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# THE STRUCTURE OF REVELATION

by *The Rev. Dr. GEORGE K. BARR*

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This article uses scalometric techniques to provide an alternative to A.q.Morton's Cusum analysis of *Revelation*. The identification of internal scale changes must form an essential part of stylometric analysis, especially in the case of visionary material.

A.Q. Morton's stunning article on Revelation (*IBS* 19, 81-91) must shake us into reconsidering the structure of the work. His fitting together into codex form of the various sources which he has detected by Cusum analysis is little short of miraculous. It depends, of course, upon the validity of the Cusum method which he says "has been widely used and repeatedly validated". He does not provide any evidence in terms of Cusum data, and one must assume that Morton has followed the procedures described in Jill Farrington's book<sup>1</sup> to which he refers.

## The Cusum Method

The method described therein involves the comparison between graphical traces based on variations in sentence length and similar traces based on the rate of occurrence of selected features. The most common feature used in the book is a combination of the occurrences of two- and three-letter words plus other words beginning with a vowel. Experiment shows that in Revelation these components taken separately behave erratically. In fact, both are scale-sensitive. Two- and three-letter words in Revelation are slightly high-scale sensitive as they tend to occur more often in longer sentences; initial vowel words are slightly low-scale sensitive as they tend to occur more often in shorter sentences. In combination, these tendencies substantially cancel each other out and the combination behaves more consistently than the components do separately. This combination (2/3lw+ivw) has therefore been used in tests described below.

## Implications for Revelation

To accept Morton's page plan for Revelation involves the acceptance of his alleged combination of sources, and there is a heavy price to pay in

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<sup>1</sup> Jill M. Farrington, *Analysing for Authorship*. Cardiff: University of Wales Press, 1996. I have criticised the Cusum method in my review of this book in the article entitled *The Cusum Mechanism* published in the journal *Expert Evidence*, Volume 5(4). G.K.B.

George K.Barr, *The Structure of Revelation*, *IBS* 19, July 1997  
terms of credibility which is seen when one considers the points at which sections are joined. The plan requires acceptance of the following:

1. The Letters to the Seven Churches, which have a most unusual epistolary form, do not all come from the same source. The seven churches are specified at length in 1:11-20 but it is claimed that only five of the letters come from this source; the other two are said to come from a different source.

2. The plagues of the seven seals do not all come from the same source. Six come from one source (the one which introduces the seven plagues) but the seventh plague comes from a different source.

3. Of the seven angels mentioned in 8:6, four come from one source and the remainder from another.

4. Half of the proclamation of the power of God and of Christ in 12:10-12 comes from one source and half from another.

5. The taunt song of Chapter 18 is divided into three parts, allegedly from different sources, even though the first division at v.10/11 occurs in the middle of a series (kings/ merchants/ shipmasters who are all dependent on the wealth of Babylon). The second division at v. 21/22 occurs in the middle of a series of rhythmic verses with a recurring motif.

6. Chapters 21-22 on the New Heaven and the New Earth are divided into five sections. The introduction 21:1-8 is divided between two sources. The specification of the Holy City 21:9-21 is divided between two sources. After 22:21 there is another change of source.

### **Testing the Cusum Method in Revelation**

To determine whether Cusum analysis really does justify these unlikely divisions I prepared Cusum graphs of the texts straddling each of the junctions of these sections. Trials were made using Morton's "modified full stop sentences" which divide the text at every full stop, colon and interrogation mark, and where appropriate I checked the effect of using full stop sentences. Graphs were prepared using both Morton's method of scaling graphs according to the range of cumulative sum values and alternatively using the percentage occurrence of the features. As indicated above the combination of two- and three-letter words and initial vowel words was used.

At none of the junctions was there any clear sign of differences between sections, though frequently anomalies were noted within sections. Samples of 500 words were taken from the two main alleged sources to determine whether there was a significant difference in the rates of occurrence of these features. The results are as follows:

SOURCE	TEXT	%AGE 2/3LW+IVW
1	1:7-2:9a	70.6%
1	11:11b-12:10	70.8%
2	12:11-13:14a	71.4%
2	21:22-22:19a	69%

It will be seen that the rates of occurrence in Source 2 straddle those found in the samples from Source 1. Variations in these rates of occurrence can not therefore be used to distinguish between the two alleged sources if indeed the difference between sources is a matter of each source having a different habit in the use of these features.

In view of these findings it is necessary to question again the validity of the Cusum method. Not everyone accepts this method which is explained in Jill Farrington's book *Analysing for Authorship*. It does, I believe, sometimes produce the right answer; it may also produce very wrong answers.

### **Two Important Decisions**

Cumulative sum graphs are a valuable tool with many useful and proved applications in the fields of commerce and science. When they are used in the examination of the structure of literature two important decisions must be made.

The first concerns the definition of a sentence. Morton uses "modified full stop sentences" (MFSSs) in which the text is divided at every colon, full stop and interrogation mark. This appeals to statisticians as by dividing the text up into short sections it behaves in a rather more statistically normal fashion. Sentence lengths, however, have never been statistically normal in their distribution which is always skewed. The fragments of text created in this way have no consistent syntactical rationale. Some are whole sentences; some are clauses or phrases; others may not even have a verb. The penalty to be paid is the loss of important scale-related features which are characteristic of individual authors. Using MFSSs destroys important evidence. The alternative is to use full stop sentences (FSSs). Of course, the original Greek texts were not punctuated and we have to rely on punctuation provided by modern editors. Comparison of several editions of the Greek New Testament shows that there is, in fact, a large measure of agreement regarding the main stops. Full stop sentences are complete syntactically. Occasionally a choice has to be made between a full stop and a colon, but attention to the scale of the context usually enables a rational decision to be made. This preserves the

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scale-related textual patterns which must be considered in questions of authorship.

The second decision concerns the method of scaling graphs when the occurrence of particular features is compared with the underlying sentence pattern (which forms the basis of Morton's Cusum method). The logical way of doing this is to use the percentage occurrence of the selected feature. That is, if variations in the occurrence of initial vowel words are being compared with variations in sentence length, and initial vowel words comprise 30% of the text, then the scale representing variations in the occurrence of initial vowel words should be 30% of the scale representing variations in sentence length (in terms of words per inch). This places them in a meaningful relationship.

Morton adopts another approach. He scales the two traces so that the highest and lowest points of each trace are the same distance apart in the combination graph. This forces the two traces into a rough correspondence and Cusum analysis is based on the portions where the traces do not match but create "anomalies". In almost every case this results in a **mismatch of scales**. By manipulating scales it is possible to make traces coincide at any chosen point. Separation between traces occurs when sources with different characteristics are mixed; the different characteristics may be due to multiple authorship or may be due to internal differences of genre or scale within the work of one author - the Cusum method can not distinguish between these. Mismatching the scales results in these separations becoming distorted. The anomalies may appear in the wrong place or may be partly eliminated leaving only a fortuitous portion of the separation. On such irrational, fortuitous portions the Cusum practitioner may base his interpretation.

The combination of MFSSs and scaling according to the Cusum ranges can result in very misleading distortions. Fig. 1 shows graphs of Rev. 21:5-22:5 in which the occurrences of two- and three-letter words plus initial vowel words are compared with the sentence pattern. These features comprise 65.48% of the text and this figure is used to determine the appropriate scale in the two graphs on the left hand side. It is seen that the displacement in the top graph in which full stop sentences were used is very similar to that in the lower left graph in which MFSSs were used. These traces truly reflect variations in the occurrences of these features in that text.

The two graphs on the right are scaled according to the ranges of Cusum values (following Morton). These values are 53.13% when full stop sentences are used and no less than 81.77% when MFSSs are used. It is irrational to use these figures to determine scales. The lower right hand

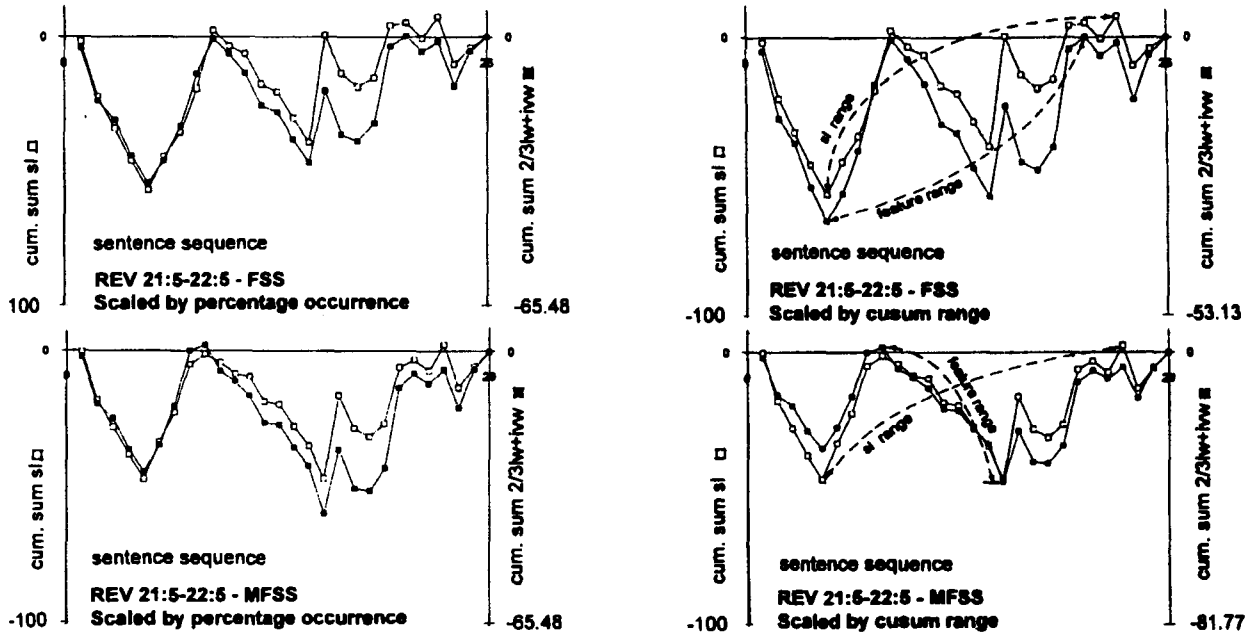


Fig. 1 The two graphs on the left are scaled by percentage occurrence of the feature. Anomalies appear in the same areas when either FSSs or MFSSs are used in sentence definition.

The two graphs on the right are scaled according to the ranges of cusum values. Anomalies appear in different areas depending on which sentence definition is used. The two colons in this chapter treated as full stops are enough to make the difference shown in these graphs. The correspondence in the middle section in the lower right hand graph is fortuitous and meaningless as the scales are mismatched. This is the system used by Morton.

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graph shows the distortion produced by a combination of MFSSs and scaling by Cusum range. The apparent correspondence of the two traces in the middle part of the graph is fortuitous and meaningless and results from the mismatching of scales. This is the combination most frequently used by Morton.

The apparent correspondence is illusory and many examples of similar illusions are to be found in Jill Farrington's book *Analysing for Authorship* - for example on pages 68 and 182. This is not to say that Cusum analysis always gives the wrong answer. Sometimes when a mixed text comprises work by two authors who do have different characteristics in the use of these test features, the differences do show up and Cusum method may give the right answer. But where different authors overlap in their characteristics, Cusum can not distinguish between them.

What mostly reduces my confidence in the method is the fact that by simply selecting passages with similar characteristics, texts by different authors may be seamlessly joined to provide Cusum graphs which appear to indicate perfect homogeneity. In this way it can be "proved" that the author of Philemon was the late Prof. J.S. Stewart. I repeat - scaling by means of Cusum ranges mismatches the scales and combined with the use of MFSSs results in fortuitous and meaningless separations. On these Cusum method is founded.

### **The Structure of Revelation**

What then may be said of the structure of Revelation?

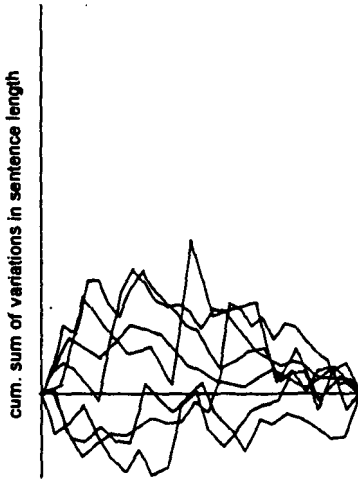
In the first place, I would make a strong plea for the integrity of the Letters to the Seven Churches. These have an unusual epistolary form. They take their form firstly from the long initial sentence which begins 'To the angel of the church in...'. The second sentence also has a standard beginning, 'I know your works/tribulation/where you dwell...'. The conclusion also has a standard form, though in some letters the last two verses come in reverse order. One sentence begins, 'To him who conquers...' or 'He who conquers...': the other begins, 'He who has an ear...'. Between these standard formulae at the beginning and at the end, a special message for each church is enclosed. It is probably a form devised by one author for a particular purpose and not an epistolary form in general use. Graphs of these seven letters show a certain amount of order. It was suggested to me some years ago by a member of staff at Edinburgh University that a similar kind of order might be found in items by newspaper leader writers. I bought seven newspapers one day and found that this was not so. Fig. 2 shows the patterns of seven articles by leader writers all written on the same day. These have been scaled to a common

base in order to compare the shapes. There is no detectable common pattern. Fig. 3 shows the seven letters from Revelation, also drawn on a common base; clearly there is a much greater sense of order in these.

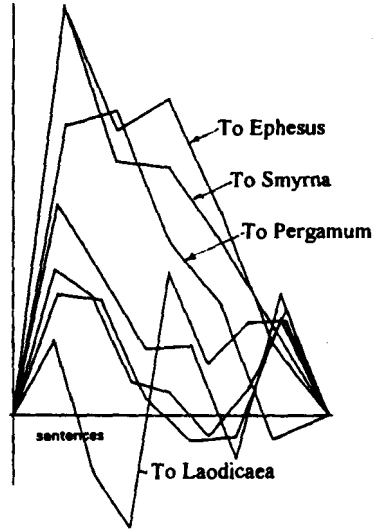
When the graphs are scaled to a common base, scaling differences are eliminated and the letters to Ephesus, Pergamum and Smyrna are seen to be similar in form. A second sub-group includes the letters to Philadelphia, Thyatira and Sardis which according to Morton come from two different sources. These are shown separately in Fig. 4. The letter to Laodicea is rather different, but still shares some of the common features. One can not "prove" authorship from the shapes of graphs, but having examined graphs of over half a million words of works in Greek, Latin and modern English over a period of thirty years, it seems unlikely to me that the letters to Thyatira and Sardis come from a different source from that of the letter to Philadelphia as Morton suggests. It is, of course, possible that someone found five letters and imitated their peculiar epistolary form in adding the two missing letters. However, it is not as easy as might be expected to produce a common graphical pattern in this way.

Secondly, it should be appreciated that Revelation is visionary material and does not lend itself to analysis in terms of main- and sub-sections and intermezzos, though some scholars have tried to force the text into such a structure (e.g. F. Palmer in *The Drama of the Apocalypse*, 1905). Revelation may rather be compared to the sermons of James S. Stewart which often could not be divided into a number of "points". The structure which gave his sermons form and power was based on an irregular rhythm in which small scale sections alternated with large scale sections. Stewart's method of preaching was to take a human situation and examine it in short, terse sentences, at a very domestic scale level. Then he would take that human situation and set it in the light of God's holiness. At that point the structure of his text changed dramatically, and he used the most extraordinarily long sentences. This irregular rhythm of low-scale and high-scale sections persists throughout his preaching. The low-scale sections have low average sentence length; the high-scale sections have great numinous content and a high average sentence length. Fig. 5 shows the graph of his sermon "O Man, Greatly Beloved" from *The Gates of New Life* (Hodder and Stoughton, 1938). The monumental, numinous passages appear as great slashes in the graph. The average sentence length of these passages is 90 words, compared with about 15 words for the remainder of the text. This phenomenon also appears in the writings of John Ruskin and Thomas Carlyle, where very long sentences are associated with numinous content.



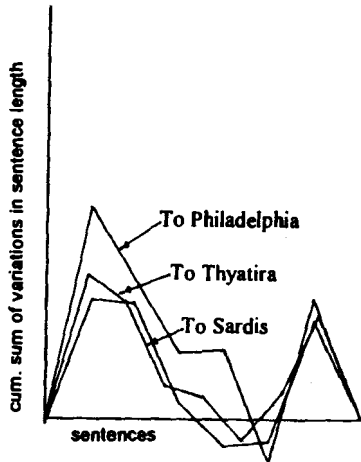


**Fig. 2** Cumulative sum graphs of leading articles from seven newspapers appearing on 28th January, 1994. These do not show any detectable common pattern.



**Fig. 3** Cumulative sum graphs of the Letters to Seven Churches drawn on a common base. Common features are due to the use of an unusual epistolary form.

**COMPARISON OF GRAPHS:  
LETTERS TO SEVEN CHURCHES  
AND SEVEN LEADING ARTICLES**



**Fig. 4** The letters to Thyatira, Sardis and Philadelphia provide similar patterns.

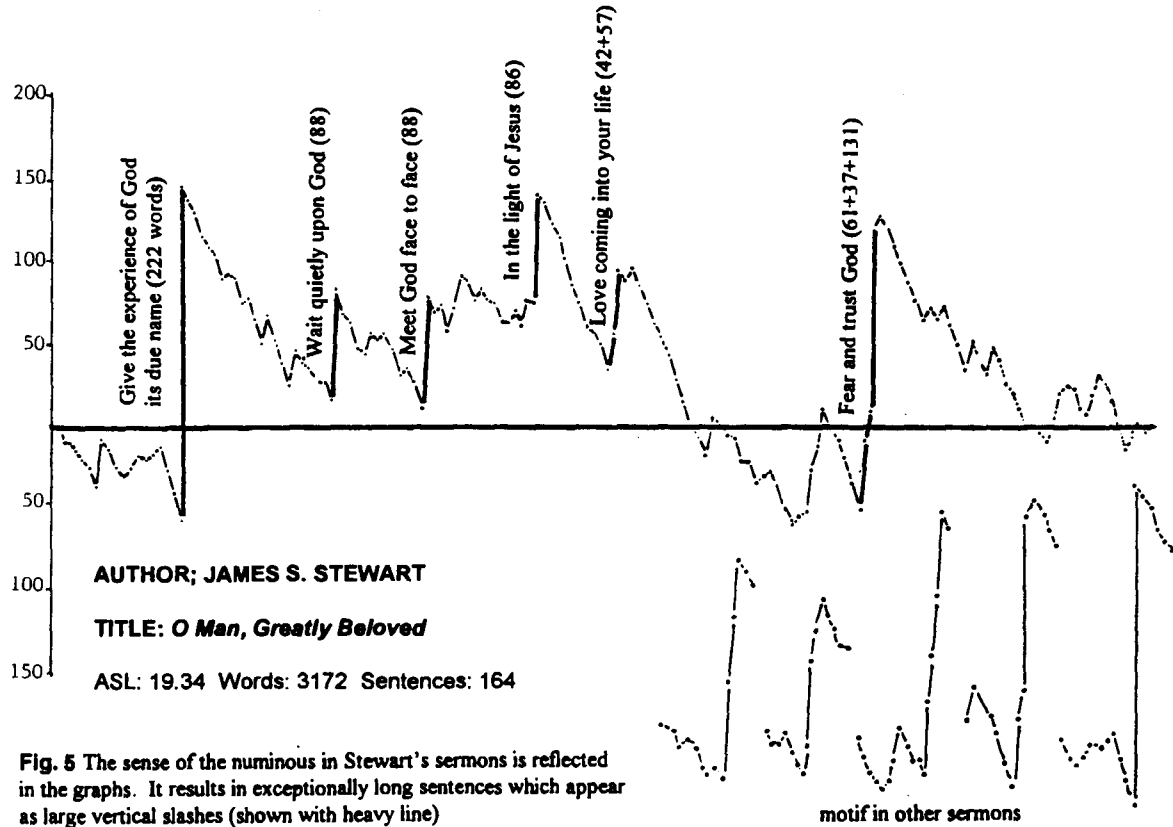
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It is found too in Revelation. The most significant monumental, numinous passages are listed in the table below and are shown with a heavy line in Fig. 6.

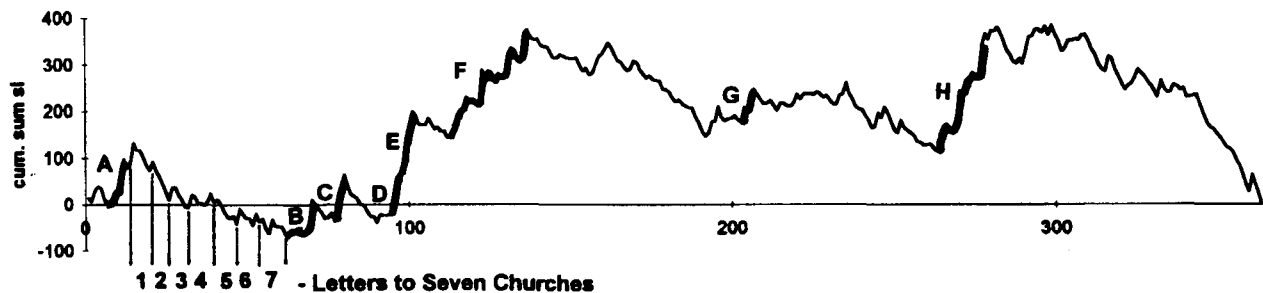
	Subject	Text	No. of sentences	Average length
<b>A</b>	Vision of Christ	1:9-20	7	39.4
<b>B</b>	Heavenly worship	4:1-11	8	36.6
<b>C</b>	Song of creatures and elders	5:8-13	3	59.7
<b>D</b>	Day of wrath	6:12-17	2	67.5
<b>E</b>	The 144,000 and the Multitude	7:1-12	5	55.2
<b>F</b>	The trumpets	8:7-10:7	24	36.5
<b>G</b>	Angel messages	14:6-11	4	45
<b>H</b>	Taunt Song	18:1-24	15	42

The average sentence length of these monumental passages is 42 words; the average sentence length of the remainder of the text is just under 24 words. In other isolated cases, the inclusion of songs results in very long sentences, but those listed above show a monumentality which is usually associated with a sense of the numinous. Perhaps the numinous quality is less evident in the taunt song of Chapter 18, but this is a sustained high-scale passage and must be a unity.

Revelation, then, is not structured like a 'three-point' sermon. It is more like Stewart's preaching, coming from the heart in an irregular rhythm of low-scale and high-scale passages. The variation in scale is a reflection of the preacher's feelings, and of his sense of the numinous. This type of preaching has variety and power through the preacher constantly slipping from a low-scale mode into a high-scale monumental, numinous mode, and back again into a more domestic mode. These modes involve changes of genre and scale which must be taken into account in any stylometric analysis of the text.



**Fig. 5** The sense of the numinous in Stewart's sermons is reflected in the graphs. It results in exceptionally long sentences which appear as large vertical slashes (shown with heavy line)



**REVELATION**

**Fig. 6** Cumulative sum graph of Revelation. The Letters to Seven Churches show common features (see Figs. 3 and 4 for detail) and are low-scale. The high-scale sections with numinous content are shown in heavy line.

**Conclusion**

I am glad to acknowledge my debt to A.Q. Morton whose work in the 1960s kindled my interest in the structure of literature. However, I find technical faults in the graphical practices used in the Cusum method and can not accept these conclusions regarding Revelation. The evidence suggests that the proposed divisions arise from an assumption that the text was bound in a particular codex form rather than vice versa. No account is taken of variations in genre and scale which must form an important part of stylometric investigation. On balance I think it likely that the text of Revelation as we now have it, is substantially as it was first written.

George K. Barr  
7 Tay Avenue,  
Comrie,  
PH6 2PF.