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LEVELS OF STYLE IN BYZANTINE GREEK AND THE ROLE OF SYNTACTIC COMPLEXITY: A QUANTITATIVE ANALYSIS OF THE SENTENCE STRUCTURE OF THREE EARLY BYZANTINE HAGIOGRAPHIC TEXTS[1]

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1. Levels of style in Byzantine Greek

A characteristic of Medieval Greek literature that readers have always been instinctively aware of is its linguistic heterogeneity. Traditional linguistic forms dating as far back as Homer and Classical Attic continued to be cultivated by learned Byzantines alongside a range of varieties ultimately derived from the Hellenistic Koine, the internationalized Attic cemented as the lingua franca of the Eastern Mediterranean in Hellenistic times, but influenced to varying degrees by later developments in the history of the spoken language. The metaphor of verticality is often applied to this kind of variation, which in sociolinguistics is referred to as *diglossia*, with two main language systems, H(igh) and L(ow), in use in the same speech community.[2]

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[1] I would here like to express my warmest gratitude to a number of people in both Helsinki and Rethymno, who in one way or another helped me complete my Master's thesis (University of Helsinki 20.8.2012), on which this paper is based: my instructors, Prof. Mika Kajava and Dr. Hilla Halla-aho for their helpful and diligent guidance; Dr. Marina Detoraki for her enthusiastic support and feedback; Dr. Marja Vierros for her valuable comments; Prof. Fred Karlsson for pointing me to a series of studies of syntax which proved most useful in both theory and practice; and my father, MS Timo Kälviäinen for helping with inferential statistics. I also wish heartily to thank Otto Nieminen for correcting my English expression. The responsibility for any remaining errors lurking in the pages of the present paper are of course solely my own. Finally, to Georgia: *επιτέλους είμαι σπίτι!*

[2] N. Toufexis, "Diglossia and register variation in Medieval Greek" *BMGS* 32.2 (2008) 208–09. Toufexis is concerned specifically with the Late Byzantine period, but the diglossic situation is present during the entire Byzantine millennium, ultimately dating back to antiquity (cf. the dichotomy of Atticism and Koine).

There is, however, no question of two distinctly separate linguistic systems being in use.[3] Throughout Byzantine history the conventional terms H and L can be seen as the two idealized extreme poles of a linguistic continuum stretching from the elite literature of highly educated Constantinopolitans, with their Atticizing and classicizing pursuits, through the various levels of educated, bureaucratic and ecclesiastical Koine all the way down to "vernacular" literature with relatively few archaisms and comparatively heavy influence from spoken forms of Greek.[4] Of these two poles, H enjoys higher prestige and is associated with learning and elite literature, whereas L is less prestigious and is associated with everyday uses of language. L is based on the spoken language of Greek-speaking Byzantines, whereas H is no-one's native tongue; the ability to use H is acquired through extensive education and as a consequence it is, in the words of Toufexis, "far from homogeneous, as it incorporates more than one register or variety with different linguistic characteristics in correlation both with the genre of each text and the educational level of each author".[5] Of course, the written L is heterogeneous as well, being necessarily influenced by the conventions of the more conservative written registers, since one could not learn to write without learning at least some H.[6]

Apart from genre and the author's own literary background, there is another important factor affecting the choice of register: that of the target audience's educational level. It has often been observed, in the case of hagiographical works intended to cater to the spiritual needs of common people, that even educated authors such as Palladius, John Moschus and Leontius of Neapolis would sometimes deliberately write in a low register in order for less educated audiences to be able to derive benefit from their edifying tales.[7] In fact, one can easily appreciate the stylistic difference by examining the proems of texts such as Moschus' *Pratum Spirituale* and Palladius' *Historia Lausiaca*, the rhetorical character of which

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[3] Toufexis (above n. 2) 210.

[4] See, e.g., G. Horrocks, *Greek: A History of the Language and its Speakers*, Chichester 2010^2, 207–30 for a concise account of this variation in the language of Byzantine literature and p. 244 for the coalescing of the middle registers after the Early Byzantine period.

[5] Toufexis (n. 2) 211–12.

[6] Toufexis (n. 2) 212.

[7] Cf., e.g., K. Hult, *Syntactic Variation in Greek of the 5th century A.D.*, Göteborg 1990, 28; Horrocks 2010 (n. 4) 225–26; D. Hesseling, *Morceaux choisis du Pré Spirituel de Jean Moschos*, Paris 1931, 49; I. Ševčenko, "Levels of Style in Byzantine Prose", *JÖB* 31.1 (1981) 295–96.

contrast starkly with the simpler, lower style of the main text.[8] Thus, the relationship between education and the use of H in writing is not always as straightforward as it might seem. It is also worth mentioning that direct speech in Byzantine narrative texts seems to be rendered quite often by a lower linguistic form than that used in the actual narrative.[9]

Now the obvious question facing the student of Byzantine style is how do we operationalize this continuum of vertical stylistic variation (i.e. replace it with something countable) in order to study it? This problem was tackled by I. Ševčenko in an insightful paper published some thirty years ago.[10] Ševčenko adopted the concept of "Three Styles", which have been used in rhetorical and stylistic theory since ancient times, and posited three main levels of style: *high style*, characterized by Atticisms, linguistic classicism and periodic syntax; *middle style*, denoting works in a less complex style, influenced by the Scripture and patristic writings, syntactically less periodic and tending towards parataxis; *low style*, that of works with plentiful vernacular vocabulary, influenced by the New Testament and the Psalter (i.e. the most commonly read parts of the Scripture) and simple paratactic syntax.[11]

This tripartite division, simplified as it is in order to be able to capture significant generalizations, is criticized by Wahlgren on the grounds that it presents Byzantine literature as divisible into categories that "are stable across the centuries without being influenced by each other".[12] Wahlgren rightly points out that style should not be oversimplified into "levels" as if they were the only stylistic divisions to be made in Byzantine literature.[13] It is of course to be hoped that a fu-

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[8] For Palladius, cf. Hult (n. 7) 28 and the discussion in I. Ševčenko, "Additional remarks to the report on levels of style", *JÖB* 32.1 (1982) 214.

[9] See, for example, M. Hinterberger, "How should we define vernacular literature?", http://www.mml.cam.ac.uk/greek/grammarofmedievalgreek/unlocking/Hinterberger.pdf (quoted 14.10.2011) 2006, 8; Horrocks (n. 4) 254; also N. Kälviäinen, "Ἀναζητώντας τὶς ἀπαρχὲς τοῦ γραπτοῦ δημώδους λόγου: Στατιστικὰ στοιχεῖα γιὰ τὴν ἔκφραση τοῦ μελλοντικοῦ χρόνου στὴν πρώιμη βυζαντινὴ ἁγιογραφία", in the proceedings of the conference Neograeca Medii Aevi VII (forthcoming).

[10] Ševčenko (n. 7).

[11] Ševčenko (n. 7) 291. Toufexis' subdivision of the higher register H into *classicizing Greek* and *Schriftkoine* is easy to equate to Ševčenko's high and middle levels, while his L would roughly correspond to Ševčenko's low style: see Toufexis (n. 2) 210 and 212.

[12] S. Wahlgren, "Byzantine Literature and the Classical Past", in E. Bakker (ed.) *A Companion to the Ancient Greek Language*, Chichester 2010, 528.

[13] Wahlgren (n. 12) 529. Ševčenko himself was clearly aware of this, as he contrasted the "ver-

ture classification of Byzantine styles will be able to locate texts in a multidimensional relation to others, instead of having just a single vertical axis. However, every investigation has to start from somewhere, and Ševčenko's classification – in part precisely because of its simplicity – is as good a starting point as any.

Ševčenko's system of levels of style is further criticized by Kazhdan as being "primarily grammatical" and therefore failing to "make clear the link between the ideas expressed and the mode of expression"; neither does it reflect e.g. individual styles.[14] What Kazhdan has in mind is that the "style" of a literary work consists of much more than just linguistic style: it is the result of a complex interplay of language, discourse structure etc. However, as Dover points out, it is necessary to distinguish between linguistic and non-linguistic style or we risk being unable to cope with the complexity of the data.[15] Similarly, Jeffries & McIntyre argue that dividing linguistic style into "levels" corresponding to the traditional categorization of the structure of language (phonology, morphology, syntax etc.) has the advantage of enabling the researcher to concentrate on one level at once.[16] Surely this applies also to distinguishing linguistic style from other aspects of style. If we try to bring too many factors into play at once, the task becomes impossible.

With this in mind, we will here concentrate on a single aspect of the syntactic level of linguistic style, namely the complexity of sentence structure. Obviously this restricts the scope of the generalizations we will be able to make, as we cannot automatically expect a linguistically archaizing author to write in a syntactically complex style (or vice versa).[17] Even so, syntactic complexity as a stylistic factor should not be left unexplored, since it is arguably the easiest of all the structural categories of language (such as morphology, syntax, vocabulary etc.) to generalize across the board.

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tical levels" with "horizontal kinds" of style such the ἰδέαι of Hermogenes' rhetorical theory (i.e. level-internal variation conditioned by genre, text/discourse type etc.): Ševčenko (n. 7) 290.

[14] A. Kazhdan, *A History of Byzantine Literature (650–850)*, Athens 1999, 162.

[15] K. Dover, *The Evolution of Greek Prose Style*, Oxford 1997, 3–4.

[16] L. Jeffries – D. McIntyre, *Stylistics*, Cambridge 2010, 35.

[17] Cf. Ševčenko (n. 8) 223.

2. Syntactic complexity

So far the discussion has been theoretical in nature, but in order to test in practice the scientific validity of levels of style coupled with syntactic complexity as a conceptual framework for a stylistic classification of Byzantine literature, we need empirical data. We accordingly need to develop a method for quantitatively analysing the syntactic complexity of Byzantine texts.[18]

Syntactic complexity essentially refers to "syntactic structures which necessitate increased parsing and processing effort".[19] In other words, increased syntactic complexity means structural differences that make a text harder to read. Complexity in itself, however, is something far too complex to be directly measured: in order to make use of syntactic complexity, we will need to operationalize it as one or more variables that can be credibly linked to the abstract concept of complexity.

First of all, it has been established that *sentence length* can be utilized as an accurate index of syntactic complexity.[20] Counting the amount of words per sentence is an economical method of establishing differences in syntactic complexity

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[18] Although this aspect of linguistic style remains largely unexplored in Classical and Byzantine philology, there are a few studies that must be cited as having inspired the present paper. T. Webster, "A Study of Greek Sentence Construction", *AJPh* 62 (1941) 385–415 studies the evolution of Classical Greek sentence structure by using syntactic variables such as sentence length and embedding depth. Webster's study can be criticized for overlooking stylistic variation inside a given work (see Dover [n. 15] 50), but as a pioneering attempt it is noteworthy. H. Hunger, "Stilstufen in der Geschichtsschreibung des 12. Jahrhunderts: Anna Komnene und Michael Glykas", *BSEB* 5 (1978) 137–70 demonstrates in a short qualitative analysis that Anna Comnene's syntactic structure is more complex than that of Michael Glycas in terms of both sentence length and the use of subordinate structures. Similarly, W. de Melo, "Zur Sprache der republikanischen *carmina Latina epigraphica:* Satzumfang, Satzkomplexität und Diathesenwahl", in P. Kruschwitz (ed.), *Die metrischen Inschriften der römischen Republik*, Berlin 2007, 97–120 used, among others, mean T-unit length (though without calling it a T-unit) and the ratio of main clauses and subordinate clauses to show that the syntax of Lucretius' *De rerum natura* is more complex than that of Terence's *Eunuchus* and the early Latin *carmina epigraphica.* Finally, Dover's book (n. 15) on Classical Greek prose style is a treasure trove of ideas and observations on the use of syntactic variables such as T-unit (which Dover calls MCF or "main clause-finite verb unit") and the analysis of Greek sentence structure and genre-conditioned stylistic variation.

[19] B. Szmrecsányi, "On Operationalizing Syntactic Complexity", in G. Purnelle – C. Fairon – A. Dister (eds.), *Actes du colloque JADT 2004 (Journées internationales d'Analyse statistique des Données Textuelles)*, Louvain-La-Neuve 2004, 1031.

[20] Szmrecsányi (n. 19) 1037–38.

and is therefore suitable for large-scale research in cases where a more detailed analysis would be impossible, or for fast and easy analysis in general.

Sentence length as a variable, however, possesses one fundamental drawback: the lack of an unambiguous definition of the concept "sentence". While a definition based on punctuation is commonly used, it cannot here be considered an optimal approach, as in most cases whatever punctuation is found in the manuscripts neither reflects a consistent system nor originates from the author's own pen. Modern editors normally replace it with a more or less intuitive punctuation (influenced by their own working language) and significant differences can on occasion be detected in the practice of different editors.[21] Thus, we cannot rely on an author's punctuation as a guide to analysing his sentences, as is the case with modern languages endowed with reasonably standardized writing systems. On the other hand, a lexical definition based on identifying coordinating conjunctions does not work either, as most comparable items can be used alternatively as conjunctions or as discourse particles (cf. the "biblical" sentence-initial καί).

As an alternative Hunt proposes the concept of the *minimal terminable unit* or *"T-unit"*, defined as a single main clause plus any subordinate clauses dependent on it.[22] In essence, the T-unit corresponds to the sentence in all respects save that it does away with the coordination of main clauses, which would be difficult to define. However, despite the usefulness of the T-unit variable, structural length does not automatically translate to structural complexity.[23] That is, measuring length probably only works as an index of syntactic complexity due to the general probability that longer syntactic units contain more complex structures. We will thus take a step further in the hope that more complex variables will enable us to support the conclusions drawn from measurements of T-unit length.

It is generally accepted that, apart from length, syntactic complexity is related to the number, type and depth of embedding or subordination in a text.[24] Subordination is defined as "the nonsymmetrical relation holding between two

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[21] Dover (n. 15) 27. Cf. also K. Hunt, *Grammatical Structures Written at Three Grade Levels*, Champaign, Illinois 1965, 8 for a similar observation, in his case concerning the revision of schoolchildren's punctuation by English teachers.

[22] See Hunt (n. 21) 21. Essentially the same idea is proposed in Dover (n. 15) 28. Cf. also de Melo (n. 18) 101–02.

[23] Szmrecsányi (n. 19) 1032–33.

[24] K. Beaman, "Coordination and Subordination Revisited: Syntactic Complexity in Spoken and Written Narrative Discourse", in D. Tanner – R. Freedle (eds.), *Coherence in Spoken and Written Discourse*, Norwood 1984, 45.

clauses such that one is a constituent or part of (i.e. dependent upon) the other".[25] In order to understand what this means, we need to consider the fundamental structural characteristics of language. When looking at language at the phonological level, we see phonological segments strung one after another in a monodimensional chain. At the syntactic level, however, linguistic theory postulates a two-dimensional model of language structure, with two different ways of combining elements of the same type (such as clauses) to form larger structural units (such as sentences or T-units): *iteration* and *recursion*.

The main difference between iteration and recursion, as formulated by Karlsson, is that iteration "yields flat output structures, repetitive sequences on the same depth level as the first instance" while recursion "builds structure by increasing embedding depth".[26] In other words, elements combined through iteration are "concatenate",[27] syntactically equal, while elements combined through recursion form a hierarchic structure[28] in which some elements are subordinate to others of the same type (i.e. embedded in them). Such hierarchic structures are considered more complex than flat iterative structures: to quote one definition of complexity, "increased complexity is, at its most general level, increased hierarchic organization; that is, an increase in the number of hierarchic levels within a system".[29]

In sentence structure, where structural units called sentences are formed from smaller structural units called clauses, iteration manifests itself as *coordination*, where syntactically equal clauses are combined, often by means of conjunctions such as καί. The result of recursive combination of clauses, on the other hand, is known as *subordination*, where a clause is syntactically dependent on another; this relationship is in turn marked by conjunctions such as ὅτι.

Now the contrast between iteration/coordination and recursion/subordination is relevant to the issue of syntactic complexity precisely because hierarchical structures are considered more complex than flat iterative structures. A fundamental difference can be discerned between the two in actual language use as well: whereas iteration appears practically unconstrained (i.e. there are no theo-

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[25] Beaman (n. 24) 55.

[26] F. Karlsson, "Syntactic recursion and iteration", in H. van der Hulst (ed.), *Recursion and Human Language*, Berlin 2010, 45.

[27] Karlsson (n. 26) 46.

[28] Karlsson (n. 26) 46.

[29] T. Givón, *The Genesis of Syntactic Complexity: Diachrony, ontogeny, neuro-cognition, evolution*, Amsterdam 2009, 4.

retical limits to how many syntactically equal clauses can be coordinated into a single sentence) and successive application of iterative clause combination can very well result in unusually long sentences,[30] the actually occurring use of recursion to create structural complexity has been found much less impressive in comparison.[31]

Thus, according to Karlsson, even extremely long and complex sentences seem to owe their size and complexity mostly to iteration rather than recursion: it appears the greatest clausal *embedding depth*[32] (or one of the greatest in any case) achieved in Karlsson's example sentence from James Joyce (12,931 words) is 6 levels of depth, while the number of coordinated clauses certainly runs in the hundreds, if not thousands.[33] Similarly, empirical data from the study of several European languages shows that the distribution of subordinate clauses at different levels of embedding depth follows a falling curve, with an added level of embedding corresponding to a drop in the frequency of clauses occurring at that level.[34] Furthermore, it seems that more complex styles (e.g. legal language) tend to have more clauses at deeper levels of embedding than syntactically simpler varieties, an observation directly related to the issue at hand.[35]

Thus far, then, we have seen that iteration/coordination and recursion/subordination as strategies of clause combination differ greatly in actual usage, with recursion heavily limited and iteration lacking similar constraints. What is the reason behind this discrepancy? The answer is assumed to lie in the relatively greater cognitive processing difficulty of more complex, "deep" hierarchical recursive structures in comparison with less complex, "flat" iterative structures. In other words, it is considered that increasing recursive combining of elements

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30 Karlsson (n. 26) 46.

31 For an in-depth theoretical discussion, see Karlsson (n. 26) 50–65; cf. also R. Laury – T. Ono, "Recursion in conversation: What speakers of Finnish and Japanese know how to do", in H. van der Hulst (ed.), *Recursion and Human Language*, Berlin 2010, 69–70 and 84–85.

32 The term refers the structural depth achieved through successive application of recursive cycles. The embedding depth of a subordinate clause is the "vertical" relation of the level of the hierarchic structure it occupies to that of the main clause it is dependent upon (either directly or indirectly, through other embedded clauses). The level of embedding occupied by a clause is 1 + the level of embedding of its superordinate clause, with all main clauses assigned level 0. In other words, subordinate clauses directly dependent on a main clause are assigned level 1, the subordinate clauses embedded in these level 2 and so on.

33 Karlsson (n. 26) 46–47.

34 See F. Karlsson, "Multiple final embedding of clauses", *International Journal of Corpus Linguistics* 15.1 (2010) 95–99.

35 See Karlsson (n. 34) 96–97.

leads precisely to the kinds of "syntactic structures which necessitate increased parsing and processing effort" that were mentioned above. There is a large body of psycholinguistic research that indicates that increasing subordination and especially increasing embedding depth may strain the ability of the human brain to process language structure.[36]

What all this means for us is that clausal subordination is a prime candidate for a successful index of syntactic complexity in texts, on a par with T-unit length. Thus, the ratio of main and subordinate clauses in a text can be used as a simple and easily presentable index of complexity.[37] Furthermore, in order to account for the complex hierarchic structures produced by recursive clause combining, we can measure the distribution of clauses at different levels of embedding depth.

Having explored the theoretical background of syntactic complexity, we may now comment on our expectations as to its relevance to the stylistic variation observed in Byzantine Greek. Our previous experiences with texts of varying registers as well as common logic suggest that greater complexity will be found in those texts that belong to higher registers. This would also make sense insofar as learning to write in a classicizing style was a symbol of status in Byzantine literary society: the more complex the style and the greater the efforts required to master it, the greater the prestige associated with it in the elite literary circles.[38] Since the liberal use of embedding and other complexity-increasing strategies can be assumed to contribute heavily towards a style that is progressively more difficult to understand, we can hypothesize that it will accordingly augment the social standing of those who do manage to cope with it.

3. Methodological considerations

The broad research questions emerging from the preceding discussion – ones that this study alone cannot attempt to answer – are a) whether the complexity of a

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[36] See Szmrecsányi (n. 19) 1033–34; Karlsson (n. 34) 101–02; Laury – Ono (n. 31) 79. However, see also Givón (n. 29) 12–13 for possible difficulties involved in this interpretation. For the sake of the argument we adopt in this study the view that assumes the existence of a real psychological correlation between syntactic complexity and cognitive complexity, the latter being understood here to imply increasing mental processing difficulty.

[37] In measuring the performance of different indices of syntactic complexity, Hunt found this simple subordination ratio less efficient than T-unit length but better than sentence length: Hunt (n. 21) 23.

[38] Ševčenko (n. 7) 304.

text's sentence structure consistently mirrors its level of style throughout Byzantine literature and b) whether this relation can be effectively utilized in order to create an objective system of classifying Byzantine texts stylistically, i.e. by using syntactic complexity as an index of the levels of style. These questions can obviously only be answered when data from the analysis of an extensive corpus of texts is made available. The contribution of the present study is to demonstrate empirically that there exists a relation between the stylistic level and syntactic complexity and that this relation can be quantitatively measured. This aim is achieved by analysing a small test corpus, the data of which cannot yet be generalized across the board but which serves to indicate why this line of research is, in the author's opinion, worth pursuing.

In order to validate theoretically our basic hypothesis for the test corpus - according to which texts perceived as belonging to higher levels of style manifest correspondingly increasing syntactic complexity - we need to demonstrate that a systematic correlation exists between two variables: "level of style" and "syntactic complexity". Both variables, however, are far too abstract to study in themselves, so they must somehow be operationalized as measurable categorical variables. In this study, the variable "level of style" is represented by three text samples (see section 4 below), each assigned to a certain level of style on the basis of a combination of personal observation as well as judgments and comments expressed in the scholarly literature.

The variable "syntactic complexity", in turn, is operationalized as the following 5 different syntactic variables involving the length of syntactical units or the extent of recursive clause combining (subordination/embedding), both concepts theoretically linked to the complexity of syntax, as seen in the discussion above. Each variable is examined as an independent index of syntactic complexity and the overall image presented by the results yielded by the different variables is then considered the "final verdict". Variables 1–2 and 4–5 are analysed as categorical (i.e. not continuous but with a limited number of possible outcomes) and the categories of each are given here. Due to the fact that the statistical χ^2-test (see below) requires that at least 5 tokens be found in the data for each category of each variable, the categories have been adjusted after carrying out the analysis to comply with this requirement.[39]

[39] Cf. A. Hakulinen – F. Karlsson – M. Vilkuna, *Suomen tekstilauseiden piirteitä: kvantitatiivinen tutkimus*, Helsinki 1996, 99.

1. T-unit length (measured in words). T-units are grouped according to the amount of words they contain into the following 6 categories: 1–5 words, 6–10 words, 11–15 words, 16–20 words, 21–25 words and 26+ words.
2. T-unit length (measured in clauses). T-units are grouped according to the amount of clauses they contain into the following 5 categories: 1 clause, 2 clauses, 3 clauses, 4 clauses and 5+ clauses.
3. Mean T-unit and clause length. These are simple average values obtained by dividing the number of words in the sample by the number of T-units/clauses and the number of clauses by the number of T-units.
4. Main clauses and subordinate clauses. A simple measurement of the total ratio of main to subordinate clauses in the sample, with 2 categories.
5. Embedding depth. Measuring the distribution of all subordinate clauses at different levels of embedding, with 5 categories (levels 1–5) since no clauses at level 6 or deeper were found in the data (but see n. 73).

Once the raw data has been collected, it is subjected to a statistical χ^2-test or *chi-square test* in order to a) establish the significance of the results and b) evaluate the extent to which each of the three texts differs from the two others.[40] Explaining the basics of inferential statistics is beyond the scope of this article, and the reader should turn to an exposition of the subject in a basic manual of statistics for linguists.[41]

However, in a nutshell, the probability value or *p-value* obtained by means of the test is a gauge of the statistical probability that the performance of variable X (one of our complexity variables) is *not* conditioned by variable A/B (the "level

[40] I have used Preacher's online χ^2 calculation tool to compute the values: see K. Preacher, *Calculation for the chi-square test: An interactive calculation tool for chi-square tests of goodness of fit and independence*, http://quantpsy.org (quoted 13–18.8.2012), 2001.

[41] E.g., E. Levon, "Organizing and Processing Your Data: The Nuts and Bolts of Quantitative Analyses", in L. Litosseliti (ed.), *Research Methods in Linguistics*, London 2010, 68–92. See also Dover (n. 15) 47 for another demonstration of how to use the χ^2-test in practice to establish differences or similarities between Ancient Greek texts composed in different styles.

of style" variable, i.e. the different texts being compared). For example, a p-value of $p = 0.75$ would mean there is a 75% chance that texts A and B are so similar in their use of the variable X that any observable difference is due purely to chance. Where to draw the line in these probabilities is a matter of convention; according to Levon, in the humanities the standard cut-off point is $p = 0.05$.[42] This means that a p-value of 0.05 or smaller (5% or less chance that A and B do not differ with respect to X) is conventionally considered proof enough that A and B differ significantly from each other with respect to variable X, which is formally expressed by saying that the difference between A and B with respect to X is *statistically significant* at the $p < 0.05$ level.

Conversely, a p-value greater than 0.05 (over 5% chance) is taken to mean that the findings are not statistically significant, since pure chance cannot be ruled out as being responsible for the differences between A and B, and the hypothesis of A and B belonging to different levels of style has to be rejected with respect to the use they make of variable X. A and B would thus be considered in our theoretical model to belong to the exact same style as far as syntactic complexity is concerned and as far as syntactic complexity is accurately represented by X. The meaning of statistical significance to the linguist or philologist is that having statistically significant findings provides "predictive power to the descriptive facts"[43] and gives a powerful tool for objectively evaluating the differences between texts.

Apart from the p-value, there are two other values involved in the χ^2-test, the *χ^2-value* and the *degrees of freedom* (abbreviated *df*). These are also reported, although the p-value in itself reveals all that is essential. However, since a progressively higher χ^2-value corresponds to a progressively lower p-value as far as the *df* remain the same, the χ^2-values can also be compared where the comparison of extremely small p-values is impractical. (Note that χ^2-values, unlike p-values, *cannot* be compared if the corresponding *df* differ!) In short, when comparing two texts with respect to a single syntactic variable, a high χ^2-value and a low p-value indicate a large difference between the texts, whereas a low χ^2-value and a high p-value indicate a smaller difference (even if that difference may still be statistically significant if the p-value is low enough).

Having identified the variables to be measured, the question remains how to analyse a given text in such a manner that the analysis is unconditionally reproducible and falsifiable. As we have already seen in the case of the concept

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42 Levon (n. 41) 81.

43 Levon (n. 41) 71.

of "sentence", even basic linguistic terms such as word, clause and sentence are ambiguous categories and by no means immediately applicable to any text. In the Master's thesis on which this paper is based, problems related to the definition in Ancient and Byzantine Greek of concepts such as word, sentence, clause, subordination and coordination were explored in some depth. However, due to limitations of space, what is presented here is only a summary of the most important (i.e. most likely to impact on the statistics) coding decisions made in the analysis of our test corpus, leaving out most of the theoretical discussion.

1. Word. In our analysis, *word* is defined as an orthographic word (i.e. a sequence of graphemes separated from others by empty space in the text of the critical edition, including all clitics, particles, articles etc.), with the exception that words that have undergone crasis (such as κἀγώ) are counted separately.[44]

2. Clause. We define clause as a syntactic unit consisting of a single predicate and any elements syntactically dependent on it, including an initial coordinating or subordinating conjunction or relative pronoun/adverb, but excepting other clauses.

2.1 Nonverbal predicates (e.g. δεινὸς γὰρ οἶνος [Eur. *Cyc*. 678]) are treated as normal clauses, i.e. exactly as if the copula verb εἰμί were overtly present.[45]

2.2 Elliptic clauses where the predicate has been omitted are treated as normal clauses, exactly as if the predicate were present. In cases where coordinate structures make it difficult to determine exactly how many elliptic clauses are involved, the following rules are applied.[46]

2.2.1. If the half of the coordinate construction that seems to lack a predicate verb consists of a single constituent,[47] no ellipsis

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[44] For further discussion cf. Dover (n. 15) 26ff. and de Melo (n. 18) 100–02.

[45] Cf. Dover (n. 15) 29.

[46] Cf. Hakulinen – Karlsson – Vilkuna (n. 39) 10–11 and M. Haspelmath, "Coordination", in T. Shopen (ed.), *Language Typology and Syntactic Description.* Vol. II*: Complex Constructions*, Cambridge 2007[2], 4–5 and 37–44.

[47] For instructions on how to analyse a clause in terms of its constituent structure, see, e.g., M. Tallerman, *Understanding Syntax*, London 1998, 116–25 or R. Van Valin, *An Introduction to*

is posited. For example, ἔφαγε τὸν ἄρτον καὶ [τὸ μῆλον] counts as one clause (the coordination only involves the noun phrases and not the verb).

2.2.2. If the half of the coordinate construction that seems to lack a predicate verb consists of two or more separate constituents with differing syntactic functions, ellipsis of the predicate is assumed. For example, ὁ Ἰωάννης ἔφαγε τὸν ἄρτον καὶ [ὁ Κωνσταντῖνος] [τὸ μῆλον] counts as two clauses.

2.3 Monoclausal verb phrases consisting of two or more coordinated verbs are accepted only in cases where the sole constituents being coordinated are the bare, unmodified verbs. For example, ὁμοθυμαδὸν [καὶ ἔπραττον καὶ ἐστρατεύοντο] (Xen. *Hell*. 7,1,22) counts as one clause, but [ὁ πατὴρ αἰεὶ λέγει] καὶ [σὺ φῂς] καὶ [οἱ ἄλλοι δὲ πάντες ὁμολογοῦσιν] (Xen. *Cyr.* 3,3,19) counts as three.[48]

2.4 Periphrastic constructions such as ἔχω + infinitive or εἰμί + participle are treated as monoclausal.

2.5 Non-finite clauses (i.e. *all* infinitival and participial constructions) count as fully fledged clauses. This approach, while theoretically debatable, is here considered justified on the grounds that such constructions exhibit verbal syntax on a par with finite verbs (e.g. nominative or accusative subjects, accusative direct objects) that is not shared with comparable non-verbal action nouns (which take at best a genitive object or subject).[49] Note that nouns and adjectives historically de-

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Syntax, Cambridge 2001, 110–15 or any other up-to-date introduction to syntax.

[48] Cf. Hunt (n. 21) 13–14 and Dover (n. 15) 31 and Hakulinen – Karlsson – Vilkuna (n. 39) 11. Hunt generally dislikes the idea of coordinated verbs counting as separate clauses; Dover is in theory willing to accept both possibilities; Hakulinen – Karlsson – Vilkuna adopt a position diametrically opposite that of Hunt and count all overtly expressed verbs as separate clauses. Our solution is intended as a compromise.

[49] For the clausal status of non-finite constructions in general cf., e.g., D. Cheila-Markopoulou, "Προτασιακότητα και μετοχικές δομές στην Αλεξανδρινή και Μεσαιωνική Ελληνική", in D. Theofanopoulou-Kontou (ed.), *Σύγχρονες τάσεις στην ελληνική γλωσσολογία. Μελέτες αφιερωμένες στην Ειρήνη Φιλιππάκη-Warburton*, Athens 2003, 129; S. Kemmer, "Clause: Overview", in W. Frawley (ed.) *International Encyclopedia of Linguistics* I, Oxford 2003, 320; Hakulinen, Karlsson & Vilkuna (n. 39) 12. For the "internal" verbal syntax of non-finite

rived from participles (e.g. ὁ ἡγούμενος in the sense *"hegumen"*) are of course not counted as clauses, as they are (synchronically) not verbal at all.

2.6. Pragmaticalized exclamations such as Κύριε ἐλέησον, ἰδού or Ποίησον ἀγάπην (*"Please"*), functioning as discourse markers rather than true verbal predicates, are not treated as clauses unless they occur on their own.[50]

2.7 Grammaticalized lexical items such as ἄφες used as a subordinating conjunction (cf. Modern Greek ας) in ἄφες ἴδω τί ἐστιν ὃ ἔχεις (*Mir.Artem.* 1) are not counted as separate clauses.

2.8 Parenthetical clauses occurring inside another T-unit are counted as embedded in it due to the added complexity they bring to the structure.[51]

2.9. Parenthetical expressions of saying such as φησίν and ἦ δ' ὅς, whose function is simply that of markers of reported speech, are not counted as clauses.[52]

3. Subordination and coordination. In practice, distinguishing between subordination and coordination in Greek is not so difficult as to have an impact on the statistics.[53] Some problematic cases are presented below.

3.1. It is not always clear where to draw the line between relative clauses and independent sentences introduced by what is morphologically a relative pronoun or adverb. For the sake of consistency, in carrying out our analysis ὅθεν, διό etc. as well as digressive relative clauses[54] were always treated as

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constructions, cf. M. Haspelmath, *Understanding Morphology*, London 2002, 230–32 and for Greek substantivally used (articular) infinitives see A. Rijksbaron, *The Syntax and Semantics of the Verb in Classical Greek. An Introduction*, Chicago 2002[3], 112–14.

[50] Cf. De Melo (n. 18) 103 and Laury – Ono (n. 31) 71–74.

[51] See Dover (n. 15) 29.

[52] See Dover (n. 15) 29.

[53] For a detailed account of Classical Greek finite subordinate clauses, see e.g. Rijksbaron (n. 49) 49–94.

[54] Dover suggests that digressive relative clauses such as ἐντὸς Ἅλυος ποταμοῦ, ὃς ῥέων ... ἐξίει should in principle be treated as separate T-units whenever possible: Dover (n. 15) 29. I

introducing subordinate clauses, though in hindsight this approach should probably be subjected to criticism.

3.2. In order to avoid unrealistically long T-units, reported speech is separated from the verb of saying introducing it by positing an additional T-unit boundary after the verb of saying and treating the clauses introduced by it as main clauses (with the exception of the first infinitive in indirect reported speech).[55]

4. The test corpus

The material analysed in this study consists of three samples, each taken from an Early Byzantine hagiographical work: the *Miracles of Ss. Cyrus and John* of Sophronius of Jerusalem (*Mir. Cyr. & Jo.*), the *Pratum Spirituale* of John Moschus (*Prat.*) and the *Miracles of St. Artemius* (*Mir. Artem*.) of unknown authorship.

The texts have been chosen with a view to minimizing the impact of factors other than register or level of style, i.e. Ševčenko's "kinds of style" such as genre or text/discourse type (e.g. the distinction of narrative and descriptive compositional elements[56]). Each work is dated to the same period (the late 6th to 7th centuries) and belongs to one of two hagiographical subgenres with a reasonably similar internal structure. *Mir.Cyr.&Jo.* and *Mir.Artem.* represent the genre of *Miracula/Θαύματα,* independent collections of short episodes detailing the saintly hero's miraculous exploits, while *Prat.* is a collection of short edifying stories, anecdotes and sayings that illustrate the spiritual prowess of the desert-dwelling ascetics of the Near East.

In order to use this corpus as an index for the variable "levels of style", each of the three texts in the following description is tentatively assigned to a certain level of style on the basis of lexical and content-related criteria as well as comments and judgments made by other scholars: *Mir.Cyr.&Jo.* to high style and *Prat.* and *Mir.Artem*. to low style.

Sophronius, patriarch of Jerusalem (ca. 560–638) is known to have been a teacher of rhetoric before assuming monastic garb, and went on to author both

do not see why they should be treated differently from other relative clauses, however.

55 See Dover (n. 15) 29–30.

56 Cf. Kazhdan (n. 14) 159–60.

rhetorical homilies and hymns in the classical Anacreontic metre.[57] It is hardly surprising, then, that the *Miracles of Ss. Cyrus and John* is the work that represents high style in our corpus. Contrasted with the other two texts, its rhetorical nature is thrown into sharp relief: *Mir.Cyr.&Jo.* uses a classicizing vocabulary and morphology, abounds in learned, epideictic digressions, quotes Homer (30,2) as well as the Scripture, mentions various pagan classics (e.g. 30,4; 64,3; 70,8–9) and seemingly prefers to report speech indirectly rather than by means of direct quotations from its protagonists, although these too make the occasional appearance.

The monk John Moschus (ca. 540–619/634), mentor and travelling companion of our Sophronius,[58] was certainly a learned man.[59] Nevertheless, his extant work, the *Pratum Spirituale*, is written in a simple, unaffected language. It has justly been characterized an important source for the development of the spoken Greek language of the period.[60] The heavily rhetorical style of Sophronius is absent and a distinct vernacular element is present in both morphology and vocabulary, often in the form of recent loans from Latin. Horrocks characterizes Moschus' language as "the simple narrative style of educated speakers of the period, modelled on that of the only vernacular-based literary tradition and including features that were almost certainly in decline in the popular speech of Móschos' own time".[61] Although by no means consistently vernacular in the manner of much of the popular literature of the Late Byzantine period, *Prat.* is doubtless a good candidate for Ševčenko's low style.

Our third text, the anonymous *Miracles of St. Artemius*, can be dated approximately to the years 656–668.[62] There can hardly be any question that the

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[57] See *ODB* s.v. "Sophronios", 1928; Th. Detorakis, *Εισαγωγή στη σπουδή των αγιολογικών κειμένων*, Rethymno 1985, 38; H. Chadwick, "John Moschus and his Friend Sophronius the Sophist", *JThS* 25 (1974) 53.

[58] *ODB* s.v. "Moschos, John", 1415; Chadwick (n. 57) 49–56 and 59.

[59] Cf. Ševčenko (n. 7) 295–296; Chadwick (n. 57) 50–51; R. Maisano, "Tradizione orale e sviluppi narrativi nel 'Prato' di Giovanni Mosco", in C. Giuffrida – M. Mazza (eds.), *Le trasformazioni della cultura nella tarda antichità. Atti del convegno tenuto a Catania, Università degli studi, 27 sett.–2 ott. 1982*, Rome 1985, 665–70. Also, as is the case in each of our three texts, the proem is heavily rhetorical in comparison to the rest of the work.

[60] Detorakis (n. 57) 38.

[61] Horrocks (n. 4) 255.

[62] A. Papadopoulos-Kerameus, *Varia Graeca Sacra. Сборникъ греческихъ неизданныхъ богословскихъ текстовъ IV–XV вековъ* (Записки Историко-Филологическаго Факультета Императорскаго С.-Петербургскаго Университета 95), St. Petersburg 1909, ii; Kazhdan (n.

Miracles of St. Artemius belong to the lowest stylistic level in Early Byzantine hagiography. Kazhdan and Papadopoulos-Kerameus describe the use of vernacular vocabulary as conspicuous, the expression as largely brief, simple and inartistic (with little use of rhetorical figures) and the syntax as clear.[63] Papadopoulos-Kerameus even goes as far as to suggest that, on occasion, the text is so natural and inartistic that it may approach the speech of contemporary Greeks.[64] The numerous cases of direct speech are indeed rendered in what might be thought of as a credible approximation of a "written spoken language" (the question of the fundamental differences between writing and actual speech is, of course, another matter).

As far as "vertical" levels of style are concerned we expect *Mir.Cyr.&Jo.* to differ greatly from the two others in terms of syntactic complexity. At the same time we expect *Prat.* and *Mir.Artem.* to display a very similar (if probably not identical) use of syntax, since according to our hypothesis they belong to the same level of style. In terms of "horizontal" kinds of style, we can probably assume that the difference in content between the hagiographical subgenres of *Miracula* and *Apophthegmata Patrum* does not in itself correspond to differences in language use, since the two are structurally very similar.

Nevertheless, even if genre, in the broad sense of "the genre of a literary work as a whole", has been accounted for, any lengthy piece of writing may be assumed to contain sections that differ from each other in terms of style.[65] For the purposes of this work it has not been possible to subject the selected samples to such rigorous control as to eliminate this factor entirely. It is simply hoped that, even if some compositionally heterogeneous material is inevitably included in the samples, the overall similarity in structure of the three texts will dampen their impact. Ultimately, it is difficult to ascertain whether possible differences between the texts are due to genre, personal stylistic choices or other factors (for example, it may be that *Mir.Cyr.&Jo.* contains a disproportionate amount of descriptive – as opposed to narrative – elements in the form of learned digressions such as rhetorical ἐκφράσεις.[66]

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14) 27.

[63] Kazhdan (n. 14) 34; Papadopoulos-Kerameus (n. 62) i–ii.

[64] Papadopoulos-Kerameus (n. 62) ii.

[65] Cf. Dover (n. 15) 46–56.

[66] In many places Sophronius adopts the tone of rhetorical ἐγκώμια, as has also been pointed out in N. Fernandez Marcos, *Los Thaumata de Sofronio: Contribución al estudio de la incubación cristiana* (Manuales y anejos de Emérita 31), Madrid 1975, 154.

However, a result which pairs *Prat.* and *Mir.Artem.* as relatively similar and clearly less complex than *Mir.Cyr.&Jo.* will corroborate our hypothesis and suggest this line of research should be pursued further. For the purposes of this pilot study, the criteria outlined in this section will suffice to enable our results to demonstrate the fundamental validity of our method.

The next questions concern the size of the samples to be collected and the method of their collection. In their study on Finnish sentence structure, Karlsson, Hakulinen & Vilkuna compared samples of different sizes with a view to discovering how much data is required for projects investigating syntactical structure. They came to the conclusion that for syntactic variables with less than 10 categories a sample containing a few hundred clauses should suffice to provide a reliable image of the text as a whole, provided of course that the text is internally reasonably homogeneous; even the differences between their two smallest test samples (100 and 300 clauses) were not statistically significant for most of the variables examined.[67] In order to be on the safe side, we have aimed at 500+ clauses, selecting samples of approximately 2500 words (the first 2500 words plus the rest of the T-unit which would otherwise be cut in half). Furthermore, as an added security measure we have performed a "split-half test" on each of the samples, analysing the first half of each sample and performing χ^2-tests to compare each of these halves with its parent text. No statistically significant differences were detected, with the lowest p-value being 0.45 for embedding depth in *Mir.Cyr.&Jo.* Our samples are thus clearly of sufficient size.

One final question concerns the method of collecting the samples. In this study random sampling of T-units has not been used: the samples are continuous chunks of text. This is generally not considered a statistically valid approach, especially if the text is not homogeneous, but Hakulinen, Karlsson & Vilkuna argue that in studies involving syntax it is perhaps better to have a sample that works as a coherent text by itself than a random collection of unrelated syntactic elements.[68]

The samples have been selected as follows, leaving out the short proem of each work, since these are composed in a higher style than the main text:[69]

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[67] Hakulinen – Karlsson – Vilkuna (n. 39) 99–100 and 102–104.

[68] Hakulinen – Karlsson – Vilkuna (n. 39) 101.

[69] The samples have been obtained in digital form from *TLG* (http://www.tlg.uci.edu, quoted 29.7.2012). The texts are those published in Fernandez Marcos (n. 66) 241–402 (*Mir. Cyr. & Jo.*), Papadopoulos-Kerameus (n. 62) 1–75 (*Mir. Artem.*) and J.-P. Migne, "Beati Ioannis Eucratae liber qui inscribitur Pratum", in J.-P. Migne (ed.) *Patrologiae cursus completus, Series Graeca 87c*, Paris 1864, 2852–3112 (*Prat.*).

Mir.Cyr.&Jo. = Miracula 1,2–14 + miracula 2–7 + the first T-unit of miraculum 8 (2500 words)

Prat. = Capita 1–19 + the first 3 T-units of caput 20 (2505 words)

Mir.Artem. = Miracula 1–11 + the first 9 T-units of miraculum 12 (2504 words)

5. Presentation and analysis of the data

5.1. T-unit length in words

T-unit length/words	Mir.Cyr.&Jo. (114 T-units)	Prat. (270 T-units)	Mir.Artem. (223 T-units)
1–5	8 (7.0%)	84 (31.1%)	64 (28.7%)
6–10	21 (18.4%)	105 (38.9%)	72 (32.3%)
11–15	21 (18.4%)	46 (17.0%)	35 (15.7%)
16–20	17 (14.9%)	16 (5.9%)	22 (9.9%)
21–25	12 (10.5%)	11 (4.1%)	16 (7.2%)
26+	35 (30.7%)	8 (3.0%)	14 (6.3%)

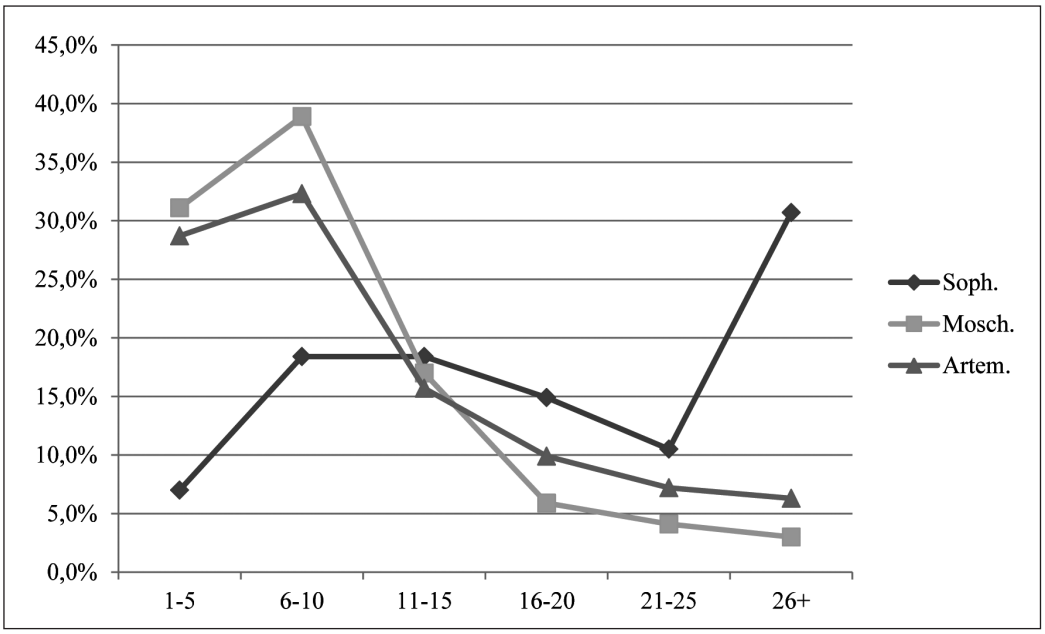

Fig. 5.1: T-unit length in words (% of total T-units / words per T-unit)

χ^2-test(df = 5)	***Mir.Cyr.&Jo.*** vs. ***Prat.***	***Mir.Cyr.&Jo.*** vs. ***Mir.Artem.***	***Prat.*** vs. ***Mir.Artem.***
	$\chi^2 = 97.925$ $p < 0.01$	$\chi^2 = 55.82$ $p < 0.01$	$\chi^2 = 9.464$ $p = 0.09$

Table 5.1.2.

Our first variable, T-unit length in words, offers tangible support to our hypothesis. *Prat.* and *Mir.Artem.* show closely parallel distributions, while the high-level *Mir.Cyr.&Jo.* differs from them dramatically on two separate counts. First, while the low-level texts show a peak at T-units of 6–10 words, followed by a falling curve, in *Mir.Cyr.&Jo.* the peak is shared with T-units of 11–15 words and the fall that comes after is much less steep.

Secondly, unlike the low-level texts, *Mir.Cyr.&Jo.* shows a second peak at T-units of 26 or more words, betraying a significant difference in the way T-units of different lengths are handled by the two groups of writers: *Prat.* and *Mir.Artem.* prefer small T-units of around 1–10 words and much more rarely use longer ones, whereas *Mir.Cyr.&Jo.* seems to strive for a balanced variation of long and short T-units, with its short ones longer than the short ones of *Prat.* and *Mir.Artem.* This kind of balanced variation in *Mir.Cyr.&Jo.* is exactly what we would expect from a sophist trained in the conventions of classical literature, while the preponderance of short T-units in *Prat.* and *Mir. Artem.* reflects their paratactic "καί-style".

Thirdly, there do seem to be some minor differences between *Prat.* and *Mir. Artem.* in the form of slightly greater T-unit length in *Mir.Artem.* (note that the χ^2 value of *Mir.Cyr.&Jo.* vs. *Mir.Artem.* is much lower than that of *Mir.Cyr.&Jo.* vs. *Prat.*, although the p-value is in both cases too small to conveniently reveal this difference). The χ^2-test reveals these differences are not statistically significant at the 0.05 level, but it is a close call, with a p-value of only 0.09. In contrast, the p-values obtained in comparing either low-level text with *Mir.Cyr.&Jo.* are vanishingly small.

5.2. T-unit length in clauses

T-unit length/ clauses	Mir.Cyr.&Jo. (114 T-units)	Prat. (270 T-units)	Mir.Artem. (223 T-units)
1	20 (17.5%)	113 (41.9%)	86 (38.6%)
2	23 (20.2%)	94 (34.8%)	58 (26.0%)

3	13 (11.4%)	34 (12.6%)	30 (13.5%)
4	14 (12.3%)	20 (7.4%)	19 (8.5%)
5+	44 (38.6%)	9 (3.3%)	30 (13.5%)

Table 5.2.1.

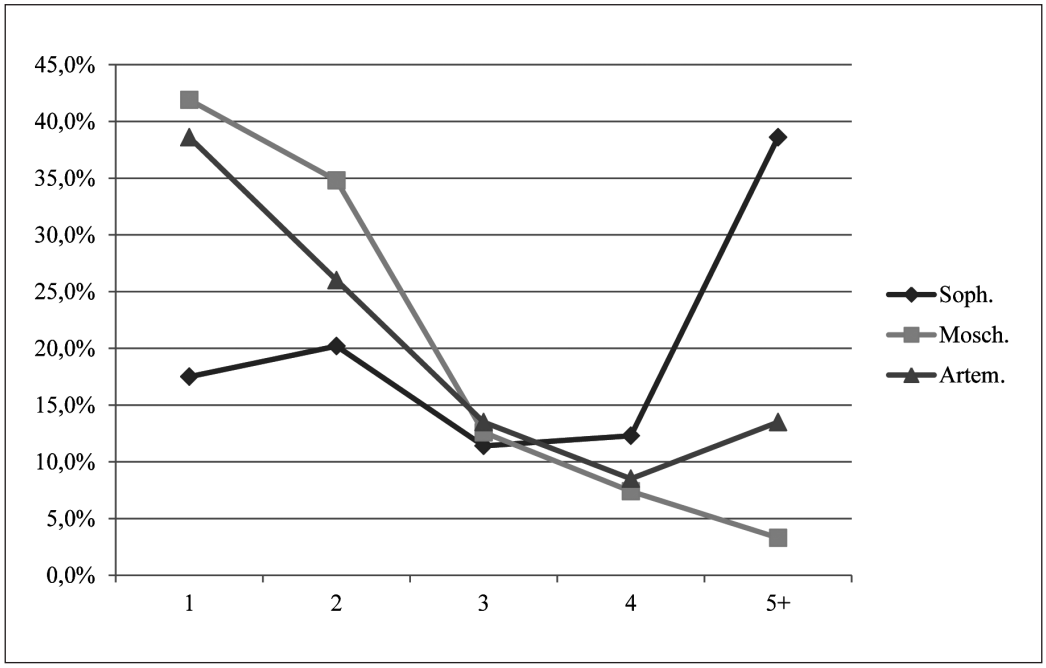

Fig. 5.2: T-unit length in clauses (% of total T-units / clauses per T-unit).

χ^2-test (df = 4)	***Mir.Cyr.&Jo.*** vs. ***Prat.***	***Mir.Cyr.&Jo.*** vs. ***Mir.Artem.***	***Prat.*** vs. ***Mir.Artem.***
	$\chi^2 = 93.772$ $p < 0.01$	$\chi^2 = 34.722$ $p < 0.01$	$\chi^2 = 19.469$ $p < 0.01$

Table 5.2.2.

Our second variable yields results that closely parallel those of T-unit length in words as far as differentiating *Mir.Cyr.&Jo.* from the other two texts is concerned. The basic pattern is the same. However, what is interesting is that *Prat.* and *Mir. Artem.* appear slightly less similar this time – although the overall shape of their curves is again parallel, this time *Mir.Artem.* has a slight peak at 5+ clauses, while *Prat.* clearly relies slightly more on very short T-units of 1–2 clauses than *Mir. Artem.* does. Furthermore, this time the χ^2-test reveals statistically significant dif-

ferences between all three authors, and although the difference between *Prat.* and *Mir.Artem.* is the smallest one, it is far from negligible.

5.3. Mean T-unit and clause length

Mean T-unit & clause length	**Mir.Cyr.&Jo.**	**Prat.**	**Mir.Artem.**
words	2500	2505	2504
T-units	114	270	223
clauses	504	540	553
mean T-unit length in words	21.9	9.3	11.2
mean T-unit length in clauses	4.4	2.0	2.5
mean clause length in words	5.0	4.6	4.5

Table 5.3.

Average T-unit length in *Mir.Cyr.&Jo.* is nearly twice that of *Mir.Artem.* and over twice that of *Prat.*, the difference between which is a small one of 1.9 words only. Mean T-unit length in clauses continues the same story, as does mean clause length in words, although here there is only a relatively small difference of around 0.5 words between *Mir.Cyr.&Jo.* on the one hand and *Prat.* and *Mir.Artem.* on the other (these being practically identical). In order to interpret this result, further study is required to explore to what extent clause length generally varies in Byzantine Greek prose.

5.4. Ratio of main to subordinate clauses

Subordination ratio	**Mir.Cyr.&Jo.**	**Prat.**	**Mir.Artem.**
clauses	504	540	553
main clauses	114	270	223
subordinate clauses	390	270	330
ratio of main to subordinate clauses	22.6% : 77.4%	50.0% : 50.0%	40.3% : 59.7%

Table 5.4.1.

χ^2-test (df = 1)	*Mir.Cyr.&Jo.* vs. *Prat.*	*Mir.Cyr.&Jo.* vs. *Mir.Artem.*	*Prat.* vs. *Mir.Artem.*
	$\chi^2 = 84.052$ $p < 0.01$	$\chi^2 = 38.065$ $p < 0.01$	$\chi^2 = 10.328$ $p < 0.01$

Table 5.4.2.

The simple subordination ratio reveals that *Mir.Cyr.&Jo.*, the high style text, has approximately three quarters of all his clauses embedded, whereas a full half of the clauses in *Prat.* are main clauses. *Mir.Artem.* is now situated in the middle even more clearly than was the case with T-unit length in clauses; clear differences seem to be emerging between the two low-style texts.

5.5. Embedding depth

Embedding depth	Mir.Cyr.&Jo. (390 sub.clauses)	Prat. (270 sub.clauses)	Mir.Artem. (330 sub.clauses)
1	202 (51.8%)	233 (86.3%)	245 (74.2%)
2	121 (31.0%)	34 (12.6%)	67 (20.3%)
3	54 (13.8%)	2 (0.7%)	16 (4.8%)
4	12 (3.1%)	1 (0.4%)	2 (0.6%)
5	1 (0.3%)		

Table 5.5.1.

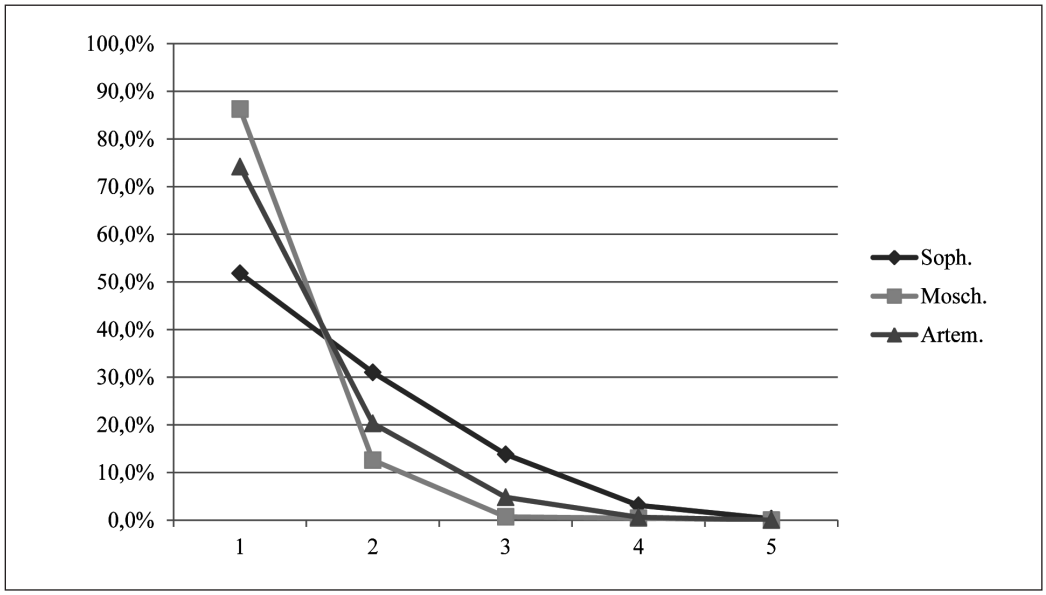

Fig. 5.5: Embedding depth (% of subordinate clauses / level of depth)

χ^2-test[70] (df = 1)	***Mir.Cyr.&Jo.*** vs. ***Prat.***	***Mir.Cyr.&Jo.*** vs. ***Mir.Artem.***	***Prat.*** vs. ***Mir.Artem.***
	$\chi^2 = 84.523$ $p < 0.01$	$\chi^2 = 38.263$ $p < 0.01$	$\chi^2 = 13.32$ $p < 0.01$

Table 5.5.2.

Embedding depth presents our authors in no different light than the previous variables. *Mir. Cyr. & Jo.* is clearly our most complex text, having significantly more clauses embedded at levels 2 and 3 than either of the others. As with T-unit length in clauses and the basic subordination ratio, these again differ among themselves as well, with *Mir.Artem.* continuing to display greater complexity than *Prat.* The difference between Mir.Artem. and Prat. is again statistically significant.

Our data for embedding depth are difficult to compare directly with those of previous studies involving modern languages since in many cases only finite clauses are counted. Nevertheless, generally speaking our texts seem to conform to the picture emerging from previous research, with embedding beyond level 4 being extremely rare and level 4 itself relatively uncommon.[71] For our purposes, then, the critical zone consists primarily of the levels 1–3: it is here that embedding depth bears out the general impression derived from studying our previous variables, as we can appreciate both the yawning chasm between *Mir.Cyr.&Jo.* and *Prat.* as well as the smaller but nevertheless distinct difference between *Prat.* and *Mir.Artem.* At level 4 the difference between *Prat.* and *Mir.Artem.* vanishes while *Mir.Cyr.&Jo.* remains distinct, and by the time level 5 is reached all distinctions have by and large been ironed out.

6. Conclusions

These results demonstrate that there indeed exists a relation between the two basic variables investigated, syntactic complexity and level of style. The sample identified as belonging to the higher level of style (*Mir.Cyr.&Jo.*) consistently manifests greater syntactic complexity than the samples identified as belonging to a lower level of style (*Prat.* and *Mir.Artem.*), with these differences being sta-

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[70] In the case of embedding depth, due to the low incidence of tokens from level 3 onwards (especially in Prat.) the χ2-test has been carried out with levels 2–5 collapsed into a single category in order to fulfil the requirement of 5+ tokens per table cell.

[71] Cf. Karlsson (n. 34) 96–98 and Laury – Ono (n. 31) 77–78.

tistically significant at the $p < 0.05$ level. Thus, the basic research hypothesis of the correlation of level of style and syntactic complexity is corroborated by these results.

On the other hand, there are two caveats. Firstly, although the vast difference between high-level text *Mir.Cyr.&Jo.* and the low-level text *Prat.* is consistently borne out in the behaviour of all 5 variables, the second text identified as belonging to a low stylistic level, *Mir.Artem.* exhibits somewhat greater complexity than *Prat.*; this difference is statistically significant in 4 out of 5 variables. On the other hand, it must be stressed that the overall image of syntactic complexity presented by *Mir.Artem.* is still relatively close to that of *Prat.* and that the differences between the two, while undeniable, should not be exaggerated either.

That statistical significance or lack thereof alone cannot neatly divide our texts into clearly separate levels of style is of course obvious, since in reality the "levels of style" are not levels but a continuum with plenty of room for statistically significant differences between personal styles even within groups of relatively similar styles. The question remains whether the continuum is an even, unbroken line across the whole corpus of Byzantine texts or whether such groups of relatively similar styles, ones that might then be named levels of style, can be identified. In such a future classification of Byzantine styles on the basis of their syntax, we might conceivably see *Mir.Artem.* labelled "lower middle style" or alternatively "low style" with *Prat.* as "super-low". Before more data are available, however, all such characterizations remain speculative.

Secondly, the corpus of texts examined in this study is extremely limited and as such the results cannot be generalized across the board. In order to establish the applicability of our method to Byzantine literature as a whole, a much larger corpus is required, with texts from different periods, genres and levels of style. It goes without saying that the method of analysis needs also to be further refined. Future research should prepare the ground for a more comprehensive account of complexity-related syntactic variation in Byzantine literature. Such an account could then be related to findings made in other areas pertaining to style, such as the lexicon, morphology, rhetorical devices and so on.

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