphics for the Edystone were adapted from Michael R. Schuyler's general readability program listing in the the Journal of Reading, (11, 560 - 561) and from Joseph C. Kretschmer's Rix program in the Journal of Reading, (12, 490 - 499). I developed the other three programs and the custom modifications in the style programs to simplify data entry and prevent errors that might skew the results.

The program's were run on an Apple IIe microcomputer with 64K and additional 64K bank switch on its 80 column card. The graphs were generated on an Epson FX-85 using a Grappler II+ printer interface card.

A listing of the six programs used to obtain the readability values and and generate the graphs and data listings are presented in this appendix.

Dupdate

This program allows the operator to update any single line entered using the Dentry program. I developed this program so that I would not have to rekey an entire sample using Dentry if I made a mistake entering the original sample.

```
10  CLEAR : HOME :D$ =  CHR$ (4):
      DIM T$(25)
20  PRINT "Edit Data Program"
30  PRINT : INPUT "ENTER NAME OF
     FILE TO UPDATE ==> ";FT$
40  PRINT D$;"OPEN ";FT$
50  PRINT D$;"READ ";FT$
60  FOR X1 = 1 TO 25
70  INPUT T$(X1)
80  NEXT X1
90  PRINT D$;"DELETE ";FT$
100  HOME
110  PRINT : INPUT "Update record
      # ";RN
120  IF RN = 0 GOTO 180
130  PRINT T$(RN)
140  PRINT : PRINT "Enter the new
      line of data": INPUT UP$
150  PRINT : PRINT "The old line
     read:": PRINT T$(RN): PRINT
     "The new line reads:": PRINT
     UP$: PRINT : INPUT "Press Y
     to accept the change ";KS$
160  IF KS$ = "Y" THEN T$(RN) = U
     P$
170 UP$ = "": GOTO 100
180  PRINT D$;"OPEN ";FT$
190  PRINT D$;"WRITE ";FT$
200  FOR X2 = 1 TO 25
210  PRINT T$(X2)
220  NEXT X2
230  PRINT D$;"CLOSE ";FT$
240  PRINT : INPUT "Update anothe
     r file (Y or N) ";KS$
250  IF KS$ = "Y" THEN  GOTO 10
260  END
```

Style

This program generates the readability values for the different readability formulas, generates the values used by the program that generates the Fry graph, and generates the values used by the composite graph program.

```
10  GOTO 240
20  IF F5 = 2 THEN 1160
30  IF  LEN (O$) < 2 THEN 1160
40  IF F5 = 1 THEN 200
50  IF  RIGHT$ (O$,3) = "EST" THEN
     170
60  IF  RIGHT$ (O$,3) = "ING" THEN
     170
70  IF  RIGHT$ (O$,3) = "IES" THEN
     170
80  IF  RIGHT$ (O$,3) = "IED" THEN
     170
90  IF  RIGHT$ (O$,2) = "LY" THEN
     180
100  IF  RIGHT$ (O$,2) = "ER" THEN
     180
110  IF  RIGHT$ (O$,2) = "ED" THEN
     180
120  IF  RIGHT$ (O$,2) = "ES" THEN
     180
130  IF  RIGHT$ (O$,1) = "S" THEN
     190
140  IF  RIGHT$ (O$,1) = "N" THEN
     190
150  GOTO 1160
160 O$ =  LEFT$ (O$,( LEN (O$) -
     3)):O$ = O$ + "Y::F5=1:GOTO
     2120
170 O$ =  LEFT$ (O$,( LEN (O$) -
     3)):F5 = 1: GOTO 880
180 O$ =  LEFT$ (O$,( LEN (O$) -
     2)):F5 = 1: GOTO 880
190 O$ =  LEFT$ (O$,( LEN (O$) -
     1)):F5 = 1: GOTO 880
200  IF  RIGHT$ (O$,1) =  MID$ (O
     $,( LEN (O$) - 1),1) THEN 22
     0
210  IF  RIGHT$ (O$,1) <  > "E" THEN
     O$ = O$ + "E":F5 = 2: GOTO 8
     80
220 O$ =  LEFT$ (O$,( LEN (O$) -
     1)):F5 = 2: GOTO 880
230  END
240  DIM R1$(16): FOR I = 1 TO 16
     : READ R1$(I): NEXT I
250  DATA  CURRENT PASSAGE #,WORD
     S,3-SYLLABLE WORDS,SENTENCES
     ,SYLLABLES,SYLLABLES PER 100
      WORDS,SENTENCES PER 100 WOR
     DS,FOG READING LEVEL,FLESCH
     READING EASE
260  DATA  FLESCH GRADE LEVEL,POW
     ERS READING EASE,HOLMQUIST,A
     RI,FLESCH-KINCAID,COLEMAN,RI
     X GRADE LEVEL
270  TEXT : HOME : PRINT : PRINT
     : PRINT : PRINT "BE RIGHT BA
     CK! PLEASE WAIT 20 SECONDS."
     : DIM C$(2934): FOR H = 1 TO
     2934: READ C$(H): NEXT H: DIM
     A$(100): NORMAL
280  PRINT "READABILITY 5.0": PRINT
     : PRINT  TAB( 11)"*** DIRECT
     IONS ***": PRINT : PRINT "DE
     LETE ALL PUNCTUATION EXCEPT
     AT ENDS": PRINT "OF SENTENCE
     S. LEAVE A SPACE BETWEEN THE
     ": PRINT "LAST WORD AND THE
     PERIOD THEN BEGIN THE": PRINT
     "NEXT SENTENCE IMMEDIATELY.
     EXAMPLE:"
290  PRINT : PRINT "THIS IS A SEN
     TENCE .THIS IS ANOTHER .": PRINT
     : PRINT "TYPE A SLASH (/) BE
     FORE PROPER NOUNS": PRINT : INPUT
     "NAME OF TEXT? ";Z9$: PRINT

300  INPUT "NAME OF FILE?";NM$:D$
      = CHR$ (4): PRINT D$;"OPEN
     ";NM$: PRINT D$"READ ";NM$:
      PRINT : FOR B = 1 TO 25: INPUT
     A$:X =  LEN (A$): IF  RIGHT$
     (A$,1) = "." THEN 340
310  IF  RIGHT$ (A$,1) = "!" THEN
     340
```

```
320  IF  RIGHT$ (A$,1) = "?" THEN
     340
330 A$ = A$ + " "
340  FOR C = 1 TO  LEN (A$):T$ =
      MID$ (A$,C,1): IF T$ = "." THEN
     480
350  IF T$ = "!" THEN 480
360  IF T$ = "?" THEN 480
370  IF T$ = " " THEN 490
380  IF T$ = "/" THEN 470
390 O$ = O$ + T$:L = L + 1:  IF T$
      = "A" THEN 450
400  IF T$ = "E" THEN 450
410  IF T$ = "I" THEN 450
420  IF T$ = "O" THEN 450
430  IF T$ = "U" THEN 450
440 D = 0: GOTO 540
450 D = D + 1: IF D = 1 THEN V =
     V + 1
460  GOTO 540
470 F4 = 1: GOTO 540
480 S = S + 1: GOTO 540
490 W = W + 1:F5 = 0: IF F4 = 1 THEN
     510
500 O1$ = O$: IF  LEN (O$) > 6 THEN
     RT = RT + 1: IF  LEN (O$) >
     6 THEN RQ = RQ + 1: GOSUB 88
     0
510 O$ = "":F4 = 0:D = 0:  IF L >
      = 9 THEN T = T + 1
520 L1 = L + L1:L = 0:  IF V >  =
     3 THEN T1 = T1 + 1
530 V = 0
540  NEXT C: NEXT B:T =  INT ((T +
     T1) / 2):R = .4 * ((T / W) *
     100 + W / S): PRINT : PRINT
     :Z1 = Z1 + 1:R =  INT (R * 1
     00) / 100:E = W / S:F = E *
     .0496:K = 3.6365:P = (B4 / W
     ) * 100:P1 = (P * .1579):T2 =
     K + P1 + F:I9 = I9 + T2:T8 =
     T8 + 1:L2 = L1 / 3.1127:L2 =
      INT (L2 * 100) / 100
550 L3 = L2 / (W / 100):L3 =  INT
     (L3 * 100) / 100:G = 1.56 *
     (L1 / W) + .19 * (W / S) - 6
     .49:G =  INT (G * 100) / 100
     :S2 = S / (W / 100):S2 =  INT
     (S2 * 100) / 100:E9 = 206.83
     5 - .846 * L3 - 1.015 * (W /
     S):E9 =  INT (E9 * 100) / 10
     0
560 E7 = (W / S) * .0512 + .1142 *
     B4 + 3.442:E7 =  INT (E7 * 1
     00) / 100:E5 =  - 2.2029 + .
     0778 * (W / S) + .0455 * L3:
     E5 =  INT (E5 * 100) / 100:M
     1 = .39 * (W / S) + 11.8 * (
     L2 / W) - 15.59:M1 =  INT (M
     1 * 100) / 100:M5 = (141.840
     1 - .21459 * (L1 / W * 100) +
     1.079812 * S2) / 100:M6 =  -
     27.4004 * M5 + 23.06395
570 M6 =  INT (M6 * 100) / 100:W9
      = W9 + W:T9 = T9 + T:S9 = S
     9 + S:L9 = L9 + L1:B5 = B5 +
     B4:R9 = .4 * ((T9 / W9) * 10
     0 + W9 / S9):R9 =  INT (R9 *
     100) / 100:T7 = I9 / T8:Q9 =
     L9 / 3.1127:Q9 =  INT (Q9 *
     100) / 100:Q8 = S9 / (W9 / 1
     00)
580 Q8 =  INT (Q8 * 100) / 100:Q7
      = Q9 / (W9 / 100):Q7 =  INT
     (Q7 * 100) / 100:E8 = 206.83
     5 - .846 * Q7 - 1.015 * (W9 /
     S9):E8 =  INT (E8 * 100) / 1
     00:E4 =  - 2.2029 + .0778 *
     (W9 / S9) + .0455 * Q7:E4 =
      INT (E4 * 100) / 100:E6 = (
     W9 / S9) * .0512 + .1142 * B
     5 + 3.442
590 E6 =  INT (E6 * 100) / 100:M2
      = .39 * (W9 / S9) + 11.8 *
     (Q9 / W9) - 15.59:M2 =  INT
     (M2 * 100) / 100:G9 = 1.56 *
     (L9 / W9) + .19 * (W9 / S9) -
     6.49:G9 =  INT (G9 * 100) /
     100:M3 = (141.8401 - .21459 *
     (L9 / W9 * 100) + 1.079812 *
     Q8) / 100:M4 =  - 27.4004 *
     M3 + 23.06395:M4 =  INT (M4 *
     100) / 100
600  PRINT  TAB( 15)R1$(1): PRINT
     : PRINT Z9$: PRINT : PRINT W
     ,R1$(2): PRINT T,R1$(3): PRINT
     S,R1$(4): PRINT L2,R1$(5): PRINT
     L3,R1$(6): PRINT S2,R1$(7): PRINT
     : PRINT R,R1$(8): PRINT E9,R
     1$(9): IF E9 > 100 THEN  PRINT
     "<4",R1$(10): GOTO 148
610  IF E9 > 90 THEN  PRINT "4",R
     1$(10): GOTO 680
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620  IF E9 > 80 THEN  PRINT "5",R
     1$(10): GOTO 680
630  IF E9 > 70 THEN  PRINT "6",R
     1$(10): GOTO 680
640  IF E9 > 60 THEN  PRINT "7-8"
     ,R1$(10): GOTO 680
650  IF E9 > 50 THEN  PRINT "9-10
     ",R1$(10): GOTO 680
660  IF E9 > 30 THEN  PRINT "11-1
     2",R1$(10): GOTO 680
670  PRINT "COLLEGE",R1$(10)
680  PRINT E5,R1$(11): PRINT E7,R
     1$(12): PRINT G,R1$(13): PRINT
     M1,R1$(14): PRINT M6,R1$(15)
     : GOSUB 1170: GOSUB 2340: PRINT
     RX,R1$(16)
690  GOSUB 2340
700  PRINT D$;"CLOSE ";NM$: INPUT
     "DO YOU HAVE MORE MATERIAL?(
     Y OR N) ";A$: IF A$ = "Y" THEN
     870
710  PRINT : PRINT : PRINT  TAB(
     15)"TOTAL PASSAGES 1 THRU ";
     Z1: PRINT : PRINT Z9$: PRINT
     : PRINT W9,R1$(2): PRINT T9,
     R1$(3): PRINT S9,R1$(4): PRINT
     Q9,R1$(5): PRINT Q7,R1$(6): PRINT
     Q8,R1$(7): PRINT : PRINT R9,
     R1$(8): PRINT E8,R1$(9): IF
     E8 > 100 THEN  PRINT "< 4",R
     1$(10): GOTO 790
720  IF E8 > 90 THEN  PRINT "4",R
     1$(10): GOTO 790
730  IF E8 > 80 THEN  PRINT "5",R
     1$(10): GOTO 790
740  IF E8 > 70 THEN  PRINT "6",R
     1$(10): GOTO 790
750  IF E8 > 60 THEN  PRINT "7-8"
     ,R1$(10): GOTO 790
760  IF E8 > 50 THEN  PRINT "9-10
     ",R1$(10): GOTO 790
770  IF E8 > 30 THEN  PRINT "11-1
     2",R1$(10): GOTO 790
780  PRINT "COLLEGE",R1$(10)
790  PRINT E4,R1$(11): PRINT E6,R
     1$(12): PRINT G9,R1$(13): PRINT
     M2,R1$(14): PRINT M4,R1$(15)
     :T2 = T7: GOSUB 1170
800  GOSUB 2200: PRINT RX,R1$(16)
     :D$ =  CHR$ (4): REM
810  PRINT D$;"OPEN FRY DATA": PRINT
     D$;"WRITE FRY DATA": PRINT Q
     7: PRINT Q8: PRINT D$;"CLOSE
      FRY DATA": PRINT D$;"OPEN C
     OMPOSITE DATA": PRINT D$;"WR
     ITE COMPOSITE DATA": PRINT T
     2: PRINT R9: PRINT E8: PRINT
     E4: PRINT E6: PRINT G9: PRINT
     M2: PRINT Q7: PRINT Q8: PRINT
     M4
820  PRINT RX: PRINT D$;"CLOSE CO
     MPOSITE DATA": INPUT "PRESS
     <RETURN> TO CONTINUE";IN$: HOME
     : PRINT : PRINT "YOU HAVE TH
     E FOLLOWING CHOICES:": PRINT
     : PRINT : PRINT "1.  SEE A F
     RY GRAPH OF YOUR DATA"
830  PRINT : PRINT "2.  GO TO THE
      PROGRAM REMARKS": PRINT : PRINT
     "3.  GO TO THE FORMULA EXPLA
     NATIONS": PRINT : PRINT "4.
      SEE A COMPOSITE GRAPH": PRINT
     : PRINT "5.  QUIT": PRINT : PRINT
     : INPUT "ENTER YOUR CHOICE =
     => ";E$: IF E$ = "1" THEN  PRINT
     D$;"RUN FRY GRAPH"
840  IF E$ = "4" THEN  PRINT D$;"
     RUN COMPOSITE"
850  IF E$ = "5" THEN  END
860  GOTO 820
870 T1 = 0:T = 0:B4 = 0:S = 0:S1 =
     0:S2 = 0:W = 0:L = 0:L1 = 0:
     L2 = 0:L3 = 0:RT = 0: HOME :
      GOTO 300
880 F4 = 0: IF  ASC (O$) < 65 GOTO
     900
890  ON ( ASC (O$) - 64) GOTO 920
     ,930,940,950,960,970,980,990
     ,1000,1010,1020,1030,1040,10
     50,1060,1070,1080,1090,1100,
     1110,1120,1120,1120,1120,112
     0,1120
900 : PRINT D$ = "": RETURN
910  IF  LEN (O$) > 6 THEN RQ = R
     Q + 1
920 C9 = 1:C8 = 125: GOSUB 1130: RETURN
930 C9 = 126:C8 = 386: GOSUB 1130
     : RETURN
940 C9 = 387:C8 = 655: GOSUB 1130
     : RETURN
950 C9 = 656:C8 = 805: GOSUB 1130
     : RETURN
960 C9 = 806:C8 = 875: GOSUB 1130
     : RETURN
970 C9 = 876:C8 = 1044: GOSUB 113
     0: RETURN
980 C9 = 1045:C8 = 1158: GOSUB 11
     30: RETURN
990 C9 = 1159:C8 = 1331: GOSUB 11
     30: RETURN
1000 C9 = 1332:C8 = 1372: GOSUB 1
     130: RETURN
1010 C9 = 1373:C8 = 1404: GOSUB 1
     130: RETURN
1020 C9 = 1405:C8 = 1434: GOSUB 1
     130: RETURN
1030 C9 = 1435:C8 = 1553: GOSUB 1
     130: RETURN
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1040 C9 = 1554:C8 = 1683: GOSUB 1
     130: RETURN
1050 C9 = 1684:C8 = 1742: GOSUB 1
     130: RETURN
1060 C9 = 1743:C8 = 1803: GOSUB 1
     130: RETURN
1070 C9 = 1804:C8 = 1993: GOSUB 1
     130: RETURN
1080 C9 = 1994:C8 = 2005: GOSUB 1
     130: RETURN
1090 C9 = 2006:C8 = 2127: GOSUB 1
     130: RETURN
1100 C9 = 2128:C8 = 2529: GOSUB 1
     130: RETURN
1110 C9 = 2530:C8 = 2713: GOSUB 1
     130: RETURN
1120 C9 = 2714:C8 = 2933: GOSUB 1
     130: RETURN
1130  FOR H5 = C9 TO C8: IF O$ =
     C$(H5) THEN O$ = " ": RETURN

1140  NEXT H5: GOTO 20
1150  IF T2 > 9.999 THEN  PRINT "
     16+","DALE CHALL SCORE"
1160 B4 = B4 + 1:O$ = "": RETURN

1170  IF T2 <  = 4.99 THEN 1240
1180  IF T2 <  = 5.99 THEN 1250
1190  IF T2 <  = 6.99 THEN 1260
1200  IF T2 <  = 7.99 THEN 1270
1210  IF T2 <  = 8.99 THEN 1280
1220  IF T2 <  = 9.999 THEN 1290
1230  RETURN
1240  PRINT "4TH OR LESS","DALE C
     HALL SCORE": RETURN
1250  PRINT "5-6","DALE CHALL SCO
     RE": RETURN
1260  PRINT "7-8","DALE CHALL SCO
     RE": RETURN
1270  PRINT "9-10","DALE CHALL SC
     ORE": RETURN
1280  PRINT "11-12","DALE CHALL S
     CORE": RETURN
1290  PRINT "COLLEGE","DALE CHALL
      SCORE": RETURN
1300  DATA  A,ABLE,ABOARD,ABOUT,A
     BOVE,ABSENT,ACCEPT,ACCIDENT,
     ACCOUNT,ACHE,ACHING,ACORN,AC
     RE,ACROSS,ACT,ACTS,ADD,ACCRE
     SS: DATA  ADMIRE,ADVENTURE,A
     FAR,AFRAID,AFTER,AFTERNOON,A
     FTERWARD,AFTERWARDS,AGAIN,AG
     AINST,AGE,AGED,AGO,AGREE,AH,
     AHEAD
1310  DATA  AID,AIM,AIR,AIRFIELD
     ,AIRPLANE,AIRPORT,AIRSHIP,AI
     RY,ALARM,ALIKE,ALIVE,ALL,ALL
     EY,ALLIGATOR,ALLOW,ALMOST,AL
     ONE: DATA  ALONG,ALOUD,ALRE
     ADY,ALSO,ALWAYS,AM,AMERICA,A
     MERICAN,AMONG,AMOUNT,AN,AND,
     ANGEL,ANGER,ANGRY,ANIMAL,ANO
     THER
1320  DATA  ANSWER,ANT,ANY,ANYBOD
     Y,ANYHOW,ANYONE,ANYTHING,ANY
     WAY,ANYWHERE,APART,APARTMENT
     ,APE,APIECE,APPEAR,APPLE,APR
     IL: DATA  APRON,ARE,ARENT,AR
     ISE,ARITHMETIC,ARM,ARMFUL,AR
     MY,AROUSE,AROUND,ARRANGE,ARR
     IVE,ARRIVED,ARROW,ART,ARTIST
     ,AS
1330  DATA  ASH,ASHES,ASIDE,ASK,A
     SLEEP,AT,ATE,ATTACK,ATTEND,A
     TTENTION,AUGUST,AUNT,AUTHOR,
     AUTO,AUTOMOBILE,AUTUMN,AVENU
     E: DATA  AWAKE,AWAKEN,AWAY,A
     WFUL,AWFULLY,AWHILE,AX,BAA,B
     ABE,BABY,BABIES,BACK,BACKGRO
     UND,BACKWARD,BACKWARDS,BACON
     ,BAD
1340  DATA  BADLY,BADGE,BAG,BAKE,
     BAKER,BAKERY,BAKING,BALL,BAL
     LOON,BANANA,BAND,BANDAGE,BAN
     G,BANJO,BANK,BANKER,BAR,BARB
     ER: DATA  BARE,BARELY,BAREF
     OOT,BARK,BARN,BARREL,BASE,BA
     SEBALL,BASEMENT,BASKET,BAT,B
     ATCH,BATH,BATHE,BATHING,BATH
     ROOM
1350  DATA  BATHTUB,BATTLE,BATTL
     ESHIP,BAY,BE,BEING,BEACH,BEA
     D,BEAM,BEAN,BEAR,BEARD,BEAST
     ,BEAT,BEATING,BEATIFUL,BEAUT
     IFY: DATA  BEAUTY,BECAME,BE
     CAUSE,BECOME,BECOMING,BED,BE
     DBUG,BEDROOM,BEDSPREAD,BEDTI
     ME,BEE,BEECH,BEEF,BEEFSTEAK,
     BEEHIVE
1360  DATA  BEEN,BEER,BEAT,BEFOR
     E,BEG,BEGAN,BEGGAR,BEGGED,BE
     GIN,BEGINNING,BEGUN,BEHAVE,B
     EHIND,BELIEVE,BELL,BELONG,BE
     LOW: DATA  BELT,BEND,BENCH,
     BENEATH,BENT,BERRY,BERRIES,B
     ESIDE,BESIDES,BEST,BET,BETTE
     R,BETWEEN,BIB,BIBLE,BICYCLE,
     BID
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1370 DATA BIG,BIGGER,BILL,BILLB
     OARD,BIN,BIND,BIRD,BIRTH,BIR
     THDAY,BISCUIT,BIT,BITE,BITIN
     G,BITTER,BLACK,BLACKBERRY: DATA
      BLACKBIRD,BLACKBOARD,BLACKM
     ESS,BLACKSMITH,BLAME,BLANK,B
     LANKET,BLAST,BLAZE,BLEED,BLE
     SS,BLESSING,BLEW,BLIND
1380 DATA BLINDS,BLINDFOLD,BLOC
     K,BLOOD,BLOOM,BLOSSOM,BLOT,B
     LOW,BLUE,BLUEBERRY,BLUEBIRD,
     BLUEJAY,BLUSH,BOARD,BOAST,BO
     AT: DATA BOB,BOBWHITE,BODY,
     BODIES,BOIL,BOILER,BOLD,BONE
     ,BONNET,BOO,BOOK,BOOKCASE,BO
     OKKEEPER,BOOM,BOOT,BORN,BORR
     OW
1390 DATA BOSS,BOTH,BOTHER,BOTT
     LE,BOTTOM,BOUGHT,BOUNCE,BOW,
     BOWL,BOWWOW,BOX,BOXES,BOXCAR
     ,BOXER,BOY,BOYHOOD,BRACELET:
      DATA BRAIN,BREAK,BRAN,BRAN
     CH,BRASS,BRAVE,BREAD,BRAKE,B
     REAKFAST,BREAST,BREATH,BREAT
     HE,BREEZE,BRICK,BRIDE,BRIDGE

1400 DATA BRIGHT,BRIGHTNESS,BRI
     NG,BROAD,BROADCAST,BROKE,BRO
     KEN,BROOK,BROOM,BROTHER,BROU
     GHT,BROWN,BRUSH,BUBBLE,BUCKE
     T: DATA BUCKLE,BUD,BUFFALO,
     BUG,BUGGY,BUILD,BUILDING,BUI
     LT,BULB,BULL,BULLET,BUM,BUMB
     LEBEE,BUMP,BUN,BUNCH,BUNDLE
1410 DATA BUNNY,BURN,BURST,BURY
     ,BUS,BUSH,BUSHEL,BUSINESS,BU
     SY,BUT,BUTCHER,BUTT,BUTTER,B
     UTTERCUP,BUTTERFLY,BUTTERMIL
     K: DATA BUTTERSCOTCH,BUTTON
     ,BUTTONHOLE,BUY,BUZZ,BY,BYE,
     CAB,CABBAGE,CABIN,CABINET,CA
     CKLE,CAGE,CAKE,CALENDAR,CALF

1420 DATA CALL,CALLER,CALLING,
     CAME,CAMEL,CAMP,CAMPFIRE,CAN
     ,CANAL,CANARY,CANDLE,CANDLES
     TICK,CANDY,CANE,CANNON,CANNO
     T: DATA CANOE,CANT,CANYON,
     CAP,CAPE,CAPITAL,CAPTAIN,CAR
     ,CARD,CARDBOARD,CARE,CAREFUL
     ,CARELESS,CARELESSNESS,CARLO
     AD
1430 DATA CARPENTER,CARPET,CARR
     AIGE,CARROT,CARRY,CART,CARVE
     ,CASE,CASH,CASHIER,CASTLE,CA
     T,CATBIRD,CATCH,CATCHER: DATA
      CATERPILLAR,CATFISH,CATSUP,
     CATTLE;CAUGHT,CAUSE,CAVE,CEI
     LING,CELL,CELLAR,CENT,CENTER
     ,CEREAL,CERTAIN,CERTAINLY

1440 DATA CHAIN,CHAIR,CHALK,CHA
     MPION,CHANCE,CHANGE,CHAP,CHA
     RGE,CHARM,CHART,CHASE,CHATTE
     R,CHEAP,CHEAT,CHECK,CHECKERS
     : DATA CHEEK,CHEER,CHEESE,C
     HERRY,CHEST,CHEW,CHICK,CHICK
     EN,CHIEF,CHILD,CHILDHOOD,CHI
     LDREN,CHILL,CHILLY,CHIMNEY
1450 DATA CHIN,CHINA,CHIP,CHIP
     MUNK,CHOCOLATE,CHOICE,CHOOSE
     ,CHOP,CHORUS,CHOSE,CHOSEN,CH
     RISTEN,CHRISTMAS,CHURCH,CHUR
     N: DATA CIGARETTE,CIRCLE,C
     IRCUS,CITIZEN,CITY,CLANG,CLA
     P,CLASS,CLASSMATE,CLASSROOM,
     CLAW,CLAY,CLEANER,CLEAN,CLEA
     R
1460 DATA CLEVER,CLICK,CLIFF,CL
     IMB,CLIP,CLOAK,CLOCK,CLOSET,
     CLOSE,CLOTH,CLOTHES,CLOTHING
     ,CLOUD,CLOUDY,CLOVER,CLOWN: DATA
      CLUB,CLUMP,CLUCK,COACH,COAL
     ,COAST,COAT,COB,COBBLER,COCO
     A,COCONUT,COCOON,COD,CODFISH
     ,COFFEE,COFFEEPOT
1470 DATA COIN,COLD,COLLAR,COL
     LEGE,COLOR,COLORED,COLT,COLU
     MN,COMB,COME,COMFORT,COMIC,C
     OMING,COMPANY,COMPARE,CONDUC
     TOR: DATA CONE,CONNECT,COO
     ,COOK,COOKED,COOKING,COOKIE,
     COOKIES,COOL,COOLER,COOP,COO
     PER,COPY,CORD,CORK,CORN,CORN
     ER
1480 DATA CORRECT,COST,COT,COTT
     AGE,COTTON,COUCH,COUGH,COULD
     ,COULDNT,COUNT,COUNTER,COUNT
     RY,COUNTY,COURSE,COURT: DATA
      COUSIN,COVER,COW,COWARD,COW
     ARDLY,COWBOY,COZY,CRAB,CRACK
     ,CRACKER,CRADLE,CRAMPS,CRANB
     ERRY,CRANK,CRANKY
1490 DATA CRASH,CRAWL,CRAZY,CRE
     AM,CREAMY,CREED,CREEK,CREPT,
     CRIED,CROAK,CROOK,CROOKED,CR
     OP,CROSS,CROSSING,CROSSEYED:
      DATA CROW,CROWD,CROWED,CRO
     WN,CRUEL,CRUMB,CRUMBLE,CRUSH
     ,CRUST,CRY,CRIES,CUB,CUFF,CU
     P,CUPBOARD,CUPFUL,CURE
1500 DATA CURL,CURLY,CURTAIN,CU
     RVE,CUSHION,CUSTARD,CUSTOMER
     ,CUT,CUTE,CUTTING,DAB,DAD,DA
     DDY,DAILY,DAIRY,DAISY,DAM: DATA
      DAMAGE,DAME,DAMP,DANCE,DANC
     ER,DANCING,DANDY,DANGER,DANG
     EROUS,DARE,DARK,DARKNESS,DAR
     LING,DARN,DART,DASH
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1510 DATA DATE,DAUGHTER,DAWN,DA
     Y,DAYBREAK,DAYTIME,DEAD,DEAF
     ,DEAL,DEAR,DEATH,DECEMBER,DE
     CK,DECIDE,DEED,DEEP,DEER: DATA
      DEFEAT,DEFEND,DEFENSE,DELIG
     HT,DEN,DENTIST,DEPEND,DEPOSI
     T,DESCRIBE,DESERT,DESERVE,DE
     SIRE,DESK,DESTROY
1520 DATA DEVIL,DEW,DIAMOND,DID
     ,DIDNT,DIE,DIED,DIES,DIFFER,
     DIFFERENCE,DIFFERENT,DIG,DIM
     ,DIME,DINE,DINGDONG: DATA D
     INNER,DIP,DIRECT,DIRECTION,D
     IRT,DIRTY,DISCOVER,DISH,DISL
     IKE,DISMISS,DITCH,DIVE,DIVER
     ,DIVIDE,DO,DOCK
1530 DATA DOCTOR,DOES,DOESNT,DO
     G,DOLL,DOLLAR,DOLLY,DONE,DON
     KEY,DONT,DOOR,DOORBELL,DOORK
     NOB,DOORSTEP,DOPE,DOT,DOUBLE
     : DATA DOUGH,DOVE,DOWN,DOWN
     STAIRS,DOWNTOWN,DOZEN,DRAG,D
     RANK,DRAIN,DRAW,DRAWER,DRAWI
     NG,DREAM,DRESS,DRESSER
1540 DATA DRESSMAKER,DREW,DRIED
     ,DRIFT,DRILL,DRINK,DRIP,DRIV
     E,DRIVEN,DRIVER,DROP,DROVE,D
     ROWN,DROWSY,DRUG,DRUM,DRUNK:
      DATA DRY,DUCK,DUE,DUG,DULL
     ,DUMB,DUMP,DURING,DUST,DUSTY
     ,DUTY,DWARF,DWELL,DWELT,DYIN
     G,EACH,EAGER,EAGLE,EAR,EARLY

1550 DATA EARN,EARTH,EAST,EASTE
     RN,EASY,EAT,EATEN,EDGE,EGG,E
     H,EIGHT,EIGHTEEN,EIGHTH,EIGH
     TY,EITHER,ELBOW,ELDER,ELDEST
     : DATA ELECTRIC,ELECTRICITY
     ,ELEPHANT,ELEVEN,ELF,ELM,ELS
     E,ELSEWHERE,EMPTY,END,ENDING
     ,ENEMY,ENGINE,ENGINEER,ENGLI
     SH
1560 DATA ENJOY,ENOUGH,ENTER,EN
     VELOPE,EQUAL,ERASE,ERASER,ER
     RAND,ESCAPE,EVE,EVEN,EVENING
     ,EVER,EVERY,EVERYBODY: DATA
      EVERYDAY,EVERYONE,EVERYTHIN
     G,EVERWHERE,EVIL,EXACT,EXCEP
     T,EXCHANGE,EXCITED,EXCITING,
     EXCUSE,EXIT,EXPECT
1570 DATA EXPLAIN,EXTRA,EYE,EYE
     BROW,FABLE,FACE,FACING,FACT,
     FACTORY,FAIL,FAINT,FAIR,FAIR
     Y,FAITH,FAKE,FALL,FALSE: DATA
       FAMILY,FAN,FANCY,FAR,FARAW
     AY,FARE,FARMER,FARM,FARMING,
     FAROFF,FARTHER,FASHION,FAST,
     FASTEN,FAT,FATHER,FAULT

1580 DATA FAVOR,FAVORITE,FEAR,F
     EAST,FEATHER,FEBRUARY,FED,FE
     ED,FEEL,FEET,FELL,FELLOW,FEL
     T,FENCE,FEVER,FEW,FIB: DATA
      FIDDLE,FIELD,FIFE,FIFTEEN,F
     IFTH,FIFTY,FIG,FIGHT,FIGURE,
     FILE,FILL,FILM,FINALLY,FIND,
     FINE,FINGER,FINISH
1590 DATA FIRE,FIREARM,FIRECRA
     CKER,FIREPLACE,FIREWORKS,FIR
     ING,FISH,FISHERMAN,FIRST,FIS
     T,FIT,FIVE,FIX,FLAG,FLAKE: DATA
       FLAME,FLAP,FLASH,FLASHLIGH
     T,FLAT,FLEA,FLESH,FLEW,FLIES
     ,FLIGHT,FLIP,FLIPFLOP,FLOAT,
     FLOCK,FLOOD,FLOOR,FLOP
1600 DATA FLOUR,FLOW,FLOWER,FLO
     WERY,FLUTTER,FLY,FORM,FOG,FO
     GGY,FOLD,FOLKS,FOLLOW,FOLLOW
     ING,FOND,FOOD,FOOL,FOOLISH: DATA
      FOOT,FOOTBALL,FOOTPRINT,FOR
     ,FOREHEAD,FOREST,FORGET,FORG
     IVE,FORGOT,FORGOTTEN,FORK,FO
     RM,FORT,FORTH,FORTUNE
1610 DATA FORTY,FORWARD,FOUGHT,
     FOUND,FOUNTAIN,FOUR,FOURTEEN
     ,FOURTH,FOX,FRAME,FREE,FREED
     OM,FREEZE,FREIGHT,FRENCH: DATA
      FRESH,FRET,FRIDAY,FRIED,FRI
     END,FRIENDLY,FRIENDSHIP,FRIG
     HTEN,FROG,FROM,FRONT,FROST,F
     ROWN,FROZE,FRUIT,FRY
1620 DATA FUDGE,FUEL,FULL,FULL
     Y,FUN,FUNNY,FUR,FURNITURE,FU
     RTHER,FUZZY,GAIN,GALLON,GALL
     OP,GAME,GANG,GARAGE,GARBAGE:
      DATA GARDEN,GAS,GASOLINE,
     GATE,GATHER,GAVE,GAY,GEAR,GE
     ESE,GENERAL,GENTLE,GENTLEMAN
     ,GENTLEMEN,GEOGRAPHY,GET
1630 DATA GETTING,GIANT,GIFT,GI
     NGERBREAD,GIRL,GIVE,GIVEN,GI
     VING,GLAD,GLADLY,GLANCE,GLAS
     S,GLASSES,GLEAM,GLIDE: DATA
      GLORY,GLOVE,GLOW,GLUE,GO,GO
     ING,GOES,GOAL,GOAT,GOBBLE,GO
     D,GODMOTHER,GOLDEN,GOLD,GOLD
     FISH,GOLF,GONE,GOOD
1640 DATA GOODS,GOODBY,GOODBYE,
     GOODLOOKING,GOODNESS,GOODY,G
     OOSE,GOOSEBERRY,GOT,GOVERN,G
     OVERNMENT,GOWN,GRAB,GRACIOUS
     : DATA GRADE,GRAIN,GRAND,GR
     ANDCHILD,GRANDCHILDREN,GRAND
     DAUGHTER,GRANDFATHER,GRANDMA
     ,GRANDMOTHER,GRANDPA,GRANDSO
     N
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1650  DATA  GRANDSTAND,GRAPE,GRAP
      ES,GRAPEFRUIT,GRASS,GRASSHOP
      PER,GRATEFUL,GRAVE,GRAVEL,GR
      AVEYARD,GRAVY,GRAY,GRAZE: DATA
       GREASE,GREAT,GREEN,GREET,GR
      EW,GRIND,GROAN,GROCERY,GROUN
      D,GROUP,GROVE,GROW,GUARD,GUE
      SS,GUEST,GUIDE,GULF,GUM
1660  DATA  GUN,GUNPOWDER,GUY,HA,
      HABIT,HAD,HADNT,HAIL,HAIR,HA
      IRCUT,HAIRPIN,HALF,HALL,HALT
      ,HAM,HAMMER,HAND,HANDFUL: DATA
       HANDKERCHIEF,HANDLE,HANDWRI
      TING,HANG,HAPPEN,HAPPILY,HAP
      PINESS,HAPPY,HARBOR,HARD,HAR
      DLY,HARDSHIP,HARDWARE
1670  DATA  HARE,HARK,HARM,HARNES
      S,HARP,HARVEST,HASNT,HAS,HAS
      TE,HASTEN,HASTY,HAT,HATCH,HA
      TCHET,HATE,HAUL,HAVE: DATA
      HAVENT,HAVING,HAWK,HAY,HAYFI
      ELD,HAYSTACK,HE,HEAD,HEADACH
      E,HEAL,HEALTH,HEALTHY,HEAP,H
      EAR,HEARING,HEARD
1680  DATA  HEART,HEAT,HEATER,HEA
      VEN,HEAVY,HEED,HEEL,HEIGHT,H
      ELD,HELL,HELLO,HELMET,HELP,H
      ELPER,HELPFUL,HEM,HEN: DATA
       HENHOUSE,HER,HERS,HERE,HERE
      S,HERO,HERSELF,HES,HEY,HICKO
      RY,HID,HIDDEN,HIDE,HIGH,HIGH
      WAY,HILL,HILLSIDE
1690  DATA  HILLTOP,HILLY,HIM,HIM
      SELF,HIND,HINT,HIP,HIRE,HIS,
      HISS,HISTORY,HIT,HITCH,HIVE,
      HO,HOE,HOG,HOLD,HOLDER: DATA
       HOLD,HOLIDAY,HOLLOW,HOLY,HO
      ME,HOMELY,HOMESICK,HONEST,HO
      NEY,HONEYBEE,HONEYMOON,HONK,
      HONOR,HOOD,HOOF,HOOK
1700  DATA  HOOP,HOP,HOPE,HOPEFUL
      ,HOPELESS,HORN,HORSE,HORSEBA
      CK,HORSESHOE,HOSE,HOSPITAL,H
      OST,HOT,HOTEL,HOUND,HOUR: DATA
        HOUSE,HOUSETOP,HOUSEWIFE,H
      OUSEWORK,HOW,HOWEVER,HOWL,HU
      G,HUGE,HUM,HUMBLE,HUMP,HUNDR
      ED,HUNG,HUNGER,HUNGRY
1710  DATA  HUNK,HUNT,HUNTER,HUR
      RAH,HURRIED,HURRY,HURT,HUSBA
      ND,HUSH,HUT,HYMN,I,ICE,ICY,I
      D,IDEA,IDEAL,IF,ILL,IM: DATA
       IMPORTANT,IMPOSSIBLE,IMPROV
      E,IN,INCH,INCHES,INCOME,INDE
      ED,INDIAN,INDOORS,INK,INN,IN
      SECT,INSIDE,INSTANT
1720  DATA  INSTEAD,INSULT,INTEND
      ,INTERSTED,INTERESTING,INTO,
      INVITE,IRON,IS,ISLAND,ISNT,I
      T,ITS,ITSELF,IVE,IVORY: DATA
       IVY,JACKET,JACKS,JAIL,JAM,J
      ANUARY,JAR,JAW,JAY,JELLY,JEL
      LYFISH,JERK,JIG,JOB,JOCKEY,J
      OIN,JOKE,JOKING,JOLLY
1730  DATA  JOURNEY,JOY,JOYFUL,JO
      YOUS,JUDGE,JUG,JUICE,JUICY,J
      ULY,JUMP,JUNE,JUNIOR,JUNK,JU
      ST,KEEN,KEEP,KEPT,KETTLE: DATA
       KEY,KICK,KID,KILL,KILLED,KI
      ND,KINDLY,KINDNESS,KING,KING
      DOM,KISS,KITCHEN,KITE,KITTEN
      ,KITTY,KNEE,KNEEL
1740  DATA  KNEW,KNIFE,KNIT,KNIVE
      S,KNOB,KNOCK,KNOT,KNOW,KNOWN
      ,LACE,LAD,LADDER,LADIES,LADY
      ,LAID,LAKE,LAMB,LAME,LAMP: DATA
       LAND,LANE,LANGUAGE,LANTERN,
      LAP,LARD,LARGE,LASH,LASS,LAS
      T,LATE,LAUGH,LAUNDRY,LAW,LAW
      N,LAWYER,LAY,LAZY,LEAD
1750  DATA  LEADER,LEAK,LEAF,LEAN
      ,LEAP,LEARN,LEARNED,LEAST,LE
      ATHER,LEAVE,LEAVING,LED,LEFT
      ,LEG,LEMON,LEMONADE,LEND: DATA
       LENGTH,LESS,LESSON,LET,LETS
      ,LETTER,LETTING,LETTUCE,LEVE
      L,LIBERTY,LIBRARY,LICE,LICK,
      LID,LIE,LIFE,LIFT
1760  DATA  LIGHT,LIGHTNESS,LIGHT
      NING,LIKE,LIKELY,LIKING,LILY
      ,LIMB,LIME,LIMP,LINE,LINEN,L
      ION,LIP,LIST,LISTEN,LIT: DATA
       LITTLE,LIVE,LIVES,LIVELY,LI
      VER,LIVING,LIZARD,LOAD,LOAF,
      LOAN,LOAVES,LOCK,LOCOMOTIVE,
      LOG,LONE,LONELY
1770  DATA  LONESOME,LONG,LOOK,LO
      OKOUT,LOOP,LOOSE,LORD,LOSE,L
      OSER,LOSS,LOST,LOT,LOUD,LOVE
      ,LOVELY,LOVER,LOW,LUCK,LUCKY
      : DATA  LUMBER,LUMP,LUNCH,LY
      ING,MA,MACHINE,MACHINERY,MAD
      ,MADE,MAGAZINE,MAGIC,MADE,MA
      IL,MAILBOX,MAILMAN,MAJOR
1780  DATA  MAKE,MAKING,MALE,MAMA
      ,MAMMA,MAN,MANAGER,MANE,MANG
      ER,MANY,MAP,MAPLE,MARBLE,MAR
      CH,MARE,MARK,MARKET,MARRIAGE
      : DATA  MARRIED,MARRY,MASK,M
      AST,MASTER,MAT,MATCH,MATTER,
      MATTRESS,MAY,MAYBE,MAYOR,MAY
      POLE,ME,MEADOW,MEAL,MEAN,MEA
      NS
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1790  DATA  MEANT,MEASURE,MEAT,ME
      DICINE,MEET,MEETING,MELT,MEM
      BER,MEN,MEND,MEOW,MERRY,MESS
      ,MESSAGE,MET,METAL,MEW,MICE:
       DATA  MIDDLE,MIDNIGHT,MIGHT
      ,MIGHTY,MILE,MILK,MILKMAN,MI
      LL,MILLER,MILLION,MIND,MINE,
      MINER,MINT,MINUTE,MIRROR
1800  DATA  MISCHIEF,MISS,MISSPEL
      L,MISTAKE,MISTY,MITT,MITTEN,
      MIX,MOMENT,MONDAY,MONEY,MONK
      EY,MONTH,MOO,MOON,MOONLIGHT:
       DATA  MOOSE,MOP,MORE,MORNIN
      G,MORROW,MOSS,MOST,MOSTLY,MO
      THER,MOTOR,MOUNT,MOUNTAIN,MO
      USE,MOUTH,MOVE,MOVIE,MOVIES
1810  DATA  MOVING,MEOW,MR,MRS,MU
      CH,MUD,MUDDY,MUG,MULE,MULTIP
      LY,MURDER,MUSIC,MUST,MY,MYSE
      LF,NAIL,NAME,NAP,NAPKIN: DATA
       NARROW,NASTY,NAUGHTY,NAVY,N
      EAR,NEARBY,NEARLY,NEAT,NECK,
      NECKTIE,NEED,NEEDLE,NEEDNT,N
      EGRO,NEIGHBOR,NEIGHBORHOOD
1820  DATA  NEITHER,NERVE,NEST,NE
      T,NEVER,NEVERMORE,NEW,NEWS,N
      EWSPAPER,NEXT,NIBBLE,NICE,NI
      CKEL,NIGHT,NIGHTGOWN,NINE: DATA
       NINETEEN,NINETY,NO,NOBODY,N
      OD,NOISE,NOISY,NONE,NOON,NOR
      ,NORTH,NORTHERN,NOSE,NOT,NOT
      E,NOTHING,NOTICE
1830  DATA  NOVEMBER,NOW,NOWHERE,
      NUMBER,NURSE,NUT,OAK,OAR,OAT
      MEAL,OATS,OBEY,OCEAN,OCLOCK,
      OCTOBER,ODD,OF,OFF,OFFER: DATA
       OFFICE,OFFICER,OFTEN,OH,OIL
      ,OLD,OLDFASHIONED,ON,ONCE,ON
      E,ONION,ONLY,ONWARD,OPEN,OR,
      ORANGE,ORCHARD,ORDER
1840  DATA  ORE,ORGAN,OTHER,OTHER
      WISE,OUCH,OUGHT,OUR,OURS,OUR
      SELVES,OUT,OUTDOORS,OUTFIT,O
      UTLAW,OUTLINE,OUTSIDE: DATA
       OUTWARD,OVEN,OVER,OVERALLS,
      OVERCOAT,OVERHEAT,OVERHEAD,O
      VERHEAR,OVERNIGHT,OVERTURN,O
      WE,OWING,OWL,OWN
1850  DATA  OWNER,OX,PA,PACE,PACK
      ,PACKAGE,PAD,PAGE,PAID,PAIL,
      PAIN,PAINFUL,PAINT,PAINTER,P
      AINTING,PAIR,PAL,PALACE: DATA
       PALE,PAN,PANCAKE,PANE,PANSY
      ,PANTS,PAPA,PAPER,PARADE,PAR
      DON,PARENT,PARK,PART,PARTLY,
      PARTNER,PARTY,PASS
1860  DATA  PASSENGER,PASS,PASTE,
      PASTURE,PAT,PATCH,PATH,PATTE
      R,PAVE,PAVEMENT,PAW,PAY,PAYM
      ENT,PEA,PEAS,PEACE,PEACEFUL:
       DATA  PEACH,PEACHES,PEAK,PE
      ANUT,PEAR,PEARL,PECK,PEEK,PE
      EL,PEEP,PEG,PEN,PENCIL,PENNY
      ,PEOPLE,PEPPER,PEPPERMINT
1870  DATA  PERFUME,PERHAPS,PERSO
      N,PET,PHONE,PIANO,PICK,PICKL
      E,PICNIC,PICTURE,PIE,PIECE,P
      IG,PIGEON,PIGGY,PILE,PILL: DATA
       PILLOW,PIN,PINE,PINEAPPLE,P
      INK,PINT,PIPE,PISTOL,PIT,PIT
      CH,PITCHER,PITY,PLACE,PLAIN,
      PLAN,PLANE,PLANT
1880  DATA  PLATE,PLATFORM,PLATTE
      R,PLAY,PLAYER,PLAYGROUND,PLA
      YHOUSE,PLAYMATE,PLAYTHING,PL
      EASANT,PLEASE,PLEASURE,PLENT
      Y: DATA  PLOW,PLUG,PLUM,POCK
      ET,POCKETBOOK,POEM,POINT,POI
      SON,POKE,POLE,POLICE,POLICEM
      AN,POLISH,POLITE,POND,PONIES

1890  DATA  PONY,POOL,POOR,POP,PO
      PCORN,POPPED,PORCH,PORK,POSS
      IBLE,POST,POSTAGE,POSTMAN,PO
      T,POTATO,POTATOES,POUND: DATA
       POUR,POWDER,POWER,POWERFUL,
      PRAISE,PRAY,PRAYER,PREPARE,P
      RESENT,PRETTY,PRICE,PRICK,PR
      INCE,PRINCESS,PRINT
1900  DATA  PRISON,PRIZE,PROMISE,
      PROPER,PROTECT,PROUD,PROVE,P
      RUNE,PUBLIC,PUDDLE,PUFF,PULL
      ,PUMP,PUMPKIN,PUNCH,PUNISH,P
      UP: DATA  PUPIL,PUPPY,PURE,P
      URPLE,PURSE,PUSH,PUSS,PUSSY,
      PUSSYCAT,PUT,PUTTING,PUZZLE,
      QUACK,QUART,QUARTER,QUEEN
1910  DATA  QUEER,QUESTION,QUICK,
      QUICKLY,QUIET,QUILT,QUIT,QUI
      TE,RABBIT,RACE,RACK,RADIO,RA
      DISH,RAG,RAIL,RAILROAD: DATA
       RAILWAY,RAIN,RAINY,RAINBOW,
      RAISE,RAISIN,RAKE,RAM,RAN,RA
      NCH,RANG,RAP,RAPIDLY,RAT,RAT
      E,RATHER,RATTLE
1920  DATA  RAW,RAY,REACH,READ,RE
      ADER,READING,READY,REAL,REAL
      LY,REAP,REAR,REASON,REBUILD,
      RECEIVE,RECESS,RECORD,RED: DATA
       REDBIRD,REDBREAST,REFUSE,RE
      INDEER,REJOICE,REMAIN,REMEMB
      ER,REMIND,REMOVE,RENT,REPAIR
      ,REPAY,REPEAT,REPORT
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1930  DATA  REST,RETURN,REVIEW,RE
      WARD,RIB,RIBBON,RICE,RICH,RI
      D,RIDDLE,RIDE,RIDER,RIDING,R
      IGHT,RIM,RING,RIP,RIPE: DATA
       RISE,RISING,RIVER,ROAD,ROAD
      SIDE,ROAR,ROAST,ROB,ROBBER,R
      OBE,ROBIN,ROCK,ROCKY,ROCKET,
      RODE,ROLL,ROLLER
1940  DATA  ROOF,ROOM,ROOSTER,ROO
      T,ROPE,ROSE,ROSEBUD,ROT,ROTT
      EN,ROUGH,ROUND,ROUTE,ROW,ROW
      BOAT,ROYAL,RUB,RUBBED,RUBBER
      : DATA  RUBBISH,RUG,RULE,RUL
      ER,RUMBLE,RUN,RUNG,RUNNER,RU
      NNING,RUSH,RUST,RUSTY,RYE,SA
      CK,SAD,SADDLE,SADNESS,SAFE
1950  DATA  SAFETY,SAID,SAIL,SAIL
      BOAT,SAILOR,SAINT,SALAD,SALE
      ,SALT,SAME,SAND,SANDY,SANDWI
      CH,SANG,SANK,SAP,SASH,SAT,SA
      TIN: DATA  SATISFACTORY,SATU
      RDAY,SAUSAGE,SAVAGE,SAVE,SAV
      INGS,SAW,SAY,SCAB,SCALES,SCA
      RE,SCARF,SCHOOL,SCHOOLBOY
1960  DATA  SCHOOLHOUSE,SCHOOLMAS
      TER,SCHOOLROOM,SCORCH,SCORE,
      SCRAP,SCRAPE,SCRATCH,SCREEM,
      SCREEN,SCREW,SCRUB,SEA,SEAL:
       DATA  SEAM,SEARCH,SEASON,SE
      AT,SECOND,SECRET,SEE,SEEING,
      SEED,SEEK,SEEM,SEEN,SEESAW,S
      ELECT,SELF,SELFISH,SELL,SEND

1970  DATA  SENSE,SENT,SENTENCE,S
      EPARATE,SEPTEMBER,SERVANT,SE
      RVE,SERVICE,SET,SETTING,SETT
      LE,SETTLEMENT,SEVEN,SEVENTEE
      N: DATA  SEVENTH,SEVENTY,SEV
      ERAL,SEW,SHADE,SHADOW,SHADY,
      SHAKE,SHAKER,SHAKING,SHALL,S
      HAME,SHANT,SHAPE,SHARE,SHARP

1980  DATA  SHAVE,SHE,SHED,SHELL,
      SHES,SHEAR,SHEARS,SHED,SHEEP
      ,SHEET,SHELF,SHELL,SHEPHERD,
      SHINE,SHINING,SHINY,SHIP: DATA
       SHIRT,SHOCK,SHOE,SHOEMAKER,
      SHONE,SHOOK,SHOOT,SHOP,SHOPP
      ING,SHORE,SHORT,SHOT,SHOULD,
      SHOULDER,SHOULDNT,SHOUT
1990  DATA  SHOVEL,SHOW,SHOWER,SH
      UT,SHY,SICK,SICKNESS,SIDE,SI
      DEWALK,SIDEWAYS,SIGH,SIGHT,S
      IGN,SILENCE,SILENT,SILK: DATA
       SILL,SILLY,SILVER,SIMPLE,SI
      NCE,SIN,SING,SINGER,SINGLE,S
      INK,SIS,SISSY,SISTER,SIT,SIT
      TING,SIX,SIXTEEN

2000  DATA  SIXTH,SIXTY,SIZE,SKAT
      E,SKATER,SKI,SKIN,SKIP,SKIRT
      ,SKY,SLAM,SLAP,SLATE,SLAVE,S
      LED,SLEEP,SLEEPY,SLEEVE,SLEI
      GH: DATA  SLEPT,SLICE,SLID,S
      LIDE,SLING,SLIP,SLIPPER,SLIP
      PERY,SLIT,SLOW,SLOWLY,SLY,SM
      ACK,SMALL,SMART,SMELL,SMILE,
      SMOKE
2010  DATA  SMOOTH,SNAIL,SNAKE,SN
      AP,SNAPPING,SNEEZE,SNOW,SNOW
      Y,SNOWBALL,SNOWFLAKE,SNUFF,S
      NUG,SO,SOAK,SOAP,SOB,SOCKS,S
      OD: DATA  SODA,SOFA,SOFT,SOI
      L,SOLD,SOLDIER,SOLE,SOME,SOM
      EBODY,SOMEHOW,SOMEONE,SOMETH
      ING,SOMETIME,SHOETIMES,SOMEW
      HERE
2020  DATA  SON,SONG,SOON,SORE,SO
      RROW,SORRY,SORT,SOUL,SOUND,S
      OUP,SOUR,SOUTH,SOUTHERN,SPAC
      E,SPADE,SPANK,SPARROW,SPEAK:
       DATA  SPEAKER,SPEAR,SPEECH,
      SPEED,SPELL,SPELLING,SPEND,S
      PENT,SPIDER,SPIKE,SPILL,SPIN
      ,SPINACH,SPIRIT,SPIT,SPLASH
2030  DATA  SPOIL,SPOKE,SPOOK,SPO
      ON,SPORT,SPOT,SPREAD,SPRING,
      SPRINGTIME,SPRINKLE,SQUARE,S
      QUASH,SQUEAK,SQUEEZE,SQUIRRE
      L: DATA  STABLE,STACK,STAGE,
      STAIR,STALL,STAND,STAMP,STAR
      ,STARE,START,STARVE,STATE,ST
      ATES,STATION,STAY,STEAK,STEA
      L,STEAM
2040  DATA  STEAMBOAT,STEAMER,STE
      EL,STEEP,STEEPLE,STEER,STEM,
      STEP,STEPPING,STICK,STICKY,S
      TIFF,STILL,STILLNESS,STING,S
      TIR: DATA  STITCH,STOCK,STOC
      KING,STOLE,STONE,STOOD,STOOL
      ,STOOP,STOP,STOPPED,STOPPING
      ,STORE,STORK,STORIES,STORM,S
      TORMY
2050  DATA  STORY,STOVE,STRAIGHT,
      STRANGE,STRANGER,STRAP,STRAW
      ,STRAWBERRY,STREAM,STREET,ST
      RETCH,STRING,STRIP,STRIPES: DATA
       STRONG,STUCK,STUDY,STUFF,ST
      UMP,STUNG,SUBJECT,SUCH,SUCK,
      SUDDEN,SUFFER,SUGAR,SUIT,SUM
      ,SUMMER,SUN,SUNDAY
2060  DATA  SUNFLOWER,SUNG,SUNK,S
      UNLIGHT,SUNNY,SUNRISE,SUNSET
      ,SUNSHINE,SUPPER,SUPPOSE,SUR
      E,SURELY,SURFACE,SURPRISE: DATA
       SWALLOW,SWAM,SWAMP,SWAN,SWA
      T,SWEAR,SWEAT,SWEATER,SWEEP,
      SWEET,SWEETNESS,SWEETHEART,S
      WELL,SWEPT,SWIFT,SWIM
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2070  DATA  SWIMMING,SWING,SWITCH
      ,SWORD,SWORE,TABLE,TABLECLOT
      H,TABLESPOON,TABLET,TACK,TAG
      ,TAIL,TAILOR,TAKE,TAKEN,TAKI
      NG: DATA  TALE,TALK,TALKER,T
      ALL,TAME,TAN,TANK,TAP,TAPE,T
      AR,TARDY,TASK,TASTE,TAUGHT,T
      AX,TEA,TEACH,TEACHER,TEAM,TE
      AR
2080  DATA  TEASE,TEASPOON,TEETH,
      TELEPHONE,TELL,TEMPER,TEN,TE
      NNIS,TENT,TERM,TERRIBLE,TEST
      ,THAN,THANK,THANKS,THANKFUL:
       DATA  THANKSGIVING,THAT,THA
      TS,THE,THEATER,THEE,THEIR,TH
      EM,THEN,THERE,THESE,THEY,THE
      YD,THEYLL,THEYRE,THEYVE,THIC
      K
2090  DATA  THIEF,THIMBLE,THIN,TH
      ING,THINK,THIRD,THIRSTY,THIR
      TEEN,THIRTY,THIS,THO,THORN,T
      HOSE,THOUGH,THOUGHT,THOUSAND
      : DATA  THREAD,THREE,THREW,T
      HROAT,THRONE,THROUGH,THROW,T
      HROWN,THUMB,THUNDER,THURSDAY
      ,THY,TICK,TICKET,TICKLE,TIE,
      TIGER
2100  DATA  TIGHT,TILL,TIME,TIN,T
      INKLE,TINY,TIP,TIPTOE,TIRE,T
      IRED,TIS,TITLE,TO,TOAD,TOADS
      TOOL,TOAST,TOBACCO,TODAY,TOE
      : DATA  TOGETHER,TOILET,TOLD
      ,TOMATO,TOMORROW,TON,TONE,TO
      NGUE,TONIGHT,TOO,TOOK,TOOL,T
      OOT,TOOTH,TOOTHBRUSH,TOOTHPI
      CK
2110  DATA  TOP,TORE,TORN,TOSS,TO
      UCH,TOW,TOWARD,TOWARDS,TOWEL
      ,TOWER,TOWN,TOY,TRACE,TRACK,
      TRADE,TRAIN,TRAMP,TRAP,TRAY:
       DATA  TREASURE,TREAT,TREE,T
      RICK,TRICYCLE,TRIED,TRIM,TRI
      P,TROLLEY,TROUBLE,TRUCK,TRUE
      ,TRULY,TRUNK,TRUST,TRUTH,TRY
      ,TUB
2120  DATA  TUESDAY,TUG,TULIP,TUM
      BLE,TUNE,TUNNEL,TURKEY,TURN,
      TURTLE,TWELVE,TWENTY,TWICE,T
      WIG,TWIN,TWO,UGLY,UMBRELLA: DATA
       UNCLE,UNDER,UNDERSTAND,UNDE
      RWEAR,UNDRESS,UNFAIR,UNFINIS
      HED,UNFOLD,UNFRIENDLY,UNHAPP
      Y,UNHURT,UNIFORM,UNITED
2130  DATA  UNKIND,UNKNOWN,UNLESS
      ,UNPLEASANT,UNTIL,UNWILLING,
      UP,UPON,UPPER,UPSET,UPSIDE,U
      PSTAIRS,UPTOWN,UPWARD,US,USE
      : DATA  USED,USEFUL,VALENTIN
      E,VALLEY,VALUABLE,VALUE,VASE
      ,VEGETABLE,VELVET,VERY,VESSE
      L,VICTORY,VIEW,VILLAGE,VINE
2140  DATA  VIOLET,VISIT,VISITOR,
      VOICE,VOTE,WAG,WAGON,WAIST,W
      AIT,WAKE,WAKEN,WALK,WALL,WAL
      NUT,WANT,WAR,WARM,WARN,WAS: DATA
       WASH,WASHER,WASHTUB,WASNT,W
      ASTE,WATCH,WATCHMAN,WATER,WA
      TERMELON,WATERPROOF,WAVE,WAX
      ,WAY,WAYSIDE,WE,WEAK
2150  DATA  WEAKNESS,WEAKEN,WEALT
      H,WEAPON,WEAR,WEARY,WEATHER,
      WEAVE,WEB,WED,WEDDING,WEDNES
      DAY,WEE,WEED,WEEK,WELL,WEEP:
       DATA  WEIGH,WELCOME,WELL,WE
      NT,WERE,WEST,WESTERN,WET,WEV
      E,WHALE,WHAT,WHATS,WHEAT,WHE
      EL,WHEN,WHENEVER,WHERE,WHICH

2160  DATA  WHILE,WHIP,WHIPPED,WH
      IRL,WHISKY,WHISPER,WHISTLE,W
      HITE,WHO,WHOD,WOLE,WHOLE,WHO
      M,WHOS,WHOSE,WHY,WICKED: DATA
       WIDE,WIFE,WIGGLE,WILD,WILDC
      AT,WILL,WILLING,WILLOW,WIND,
      WINDY,WIN,WINDMILL,WINDOW,WI
      NE,WING,WINK,WINNER
2170  DATA  WINTER,WIPE,WIRE,WISE
      ,WISH,WIT,WITCH,WITH,WITHOUT
      ,WOKE,WOLF,WOMAN,WOMEN,WON,W
      ONDER,WONDERFUL,WONT,WOOD: DATA
       WOODEN,WOODPECKER,WOODS,WOO
      L,WOOLEN,WORD,WORE,WORK,WORK
      ER,WORKMAN,WORLD,WORM,WORN,W
      ORRY,WORSE,WORST,WORTH
2180  DATA  WOULD,WOULDNT,WOUND,
      WOVE,WRAP,WRAPPED,WRECK,WREN
      ,WRING,WRITE,WRITING,WRITTEN
      ,WRONG,WROTE,WRUNG,YARD,YARN
      : DATA  YEAR,YELL,YELLOW,YE
      S,YESTERDAY,YET,YOLK,YONDER,
      YOU,YOUD,YOULL,YOUNG,YOUNGST
      ER,YOUR,YOURS,YOURE,YOURSELF
      ,YOURSELVES
2190  DATA  YOUTH,YOUVE
2200 RP = RQ / S9
2210  IF RP < .1 THEN RX = 1: RETURN

2220  IF RP < .5 THEN RX = 2: RETURN

2230  IF RP < .8 THEN RX = 3: RETURN

2240  IF RP < 1.3 THEN RX = 4: RETURN

2250  IF RP < 1.8 THEN RX = 5: RETURN

2260  IF RP < 2.4 THEN RX = 6: RETURN

2270  IF RP < 3.0 THEN RX = 7: RETURN

2280  IF RP < 4.5 THEN RX = 9: RETURN
```

```
2290  IF RP < 3.7 THEN RX = 8: RETURN
2300  IF RP < 5.3 THEN RX = 10: RETURN
2310  IF RP < 6.2 THEN RX = 11: RETURN
2320  IF RP < 7.2 THEN RX = 12: RETURN
2330  IF RP > 7.2 THEN RX = 13: RETURN
2340 RP = RT / S
2350  IF RP < .1 THEN RX = 1: RETURN
2360  IF RP < .5 THEN RX = 2: RETURN
2370  IF RP < .8 THEN RX = 3: RETURN
2380  IF RP < 1.3 THEN RX = 4: RETURN
2390  IF RP < 1.8 THEN RX = 5: RETURN
2400  IF RP < 2.4 THEN RX = 6: RETURN
2410  IF RP < 3.0 THEN RX = 7: RETURN
2420  IF RP < 4.5 THEN RX = 9: RETURN
2430  IF RP < 3.7 THEN RX = 8: RETURN
2440  IF RP < 5.3 THEN RX = 10: RETURN
2450  IF RP < 6.2 THEN RX = 11: RETURN
2460  IF RP < 7.2 THEN RX = 12: RETURN
2470  IF RP > 7.2 THEN RX = 13: RETURN
```

Fry Graph

This program generates the Fry graph and dumps the graphics and headings to the printer through printer interface card commands.

```
10 D$ =  CHR$ (4): REM  CTRL-D
20  PRINT D$;"OPEN FRY DATA"
30  PRINT D$;"READ FRY DATA"
40  INPUT Q7
50  INPUT Q8
60  PRINT D$;"CLOSE FRY DATA"
70  HGR
80  HCOLOR= 2
90  FOR H1 = 0 TO 256 STEP 8
100  HPLOT H1,0 TO H1,144
110  NEXT H1
120  FOR H2 = 0 TO 144 STEP 6
130  HPLOT 0,H2 TO 256,H2
140  NEXT H2
150  HCOLOR= 3
160  HPLOT 16,30 TO 84,6
170  HPLOT 16,48 TO 88,18
180  HPLOT 24,60 TO 96,30
190  HPLOT 24,72 TO 112,36
200  HPLOT 40,78 TO 112,44
210  HPLOT 56,99 TO 118,52
220  HPLOT 86,118 TO 152,64
230  HPLOT 112,126 TO 170,70
240  HPLOT 144,132 TO 184,82
250  HPLOT 160,144 TO 200,90
260  HPLOT 182,144 TO 216,90
270  HPLOT 208,144 TO 228,96
280 X9 =  INT ((Q7 - 108) * 4.125
     )
290 X8 = 150
300  DATA  3.6,3.7,3.8,4.0,4.2,4.
     3,4.5,4.8,5.0,5.3,5.5,5.8,6.
     3,6.7,7.1,7.5,8.3,9.2
310  DATA  10.0,11.1,12.5,14.3,16
     .7,20.0,25.0
320  DIM Z6(25)
330  FOR Z7 = 1 TO 25
340  READ Z6(Z7)
350  IF Q8 <  = Z6(Z7) THEN 380
360 X8 = X8 - 6
370  NEXT Z7
380  HCOLOR= 3
390 M1 = 1
400  FOR M = 1 TO 9
410  HPLOT X9 - 8,X8 + M1 TO X9,X
     8 + M1
420 M1 = M1 - 1
430  NEXT M
440  PRINT D$;"PR#1"
450  PRINT  CHR$ (9);"G"
460  PRINT D$;"PR#0"
470  INPUT "PRESS ANY KEY TO CONT
     INUE";R1$
480  CLEAR
490 D$ =  CHR$ (4)
500  HOME
510  VTAB (2): HTAB (1): PRINT "1
     "
```

```
520  VTAB (4): HTAB (1): PRINT "2
     "
530  VTAB (5): HTAB (1): PRINT "3
     "
540  VTAB (6): HTAB (2): PRINT "4
     "
550  VTAB (7): HTAB (3): PRINT "5
     "
560  VTAB (8): HTAB (6): PRINT "6
     "
570  VTAB (9): HTAB (11): PRINT "
     7"
580  VTAB (10): HTAB (16): PRINT
     "8"
590  VTAB (11): HTAB (19): PRINT
     "9"
600  VTAB (12): HTAB (22): PRINT
     "10"
610  VTAB (12): HTAB (26): PRINT
     "11"
620  VTAB (12): HTAB (29): PRINT
     "12"
630  VTAB (12): HTAB (33): PRINT
     "COLLEGE"
640  PRINT : PRINT D$;"PR#1"
650  PRINT  CHR$ (9);"S"
660  PRINT D$;"PR#0"
670  TEXT : HOME : CLEAR :D$ =  CHR$
     (4)
680  PRINT : PRINT "*** CHOICES *
     **"
690  PRINT : PRINT "1. INPUT MORE
      TEXT": PRINT "2. READ EXPLA
     NATIONS": PRINT "3. READ PRO
     GRAM REMARKS": PRINT "4. RUN
      HELLO PROGRAM": PRINT "5. S
     EE A COMPOSITE GRAPH": PRINT
     "6. QUIT"
700  PRINT : INPUT "SELECT ONE ==
     > ";EE
710  IF EE = 1 THEN  PRINT D$;"RU
     N STYLE"
720  IF EE = 2 THEN  GOTO 670
730  IF EE = 3 THEN  GOTO 670
740  IF EE = 4 THEN  PRINT D$;"RU
     N HELLO"
750  IF EE = 5 THEN  PRINT D$;"RU
     N COMPOSITE"
760  IF EE = 6 THEN  END
770  GOTO 670
```

Composite

This program generates the composite graph and dumps the graphics and headings to the printer through printer interface card commands

```
10 D$ =  CHR$ (4)
20  PRINT D$;"OPEN COMPOSITE DATA
     "
30  PRINT D$;"READ COMPOSITE DATA
     "
40  INPUT T2
50  INPUT R9
60  INPUT E8
70  INPUT E4
80  INPUT E6
90  INPUT G9
100  INPUT M2
110  INPUT Q7
120  INPUT Q8
130  INPUT M4
140  INPUT RX
150  PRINT D$;"CLOSE COMPOSITE DA
     TA"
160  HGR
170  HCOLOR= 3
180  HPLOT 0,0 TO 264,0
190  HPLOT 264,0 TO 264,150
200  HPLOT 264,150 TO 0,150
210  HPLOT 0,150 TO 0,0
```

```
220  FOR V = 80 TO 250 STEP 14
230  HPLOT V,0 TO V,150
240  NEXT V
250  VTAB (2): HTAB (2)
260  REM  DALE CHALL ROUTINE
270 Y = 8
280  IF T2 < 4.99 THEN X = 80:X1 =
     136: GOSUB 2450: GOTO 350
290  IF T2 < 5.99 THEN X = 136:X1
      = 164: GOSUB 2450: GOTO 350

300  IF T2 < 6.99 THEN X = 164:X1
      = 192: GOSUB 2450: GOTO 350

310  IF T2 < 7.99 THEN X = 192:X1
      = 220: GOSUB 2450: GOTO 350

320  IF T2 < 8.99 THEN X = 220:X1
      = 248: GOSUB 2450: GOTO 350

330  IF T2 < 9.99 THEN X = 248:X1
      = 260: GOSUB 2450: GOTO 350

340  IF T2 > 10 THEN X = 260:X1 =
     270: GOSUB 2450
350  REM  FOG ROUTINE
360 B = R9 - 1
370 A = B * 14 + 80
380 X = A - 7:X1 = A + 7
390 Y = 121
400  GOSUB 2450
410  REM  POWERS ROUTINE
420 B = E4 - 1
430 A = B * 14 + 80
440 X = A - 7:X1 = A + 7
450 Y = 79
460  GOSUB 2450
470  REM  HOLMQUIST ROUTINE
480 B = E6 - 1
490 A = B * 14 + 80
500 X = A - 7:X1 = A + 7
510 Y = 23
520  GOSUB 2450
530  REM  ARI ROUTINE
540 B = G9 - 1
550 A = B * 14 + 80
560 X = A - 7:X1 = A + 7
570 Y = 37
580  GOSUB 2450
590  REM  RIX ROUTINE
600 B = RX
610 A = B * 14 + 80
620 X = A - 7:X1 = A + 7
630 Y = 135
640  GOSUB 2450
650  REM  KINCAID ROUTINE
660 B = M2
670 A = B * 14 + 80
680 X = A - 7:X1 = A + 7
690 Y = 65
700  GOSUB 2450
710  REM  COLEMAN ROUTINE
720 B = M4 - 1
730 A = B * 14 + 80
740 X = A - 7:X1 = A + 7
750 Y = 107
760  GOSUB 2450
770  IF Q7 < 108 THEN Q6 = 1: GOTO
     2330
780  IF Q7 < 110 THEN 1090
790  IF Q7 < 112 THEN 1120
800  IF Q7 < 114 THEN 1150
810  IF Q7 < 116 THEN 1180
820  IF Q7 < 118 THEN 1210
830  IF Q7 < 120 THEN 1240
840  IF Q7 < 122 THEN 1270
850  IF Q7 < 124 THEN 1300
860  IF Q7 < 126 THEN 1330
870  IF Q7 < 128 THEN 1360
880  IF Q7 < 130 THEN 1390
890  IF Q7 < 132 THEN 1420
900  IF Q7 < 134 THEN 1450
910  IF Q7 < 136 THEN 1480
920  IF Q7 < 138 THEN 1510
930  IF Q7 < 140 THEN 1540
940  IF Q7 < 142 THEN 1570
950  IF Q7 < 144 THEN 1600
960  IF Q7 < 146 THEN 1630
970  IF Q7 < 148 THEN 1660
980  IF Q7 < 150 THEN 1690
990  IF Q7 < 152 THEN 1720
1000  IF Q7 < 154 THEN 1750
1010  IF Q7 < 156 THEN 1780
1020  IF Q7 < 158 THEN 1810
1030  IF Q7 < 160 THEN 1840
1040  IF Q7 < 162 THEN 1870
1050  IF Q7 < 164 THEN 1900
1060  IF Q7 < 166 THEN 1930
1070  IF Q7 < 168 THEN 1960
1080  GOTO 1990
1090 O7 = 3.7:O6 = 5:O5 = 5.5:O4 =
     6.3
1100 O3 = 7.5:O2 = 10:O1 = 14.3:O
      = 25
1110  GOTO 2060
1120 O7 = 3.8:O6 = 6.1:O5 = 5.8:O
     4 = 6.7
1130 O3 = 7.5:O2 = 10:O1 = 14.3:O
      = 25
1140  GOTO 2060
1150 O7 = 4:O6 = 5.3:O5 = 5.8:O4 =
     6.7
1160 O3 = 8.3:O2 = 11.1:O1 = 16.7
     :O = 25
1170  GOTO 2060
1180 O7 = 4:O6 = 5.5:O5 = 6.3:O4 =
     6.7
1190 O3 = 8.3:O2 = 11.1:O1 = 16.7
     :O = 25
1200  GOTO 2060
```

```
1210 O7 = 4.2:O6 = 5.5:O5 = 6.3:O
     4 = 7.1
1220 O3 = 9.2:O2 = 12.5:O1 = 20:O
      = 25
1230  GOTO 2060
1240 O8 = 3.6:O7 = 4.3:O6 = 5.8:O
     5 = 6.7
1250 O4 = 7.5:O3 = 10:O2 = 12.5:O
     1 = 20:O = 25
1260  GOTO 2050
1270 O8 = 3.6:O7 = 4.5:O6 = 5.8:O
     5 = 6.7:O4 = 7.5
1280 O3 = 10:O2 = 14.3:O1 = 20:O =
     25
1290  GOTO 2050
1300 O8 = 3.7:O7 = 4.8:O6 = 6.3:O
     5 = 7.1:O4 = 8.3
1310 O3 = 11.1:O2 = 14.3:O1 = 20:
     O = 25
1320  GOTO 2050
1330 O8 = 3.8:O7 = 5:O6 = 6.7:O5 =
     7.1:O4 = 8.3
1340 O3 = 11.1:O2 = 14.3:O1 = 20:
     O = 25
1350  GOTO 2050
1360 O8 = 3.8:O7 = 5.3:O6 = 6.7:O
     5 = 7.5:O4 = 8.3
1370 O3 = 12.5:O2 = 16.7:O1 = 20:
     O = 25
1380  GOTO 2050
1390 O8 = 4:O7 = 5.5:O6 = 7.1:O5 =
     8.3:O4 = 9.2
1400 O3 = 12.5:O2 = 16.7:O1 = 20:
     O = 25
1410  GOTO 2050
1420 O8 = 4.3:O7 = 5.8:O6 = 7.5:O
     5 = 8.3:O4 = 10
1430 O3 = 14.3:O2 = 20:O1 = 25
1440  GOTO 2050
1450 O9 = 3.7:O8 = 4.5:O7 = 6.3:O
     6 = 7.5
1460 O5 = 9.2:O4 = 11.1:O3 = 14.3
     :O2 = 20
1470  GOTO 2040
1480 O9 = 3.8:O8 = 4.8:O7 = 6.7:O
     6 = 7.5
1490 O5 = 9.2:O4 = 12.5:O3 = 14.3
     :O2 = 20
1500  GOTO 2040
1510 O9 = 4:O8 = 5:O7 = 7.1:O6 =
     8.3
1520 O5 = 10:O4 = 12.5:O3 = 16.7:
     O2 = 20
1530  GOTO 2040
1540 O9 = 4.2:O8 = 5.3:O7 = 7.5:O
     6 = 9.2
1550 O5 = 10:O4 = 12.5:O3 = 20
1560  GOTO 2040
1570 O9 = 4.3:O8 = 5.5:O7 = 8.3:O
     6 = 10
1580 O5 = 11.1:O4 = 14.3:O3 = 20
1590  GOTO 2040
1600 O9 = 4.8:O8 = 5.8:O7 = 9.2:O
     6 = 10
1610 O5 = 11.1:O4 = 14.3:O3 = 20
1620  GOTO 2040
1630 P = 3.8:O9 = 5:O8 = 6.3:O7 =
     10
1640 O6 = 11.1:O5 = 14.3:O4 = 16.
     7:O3 = 20
1650  GOTO 2030
1660 P = 4:O9 = 5.3:O8 = 6.7:O7 =
     11.1
1670 O6 = 12:O5 = 12:O4 = 20
1680  GOTO 2030
1690 P = 4.3:O9 = 5.5:O8 = 7.1:O7
      = 12.5
1700 O6 = 13.4:O5 = 14.3:O4 = 20
1710  GOTO 2030
1720 P1 = 3.8:P = 4.8:O9 = 6.3:O8
      = 7.5
1730 O7 = 12.5:O6 = 14.3:O5 = 16.
     7:O4 = 20
1740  GOTO 2020
1750 P1 = 4.2:P = 5.3:O9 = 16.7:O
     8 = 8.5
1760 O7 = 14.3:O6 = 15:O5 = 16.7:
     O4 = 20
1770  GOTO 2020
1780 P1 = 4.5:P = 5.5:O9 = 7.1:O8
      = 8.3
1790 O7 = 14.3:O6 = 16.7:O5 = 20
1800  GOTO 2020
1810 P2 = 4:P1 = 5:P = 6.3:O9 = 9
     .2
1820 O8 = 10:O7 = 16.7:O6 = 20
1830  GOTO 2010
1840 P2 = 4.3:P1 = 5.3:P = 7.1:O9
      = 9.2
1850 O8 = 10:O7 = 20
1860  GOTO 2010
1870 P2 = 4.8:P1 = 5.8:P = 7.5:O9
      = 10
1880 O8 = 12.5:O7 = 20
1890  GOTO 2010
1900 P3 = 4:P2 = 5.3:P1 = 6.7:P =
     9.2
1910 O9 = 11.1:O8 = 12.5:O7 = 20
1920  GOTO 2000
1930 P3 = 4.5:P2 = 5.8:P1 = 7.5:P
      = 11.1
1940 O9 = 12.5:O8 = 14.3:O7 = 20
1950  GOTO 2000
1960 P3 = 5.3:P2 = 6.7:P1 = 9.2:P
      = 14.3
1970 O9 = 16.7:O8 = 20
1980  GOTO 2000
1990 P3 = 6.3:P2 = 8.3:P1 = 12.5:
     P = 25
2000  IF Q8 <  = P3 THEN 2140
```

```
2010  IF Q8 <  = P2 THEN 2150
2020  IF Q8 <  = P1 THEN 2160
2030  IF Q8 <  = P THEN 2170
2040  IF Q8 <  = O9 THEN 2180
2050  IF Q8 <  = O8 THEN 2190
2060  IF Q8 <  = O7 THEN 2200
2070  IF Q8 <  = O6 THEN 2210
2080  IF Q8 <  = O5 THEN 2220
2090  IF Q8 <  = O4 THEN 2230
2100  IF Q8 <  = O3 THEN 2240
2110  IF Q8 <  = O2 THEN 2250
2120  IF Q8 <  = O1 THEN 2260
2130  IF Q8 <  = O THEN Q6 = 1: GOTO
     2330
2140 Q6 = 13: GOTO 2270
2150 Q6 = 12: GOTO 2270
2160 Q6 = 11: GOTO 2270
2170 Q6 = 10: GOTO 2270
2180 Q6 = 9: GOTO 2270
2190 Q6 = 8: GOTO 2270
2200 Q6 = 7: GOTO 2270
2210 Q6 = 6: GOTO 2270
2220 Q6 = 5: GOTO 2270
2230 Q6 = 4: GOTO 2270
2240 Q6 = 3: GOTO 2270
2250 Q6 = 2: GOTO 2270
2260 Q6 = 1: GOTO 2270
2270  REM  FRY ROUTINE
2280 B = Q6
2290 A = B * 14 + 80
2300 X = A - 7:X1 = A + 7
2310 Y = 93
2320  GOSUB 2450
2330  REM  FLESCH ROUTINE
2340 Y = 51
2350  IF E8 > 100 THEN X = 80:X1 =
     122: GOSUB 2450: GOTO 2430
2360  IF E8 > 90 THEN X = 122:X1 =
     136: GOSUB 2450: GOTO 2430
2370  IF E8 > 80 THEN X = 136:X1 =
     150: GOSUB 2450: GOTO 2430
2380  IF E8 > 70 THEN X = 150:X1 =
     164: GOSUB 2450: GOTO 2430
2390  IF E8 > 60 THEN X = 164:X1 =
     192: GOSUB 2450: GOTO 2430
2400  IF E8 > 50 THEN X = 192:X1 =
     220: GOSUB 2450: GOTO 2430
2410  IF E8 > 30 THEN X = 248:X1 =
     260: GOSUB 2450: GOTO 2430
2420  IF E8 < 30 THEN X = 248:X1 =
     260: GOSUB 2450
2430  GOSUB 2520: END
2440 X = 270:X1 = 279
2450  IF X > 280 THEN 2440
2460  IF X1 > 280 THEN 2440
2470  FOR Y2 = 1 TO 6
2480  HPLOT X,Y TO X1,Y
2490 Y = Y + 1
2500  NEXT Y2
2510  RETURN
2520  REM  TEXT OUTPUT FOR PRINTE
     D GRAPH
2530  PRINT D$;"PR#1"
2540  PRINT  CHR$ (9);"G"
2550  PRINT D$;"PR#0"
2560  INPUT R1$
2570  CLEAR
2580 D$ =  CHR$ (4)
2590  HOME
2600  VTAB (1): HTAB (1)
2610  PRINT "DALE-CHALL"
2620  VTAB (2): HTAB (1)
2630  PRINT "HOLMQUIST"
2640  VTAB (3): HTAB (1)
2650  PRINT "ARI"
2660  VTAB (4): HTAB (1)
2670  PRINT "FLESCH"
2680  VTAB (5): HTAB (1)
2690  PRINT "KINCAID"
2700  VTAB (6): HTAB (1)
2710  PRINT "POWERS"
2720  VTAB (7): HTAB (1)
2730  PRINT "FRY"
2740  VTAB (8): HTAB (1)
2750  PRINT "COLEMAN"
2760  VTAB (9): HTAB (1)
2770  PRINT "FOG"
2780  VTAB (10): HTAB (1)
2790  PRINT "RIX"
2800  VTAB (11): HTAB (12)
2810  PRINT " 1 2 3 4 5 6 7 8 9 1
     1 1 C"
2820  VTAB (11): HTAB (1)
2830  PRINT "GRADE:"
2840  VTAB (12): HTAB (12)
2850  PRINT "                    0
     1 2"
2860  PRINT D$;"PR#1"
2870  PRINT  CHR$ (9);"S"
2880  PRINT D$;"PR#0"
2890  TEXT : HOME : CLEAR :D$ =  CHR$
     (4)
```

APPENDIX B

READABILITY FORMULAS

The formulas used in the programs to calculate readability values are:

Fog = .4 * (T/W * 100 + W/S)

where:

T = Number of 3-syllable words in the passage

W = Words in the passage

S = Sentences in passage

Flesch = 206.835 - .846 * Sy - 1.015 * (W/S)

where:

Sy = Number of syllables per 100 words

W = Words in the passage

S = Sentences in passage

The Flesch score generated is a number with 1 being the worst readability value and 100 being the best. The Flesch grade level is computed by comparing the calculation value to a table. See lines 600 - 670 in the style program listing.

Powers = -2.2029 + .0778 * (W/S) + .0455

where:

W = Number of words

S = Number of sentences

Holmquist = (W/S) * .0512 + .1142 * G + 3.442

where:

G = Words not found on the Dale-Chall word list

W = Words in the passage

S = Sentences in passage

ARI = 1.56 * Wl + .19 * Sl - 6.49

where:

Wl = Word length

Sl = Sentence length in words

Flesch-Kincaid = .39 * (W/S) + 11.8 * (Sy/W) - 15.59

where:

Sy = Number of syllables in the passage

W = Words in the passage

S = Sentences in passage

Coleman = -27.4004 * Cloze% + 23.06395

Cloze% = (141.8401 - .21459 * (Lt/W * 100) +
1.079812 * (S/(W/100)))/100

Where:

Lt = Number of letters in the passage

W = Words in the passage

S = Sentences in passage

Dale-Chall = .1579 * (G/W * 100) + .0496 * (W/S) + 3.63965

where:

G = Words not found on the Dale-Chall word list

W = Words in the passage

S = Sentences in passage

Rix = Lw/S

where:

Lw = Number of words with 7 or more letters

S = Number of sentences in the passage

APPENDIX C

READABILITY TEXT SAMPLES

The following four samples from the Edystone were used to generate the readability scores used in this thesis:

Sample 1 - From the Note to the King

FROM THE AMBITION NATURAL TO MAN ALL AUTHORS ARE DESIROUS
THAT THEIR WORKS SHOULD BE PLACED IN THE MOST FAVOURABLE
POINT OF VIEW .THIS MOTIVE ALONE WOULD HAVE URGED ME TO
SOLICIT PERMISSION TO LAY MINE AT THE FEET OF MY SOVEREIGN A
SOVEREIGN WHOSE REIGN HAS BEEN MARKED BY THE MOST RAPID AND
DISTINGUISHED PROGRESS IN THE ARTS IN COMMERCE AND IN THE MOST
SUBLIME AS WELL AS THE MOST USEFUL DISCOVERIES ALTOGETHER ARISING
FROM YOUR MAJESTYS IMMEDIATE PROTECTION AND ENCOURAGEMENT .
TO BE ALLOWED TO APPROACH YOUR MAJESTY AND MIX MY
TRIBUTE WITH OTHERS OF SO MUCH HIGHER IMPORTANCE IS A MOST
FLATTERING DISTINCTION .IT IS FURTHER MY PARTICULAR FELICITY THAT
THE TRIBUTE I OFFER IS OF SUCH A NATURE AS TO ACCORD WITH THE
SCOPE OF YOUR MAJESTYS PRIVATE STUDIES .
THE VERY CLOSE MANNER IN WHICH THE MODEL OF THE /EDYSTONE
LIGHTHOUSE WAS EXAMINED BY YOUR MAJESTY SOON AFTER THE
BUILDING ITSELF WAS COMPLETED HAS LEFT THE MOST LASTING IMPRESSION
UPON MY MIND OF THE CRITICAL KNOWLEDGE WHICH YOUR
MAJESTY HAS ACQUIRED IN THE ART OF BUILDING AND THE EARNEST
ATTENTION YOUR MAJESTY WAS THEN PLEASED TO BESTOW UPON THE
SUBJECT HAS EMBOLDENED ME AT THIS DISTANT PERIOD TO PRESENT IT
ONCE MORE TO YOUR CONSIDERATION .
IT CERTAINLY REQUIRES AN APOLOGY THAT I HAVE NOT MORE EARLY
ACQUITTED MYSELF OF A WORK THAT THEN SEEMED TO ENGAGE YOUR
MAJESTYS CURIOSITY THE DELAY HOWEVER AS IT HAS GIVEN ME
TIME TO MATURE MY THOUGHTS AND HAS AFFORDED PROOF OF THE

Sample 2 - From the Preface

I AM THEREFORE RATHER SURPRISED THAT THE LEARNED HAVE NOT MUCH ATTENDED TO THIS MATTER .AS I SPEAK AND EVEN WRITE A PROVINCIAL LANGUAGE AND AS I HAVE ALREADY MENTIONED WAS NOT BRED TO LETTERS I AM GREATLY OBLIGED TO MY FRIENDS IN THE COUNTRY FOR PERUSING AND ABUNDANTLY CORRECTING MY MANUSCRIPT AND LAST OF ALL TO MY FRIEND DOCTOR /BLAGDEN WHO HAS BEEN SO OBLIGING AS TO OVERLOOK THE GREATEST PART AS IN JUSTICE TO HIM I MUST OBSERVE I WAS OBLIGED TO SEND SEVERAL SHEETS TO THE PRESS WITHOUT HIS SEEING THEM .WHENEVER THEREFORE A MORE THAN ORDINARY DEFICIENCY OCCURS IN POINT OF DICTION MY READER MAY CONCLUDE THAT SHEET NEVER WENT TO DOCTOR /BLAGDEN .IF I AM ASKED WHY BEING SO SLENDERLY EQUIPPED AS A WRITER I SET ABOUT IT AT ALL AND DID NOT WHOLLY COMMIT IT TO SOME OTHER PERSON . MY ANSWER IS THAT I CONSIDER THIS AS OF THE NATURE OF COMMENTARY AND THAT IN AN EXECUTIVE MATTER OF ART THE ARTIST MUST WRITE FOR HIMSELF AS HE ONLY CAN FEEL THE FORCE OF HIS SUBJECT SO AS TO GIVE IT ENERGY .I DO NOT APPREHEND IT TO BE THE NATURE OF COMMENTARY THAT THE STYLE SHOULD BE POLISHED ONLY THAT IT SHOULD EXPLAIN THE SUBJECT IN THE MOST EASY AND FAMILIAR MANNER .IF I HAVE FAILED IN THIS LAST RESPECT I HAVE FALLEN SHORT OF MY HOPES AND WISHES .IT IS POSSIBLE SOME DISCORDANCIES MAY BE MET WITH ON A STRICT PERUSAL NOTWITHSTANDING THE CARE AND PAINS I HAVE BESTOWED .AS IT IS I COMMIT IT TO ITS FATE HAVING NO PRESAGE IT WILL BE USED WORSE THAN IT DESERVES .

Sample 3 - From the Experiments with Water Cements

BEFORE I PROCEED ANY FURTHER IT WILL BE NECESSARY TO EXPLAIN THE MODE IN WHICH I COMPOUNDED AND MADE UP MORTAR FOR TRIALS .I TOOK AS MUCH OF THE INGREDIENTS AS ALL TOGETHER WOULD ULTIMATELY FORM A BALL OF ABOUT TWO INCHES DIAMETER .THIS BALL LYING UPON A PLATE TIL IT WAS SET AND WOULD NOT YIELD TO THE PRESSURE OF FINGERS WAS THEN PUT INTO A FLAT POT FILLED WITH WATER SO AS TO BE COVERED BY THE WATER AND WHAT HAPPENED TO THE BALL IN THIS STATE WAS THE CRITERION BY WHICH I JUDGED OF THE VALIDITY OF THE COMPOSITION FOR OUR PURPOSES .THE MEASURE I USED WAS A COMMON SMALL CLIP BOX TAKING AS MANY MEASURES FROM EACH INGREDIENT AS I MEANT TO TRY .I CONSTANTLY PUT DOWN THE LIME UPON THE FLAT BOTTOM OF A COMMON PEWTER PLATE WITH A BROAD POINTED KNIFE TILL IT WAS BECOME A TOUGH BUT A PRETTY PASTE .I AFTERWARDS ADDED THE QUANTITY I INTENDED OF TARRAS OR OTHER GROSS MATTER GRADUALLY WORKING IT AFTER EACH ADDITION TILL IT WAS BECOME TOUGH AND IN THIS WAY ADDING THE GROSS MATTER AT THREE OR FOUR DIFFERENT TIMES I WAS GENERALLY ENABLED TO GET IN THE WHOLE QUANTITY WITHOUT ANY ADDITION OF WATER MORE THAN HAD BEEN NECESSARY TO BRING THE LIME ONLY AT FIRST TO A PROPER CONSISTENCE .THE WHOLE WAS THUS WORKED TILL IT ACQUIRED A TOUGH AND STIFF DUCTILITY BUT IF IT HAPPENED BY THE ADDITION OF TOO MUCH WATER TO BECOME TOO SOFT I LET IT STAND TILL IT BEGAN TO SET WHICH MIGHT BE QUICKENED BY PUTTING IT A FEW MINUTES UPON A DRY STONE OR BRICK AND WHEN IT WAS A LITTLE HARDENED BY PARTIALLY SETTING I WORKED IT TILL IT WAS BROUGHT TO A STIFF PASTE THE WHOLE OF WHICH OPERATION TOOK UP GENERALLY ABOVE A QUARTER AND SOMETIMES NEAR HALF AN HOUR TO MAKE A SINGLE BALL .IN MAKING UP BALLS OF MORTAR THIS WAY HOWEVER WELL THEY WERE WORKED IF MADE UP OF NO OTHER INGREDIENTS

Sample 4 - From the Anecdote about Dr. Spry

WE WILL NOW RETURN TO THE POOR UNFORTUNATE MAN WHO RECEIVED SO PECULIAR AN INJUR
Y
BY THE MELTED LEAD .HIS NAME WAS /HENRY /HALL OF /STONEHOUSE NEAR /PLYMOUTH
AND THOUGH AGED 94 YEARS BEING IN GOOD CONSTITUTION HE WAS REMARKABLY ACTIVE
CONSIDERING HIS TIME OF LIFE HE HAD INVARIABLY TOLD THE SURGEON WHO ATTENDED HIM
/MR /SPRY NOW /DR /SPRY OF /PLYMOUTH WHO CONSTANTLY ADMINISTERED THE PROPER
REMEDIES TO SUCH BURNS AND HURTS AS COULD BE PERCEIVED THAT IF HE WOULD DO ANY
THING EFFECTUAL TO HIS RECOVERY HE MUST RELEIVE HIS STOMACH FROM THE LEAD WHICH
HE WAS SURE WAS WITHIN HIM AND THIS HE NOT ONLY TOLD /DR /SPRY BUT THOSE ABOUT
HIM THOUGH IN A HOARSE VOICE AND HE ALSO SAID THE SAME THING TO /MR /JESSOP
WHO WENT TO SEE HIM SEVERAL TIMES DURING HIS ILLNESS AND WHO GAVE ME THIS
INFORMATION .THE REALITY OF THE ASSERTION SEEMED HOWEVER THEN INCREDIBLE TO
/DR /SPRY WHO COULD SCARCELY SUPPOSE IT POSSIBLE THAT ANY HUMAN BEING COULD EXIS
T
AFTER RECEIVING MELTED LEAD INTO THE STOMACH MUCH LESS THAT HE SHOULD AFTERWARDS
BE ABLE TO BEAR TOWING THROUGH THE SEA FROM THE ROCK AND ALSO THE FATIGUE AND
INCONVENIENCE FROM THE LENGTH OF TIME HE WAS IN GETTING ON SHORE BEFORE ANY
REMEDIES COULD BE APPLIED .THE MAN DID NOT SHOW ANY SYMPTOMS HOWEVER OF BEING
EITHER MUCH WORSE OR OF AMENDMENT TILL THE SIXTH DAY AFTER THE ACCIDENT WHEN
HE WAS THOUGHT TO BE BETTER HE CONSTANTLY TOOK HIS MEDICINES AND SWALLOWED
MANY THINGS BOTH LIQUID AND SOLID TILL THE TENTH OR ELEVENTH DAY AFTER WHICH
HE SUDDENLY GREW WORSE AND THE TWELFTH DAY BEING SEIZED WITH COLD SWEATS AND
SPASMS HE SOON AFTERWARDS EXPIRED .
/MR /JESSOP WAS DESIRED BY /DR /SPRY TO ATTEND THE OPENING OF THE BODY BUT
BEING AVERSE TO SIGHTS OF THAT KIND HE EXCUSED HIMSELF FROM SEEING THE
OPERATION AS DID ALSO THE DAUGHTER OF THE DECEASED AND ANOTHER WOMAN OF THE HOUS
E
ON OPENING THE STOMACH /DR /SPRY FOUND THEREIN A SOLID PIECE OF LEAD OF A FLAT

VITA[2]

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