

# On Josephus' Use of Nicolaus of Damascus: A Stylometric Analysis of *BJ* 1.225-273 and *AJ* 14.280-369

David S. Williams

Recently in this journal, D.R. Schwartz offered a theory concerning Josephus' use of Nicolaus of Damascus as a source for the parallel narratives, *BJ* 1.225-273 and *AJ* 14.280-369.<sup>1</sup> Schwartz maintained that in the former passage Josephus deviates from Nicolaus but in the latter more or less faithfully reproduces Nicolaus. My primary purpose in the present paper is to evaluate Schwartz's theory, using *stylometry* — the numerical study of literary style.<sup>2</sup> In brief, my results generally support Schwartz: *AJ* 14.280-369 does seem to bear closer resemblance to Nicolaus' style than does *BJ* 1.225-273. I also find, however, that Schwartz has overstated certain elements of his case. I begin by outlining Schwartz's theory.

## I

Schwartz notes that Josephus' use of sources, a topic of great scholarly interest,<sup>3</sup> is "a question which is particularly well studied on the basis of parallel narratives, for one may frequently use both narratives as witnesses to a common source".<sup>4</sup> In his paper, Schwartz analyzes one such parallel — *BJ* 1.225-273 and

---

<sup>1</sup> D.R. Schwartz, "On Drama and Authenticity in Philo and Josephus", *SCI* 10 (1989/90), 120-129. I wish to thank Professor Schwartz for drawing my attention to his article, which has sparked the present study.

<sup>2</sup> For a general overview of stylometry, see: A.Q. Morton, *Literary Detection. How to Prove Authorship and Fraud in Literature and Documents* (New York 1978). Three helpful studies for understanding stylometric procedures are by A.J.P. Kenny: *The Aristotelian Ethics. A Study of the Relationship between the Eudemian and Nicomachean Ethics of Aristotle* (Oxford 1978); *The Computation of Style. An Introduction to Statistics for Students of Literature and Humanities* (Oxford 1982); and *A Stylometric Study of the New Testament* (Oxford 1986).

<sup>3</sup> For an annotated bibliography on Josephus' use of sources, see L.H. Feldman, *Josephus and Modern Scholarship. 1937-1980* (New York 1984), 392-419.

<sup>4</sup> Schwartz, *op. cit.* (above, n. 1), 121.

*AJ* 14.280-369 — concerning events from 43 BCE to 40 BCE. Scholars agree that these narratives are ultimately or directly dependent upon the lost history of Nicolaus of Damascus.<sup>5</sup> Yet, as Schwartz observes, the passage in *BJ* is more dramatic than the passage in *AJ*. For instance, in *BJ* 1.252 Herod becomes enraged by the actions of some citizens and he kills many of them. By contrast, in the parallel section in *AJ*, Herod's rage is not mentioned, only that he killed many adversaries. Schwartz lists many such examples.<sup>6</sup>

One is prompted to ask, therefore, why, if Nicolaus is the basis of both passages, *BJ* 1.225-273 is more dramatic than *AJ* 14.280-369. By way of an answer, Schwartz notes the following: (1) Nicolaus did not tend to write dramatically.<sup>7</sup> (2) Josephus admits that he used literary assistants while producing the Greek version of *BJ* (cf. *CA* 1.50). Schwartz suspects "that Josephus was not capable of producing [*BJ*] himself. In other words, it makes sense to attribute much of the *War's* style to Josephus' assistants".<sup>8</sup> According to Schwartz, then, "it is easy to imagine [these] assistants ... adding various dramatic elements to the narrative. So all we have to suppose, to understand what is going on here, is that in [*BJ* 1.225-273] Josephus' Greek assistants ... spiced up Nicolaus' narrative".<sup>9</sup> (3) In *AJ*, Josephus' "job, as he says a few times, is simply to collect, properly organize, and present for the Greek reader the materials which deal with the history of the Jews".<sup>10</sup> Schwartz feels, therefore, that Josephus' "basic position was that he should not change his sources, whether with regard to point of view or style [and thus his] narrative in *Antiquities* may be considered to be a good reflection of his sources".<sup>11</sup> In *AJ* 14.280-369, then, "Josephus himself, writing without helpers ... reproduced Nicolaus more or less faithfully".<sup>12</sup>

In short, Schwartz feels that in *AJ* 14.280-369 Josephus virtually reproduced Nicolaus' narrative, and that is why the passage is less dramatic than its parallel in *BJ*, which was significantly altered by Josephus' assistants. In the following section, I lay the groundwork for my stylometric evaluation of this theory.

<sup>5</sup> Cf. Schwartz, *op. cit.* (above, n. 1), 124 and note 21. On Nicolaus, see B.Z. Wacholder, *Nicolaus of Damascus* (Berkeley/Los Angeles 1962). On Nicolaus as a source for Josephus, see *idem*, "Josephus and Nicolaus of Damascus", in *Josephus, the Bible, and History*, edd. L.H. Feldman and G. Hata (Detroit 1989), 147-172; and Feldman, *op. cit.* (above, n. 3), 402-406.

<sup>6</sup> Schwartz, *op. cit.* (above, n. 1), 122-123.

<sup>7</sup> Cf. Schwartz, *ibid.* 125 n. 24.

<sup>8</sup> *Ibid.* 126.

<sup>9</sup> *Ibid.* 124-125.

<sup>10</sup> *Ibid.* 126-127.

<sup>11</sup> *Ibid.* 127.

<sup>12</sup> *Ibid.* 125. In note 24 to p. 125, Schwartz declares that his phrasing here "is meant not to exclude the obvious possibility, and occasionally obvious reality, that Josephus added his own comments to what he found in Nicolaus, or said less on a subject than Nicolaus did, or even corrected him".

## II

**A. Introduction**

A celebrated stylometric study sets the tone for my approach.<sup>13</sup> F. Mosteller and D. Wallace investigated the authorship of some of the *Federalist Papers*, a series of articles written to persuade New Yorkers to ratify the U.S. Constitution.<sup>14</sup> The papers were published anonymously, but their authors eventually became known: John Jay, Alexander Hamilton and James Madison. In time, the author of each paper was identified, save for twelve papers which were attributed alternatively to Hamilton and Madison. Papers of known authorship by these two authors provided Mosteller and Wallace with material from which discriminating stylistic features could be extracted. After much study, it was found useful to isolate *function* words — articles, conjunctions and the like — which were used by both authors with comparative frequency but at markedly different rates.<sup>15</sup> It was determined, for instance, that Hamilton regularly used the word “by” at a much lower rate than did Madison; with the word “upon”, the situation was reversed. By examining the rates of usage of such words (which I will call *marker words*) in the disputed papers, Mosteller and Wallace concluded that Madison had been their author.

**B. Isolating Marker Words**

To find marker words for Nicolaus and Josephus, I have assembled for each author an aggregate set of sample texts with a combined length of 10,500 words.<sup>16</sup> Gathering these texts for Nicolaus was a relatively straightforward matter. His works are preserved primarily in two compilations prepared under the sponsorship of the Byzantine emperor, Constantine VII Porphyrogenitus,<sup>17</sup> and

<sup>13</sup> Throughout the remainder of this study, I occasionally draw from material which is presented in more detail in my *Stylometric Authorship Studies in Flavius Josephus and Related Literature* (Lewiston, NY 1992), and “Josephus, Stylometry and Jewish Studies: A New Tool for Evaluating Disputed Authorship”, *Shofar. An Interdisciplinary Journal of Jewish Studies* (forthcoming).

<sup>14</sup> F. Mosteller and D.L. Wallace, *Inference and Disputed Authorship: The Federalist Papers* (Reading, MA 1964).

<sup>15</sup> Cf. Morton, *op. cit.* (above, n. 2), 38: “The fundamental principle of stylometry may be set down thus: the authorship of texts is determined by looking at habits which are common to all writers of the class under examination. The habits are used by each writer at his [or her] own rate. The different writers are separated by calculating the differences between their rates”.

<sup>16</sup> Calculation reveals that this amount is sufficient for the present purposes. Cf. the discussion in Williams, *Stylometric Authorship Studies* (above, n. 13), 35.

<sup>17</sup> Cf. Wacholder: “It is ... possible to evaluate the quality of these fragments [of Nicolaus], as we know something of the method of the Constantine excerptors ...

the pertinent fragments have been assembled by F. Jacoby.<sup>18</sup> In an effort to represent different stages of Nicolaus' writing career, I chose three passages from his *Histories*,<sup>19</sup> two from his *Life of Augustus*,<sup>20</sup> and one from his *Autobiography*.<sup>21</sup>

With regard to collecting sample texts for Josephus, one encounters several difficulties: (a) Greek was not Josephus' first tongue. He may well have changed aspects of his Greek writing style as he became more comfortable with the language and more knowledgeable about Greek literary history. (b) As I noted above, in *CA* 1.50 Josephus admits that he used assistants to help him with the Greek version of *BJ*. Theories have been raised suggesting the activity of literary assistants elsewhere in the Josephan corpus.<sup>22</sup> (c) Josephus made widespread use of source materials.<sup>23</sup> He informs us in some places that he is copying from a source, but it is likely that there are other times when he is copying without telling us. (d) Some scholars maintain that Christian interpolations were inserted in the original text of Josephus' work during its transmission.<sup>24</sup>

Such difficulties lessen our confidence that a given passage in Josephus' writings actually derives from Josephus himself, and demand that one take precautions to ensure that "Josephan" texts, in actuality, are Josephan. So far as his early work is concerned, some studies suggest that Josephus was ultimately responsible for the wording of certain speeches found in *BJ*.<sup>25</sup> This finding would seem to apply especially to speeches placed in the mouth of Josephus himself. To assemble the Josephan aggregate sample, therefore, I began by taking three 1500-word samples from speeches in *BJ*, giving precedence to speeches

---

the materials were copied with hardly any alteration of the text", *op. cit.* (above, n. 5), 8.

<sup>18</sup> *FGrH* 90.

<sup>19</sup> *FGrH* 90 F4 (1560 words), F44 (809 words), and F66 (3277 words).

<sup>20</sup> *FGrH* 90 F127 (1472 words), and F130 (2612 words, counting from the beginning of the passage).

<sup>21</sup> *FGrH* 90 F136 (770 words).

<sup>22</sup> For an annotated bibliography on Josephus' literary assistants, see Feldman, *op. cit.* (above, n. 3), 827-830.

<sup>23</sup> For an annotated bibliography on Josephus' use of sources, see Feldman, *ibid.*, 392-419.

<sup>24</sup> Many scholars hold, e.g., that at least one hand glossed the famous "Christ passage" (*Testimonium Flavianum*), found in *AJ* 18.63-64. For an annotated bibliography on this subject, see Feldman, *ibid.*, 679-703.

<sup>25</sup> See especially: H. Lindner, *Die Geschichtsauffassung des Flavius Josephus im Bellum Judaicum. Gleichzeitig ein Beitrag zur Quellenfrage* (Leiden 1972); and D. Runnalls, "Hebrew and Greek Sources in the Speeches of Josephus' Jewish War" (Ph.D. diss., University of Toronto 1971).

presented as having been made by Josephus himself.<sup>26</sup> I chose: *BJ* 2.345-401,<sup>27</sup> a speech given by Agrippa II; *BJ* 3.361-382,<sup>28</sup> a speech made by Josephus; and *BJ* 5.362-419,<sup>29</sup> a speech delivered by Josephus. In addition, it is necessary to include some material from Josephus' later writing in order to establish for each marker word whether or not it was used by Josephus in a consistent manner throughout his literary career. I therefore chose four additional 1500-word samples taken, respectively, from *AJ* 20.97-142,<sup>30</sup> *Vita* 7-47,<sup>31</sup> *Vita* 114-153,<sup>32</sup> and *Vita* 290-332.<sup>33</sup> In each case, it is reasonable to assume that Josephus was the author of the passage: according to the eminent Josephan scholar, H. St. J. Thackeray, *AJ* 20 represents the "normal" style of Josephus,<sup>34</sup> and the passages from *Vita* discuss personal matters in Josephus' career, such as his education and various military experiences.

Having assembled a 10,500-word aggregate sample text for Nicolaus, and another for Josephus, I then searched for marker words to distinguish between writing by the two. I concentrated on particles and prepositions (two categories of function words), since experience shows that such words are ideal for use in stylometric studies of ancient Greek. I eventually isolated two particles and two prepositions which are used by Nicolaus and Josephus at markedly different rates, and which are appropriate for the present study. These words are: γάρ, καί, κατά, and πρός. Nicolaus uses καί at a much higher rate than does Josephus. Josephus uses each of the other words at a much higher rate than does Nicolaus. It is best to treat καί individually, and to pool the other three words

<sup>26</sup> 1500 words is a common sample size. See Williams, *Stylometric Authorship Studies* (above, n. 13), 15.

<sup>27</sup> Throughout this study, I rely upon the Loeb Classical Library (*LCL*) edition for the Josephan text: H. St. J. Thackeray, R. Marcus, A. Wikgren, L.H. Feldman, edd. and trans., 9 vols. (Cambridge, MA 1926-65). Here and in what follows, I have sampled by recourse to random numbers. The 1500-word sample of *BJ* 2.345-401 begins on *LCL* 2:458 with the fourth word of the third line from the top: μή .

<sup>28</sup> The sample begins on *LCL* 2:674 with the first word of the fifth line from the bottom: τός.

<sup>29</sup> The sample begins on *LCL* 3:312 with the fifth word of the ninth line from the bottom: καί.

<sup>30</sup> The sample begins on *LCL* 9:440 with the fourth word of the fourth line from the top: προφήτης.

<sup>31</sup> The sample begins on *LCL* 1:4 with the second word of the sixteenth line from the top: έπίσημος.

<sup>32</sup> The sample begins on *LCL* 1:108 with the second word of the sixth line from the top: άνήρ.

<sup>33</sup> The sample begins on *LCL* 1:362 with the first word of the seventh line from the top: κατέλιπεν.

<sup>34</sup> Cf. H. St. J. Thackeray, *Josephus: The Man and the Historian* (1929; New York 1967), 115.

into one *marker group*, so that an appearance by any one of the three words is recorded as an occurrence of the group.<sup>35</sup>

The rate of usage for the marker group in the Josephan aggregate text is 0.0248. That is, on average, approximately 25 out of every 1000 words Josephus wrote were some combination of γάρ, κατά, and πρός. Nicolaus used these words at a much lower rate: 0.0095 in his aggregate text. This rate would produce only about 10 occurrences of the marker group in every 1000 words. Thus, Josephus seems to have favored the use of the marker group at more than twice the rate preferred by Nicolaus.

The rate of usage for καί in the Josephan aggregate text is 0.0482. This gives an average of 48 appearances in every 1000 words. In the aggregate text for Nicolaus, καί is used at a rate of 0.0655, for an average of approximately 66 per 1000 words. While the difference is not as striking as with the marker group, these rates of usage of καί are still, as we shall see, significantly different.

### C. Establishing Consistency of Usage

At this point, an important matter must be dealt with to ensure that one can confidently assume the marker group and the marker word καί were used regularly by each author. In short, it must be established that the uses of the marker group and καί are consistent from sample to sample for each author. We do not expect that the rates of usage in each sample will be identical, since some variation is inevitable. Yet the variations must fall within acceptable limits.

Methods have been developed to measure the magnitude of the deviations between two sets of statistics. If the differences exceed a predetermined *level of significance*, they are considered to be too large to have occurred as the result of chance variation and are regarded as being statistically significant. Two levels of significance are commonly used in literary studies. The *0.05 level of significance* represents that only five times out of one hundred would the variance in the statistic in question occur by chance alone. The *0.01 level of significance* provides for but one in one hundred times.

An appropriate procedure for the present situation is the *chi-squared test*,<sup>36</sup> which produces a numerical value that can be measured against a standard chart to ascertain whether a level of significance has been reached.<sup>37</sup> The values representing the levels of significance vary, depending upon how many samples

---

<sup>35</sup> To group words in this manner is a standard stylometric practice. See, e.g., Kenny, *Aristotelian Ethics* (above, n. 2), 128ff. The primary methodological consideration which leads to grouping the three words involves the need for a minimum number of occurrences per sample.

<sup>36</sup> On this test, see Kenny, *Computation* (above, n. 2), 110-119.

<sup>37</sup> Such a chart may be found in Kenny, *ibid.*, 169.

are represented. There are six samples in the aggregate text for Nicolaus and seven samples for Josephus.

With six samples, a chi-squared score of 11.071 is required to reach the 0.05 level of significance, and a score of 15.086 to reach the 0.01 level of significance. The chi-squared score for the marker group in Nicolaus' aggregate text is 7.8926 and the chi-squared score for *καί* is 9.3027. In neither case, then, does the chi-squared score reach either of the standard levels of significance. Thus, the uses of the marker group and *καί* are consistent within the samples for Nicolaus.

With seven samples, a chi-squared score of 12.592 demarcates the 0.05 level of significance, and a score of 14.449 denotes the 0.01 level of significance. The chi-squared score for the marker group in Josephus' aggregate text is 2.2877 and the chi-squared score for *καί* is 10.0196. Once more, neither score reaches a level of significance, and thus the uses of the marker group and *καί* by Josephus are also consistent.

#### D. Demonstrating the Marker Words as Stylistic Discriminators

Up to this point, then, I have established that group-use of the three words *γάρ*, *κατά*, and *πρός*, and the individual use of the word *καί*, appear to be consistent stylistic habits for both Nicolaus and Josephus. Before turning to examine the uses of the marker group and *καί* in *BJ* 1.225-273 and *AJ* 14.280-369, I must now demonstrate that their uses by the two authors are significantly different. This step is necessary to show that the group and *καί* do serve to discriminate between writing by Nicolaus and Josephus.

One way to accomplish this task is to employ a test that calculates the statistical significance between two rates. The most applicable procedure involves the statistic *z*.<sup>38</sup> The probability that the difference between two proportions will produce a particular *z* score has been established by statisticians. The 0.05 level of significance is marked by a *z* score of 1.96 or above, while the 0.01 level of significance requires a *z* score of 2.58 or above.

When a *z* score is computed, comparing the rates of usage of the marker group by Nicolaus and Josephus in their aggregate texts — 0.0095 and 0.0248, respectively — the result is 8.55. Obviously, this figure far surpasses the demarcation of the 0.01 level of significance (2.58), and thus it represents a very high level of significance. The extreme significance of a *z* score which exceeds 8.0 may be ascertained by the following: at *z* = 4.0, the probability that all the samples involved derive from the same author is only one in 20,000; at *z* = 5.0, the probability is less than one in a million and a half. Thus, at *z* = 8.0 the odds

<sup>38</sup> The value of *z* in a given case is found by dividing the observed difference between two rates by the standard error of the difference. On the use of *z*, see Kenny, *Aristotelian Ethics* (above, n. 2), 87 n. 1.

against common authorship are several million to one. When a  $z$  score is computed for the rates of usage of  $\kappa\alpha\iota$  by Nicolaus and Josephus in their aggregate texts — 0.0655 and 0.0482, respectively — the result is 5.42. Once more, this figure far surpasses the demarcation of the 0.01 level of significance (2.58), and therefore represents a high level of significance.

As a final step in demonstrating that the usages of the marker group and  $\kappa\alpha\iota$  by Josephus and Nicolaus differ significantly, I will now report on their uses in a 1500-word sample drawn from a passage known to have been written by Nicolaus, and another 1500-word sample drawn from a passage which we may assume was written by Josephus.

The passage which I chose for Nicolaus derives from his *Life of Augustus*.<sup>39</sup> The marker group appears in this passage 19 times, for a rate of 0.0127. The results, when  $z$  scores are determined by testing this marker group rate against the rates found in the aggregate texts for Nicolaus and Josephus, are: (a) Nicolaus' rate of 0.0095 and the rate in the passage produce a  $z$  score of 1.17; (b) Josephus' rate of 0.0248 and the rate in the passage produce a  $z$  score of 2.91. As we would expect, the results are consistent with Nicolaus' having written the passage and not Josephus: while the  $z$  score for Nicolaus' overall rate for the marker group and the rate found in the passage falls short of statistical significance, the  $z$  score for Josephus and the passage exceeds the demarcation of the 0.01 level of significance (2.58).

The word  $\kappa\alpha\iota$  is used in the sample passage 113 times, for a rate of 0.0753. Thus, the  $z$  score results are: (a) Nicolaus' rate of 0.0655 and the rate in the passage produce a  $z$  score of 1.42; (b) Josephus' rate of 0.0482 and the rate in the passage produce a  $z$  score of 4.44. Once more, the results suggest that Nicolaus wrote the passage and not Josephus: the  $z$  score for Nicolaus' overall rate for  $\kappa\alpha\iota$  and the rate found in the passage falls short of statistical significance, while the  $z$  score for Josephus and the passage exceeds 4.0 and, therefore, the demarcation of the 0.01 level of significance (2.58).

It is possible, utilizing  $z$  scores, to obtain odds against given texts having been written by a single author.<sup>40</sup> If the  $z$  score measuring an author's rate of usage for a marker word or group against the usage of that word or group in a disputed text is at the 0.05 level of significance, then the odds against the author having written the text are 20:1. For differences at the 0.01 level of significance, the odds are 100:1. Scores exceeding 4.0 and 5.0 give odds, respectively, of 20,000:1 and 1,500,000:1.

If we apply this knowledge, then we may use the  $z$  scores produced above to determine odds against Nicolaus' and Josephus' having written the sample pas-

<sup>39</sup> *FGrH* 90 F130, beginning with the eighth word of the fourth line from the top on p. 416:  $\phi\acute{o}\nu\upsilon\upsilon$ .

<sup>40</sup> The following discussion is influenced by Morton, *op. cit.* (above, n. 2), 155.



sage. In the case of Nicolaus, there are no significant  $z$  scores, so there are no odds against him as the author of the passage. Both the  $z$  scores for Josephus and the passage, however, were significant: 2.91 and 4.44. Thus, there are odds of 100:1 and 20,000:1 against him as the author of the passage. These figures may be combined to form total odds as follows:  $100 \times 20,000 = 2,000,000:1$  odds against Josephan authorship of the passage from Nicolaus.

As noted above, I chose an additional 1500-word sample passage which we may assume was written by Josephus. It is taken from his autobiography.<sup>41</sup> The marker group appears in this passage 42 times, for a rate of 0.0280. The results, when  $z$  scores are determined by testing this marker group rate against the rates found in the aggregate texts for Nicolaus and Josephus, are: (a) Nicolaus' rate of 0.0095 and the rate in the passage produce a  $z$  score of 6.21; (b) Josephus' rate of 0.0248 and the rate in the passage produce a  $z$  score of 0.74. The results are consistent with Josephus' having written the passage and not Nicolaus. The  $z$  score for Josephus' overall rate for the marker group and the rate found in the passage falls short of statistical significance, while the  $z$  score for Nicolaus and the passage far exceeds the demarcation of the 0.01 level of significance (2.58).

The word  $\kappa\alpha\acute{\iota}$  is used in the sample passage 61 times, for a rate of 0.0407. The  $z$  score results are: (a) Nicolaus' rate of 0.0655 and the rate in the passage produce a  $z$  score of 3.72; (b) Josephus' rate of 0.0482 and the rate in the passage produce a  $z$  score of 1.28. As before, the results suggest that Josephus wrote the sample passage and not Nicolaus. The  $z$  score for Josephus' overall rate for  $\kappa\alpha\acute{\iota}$  and the rate found in the passage again falls short of statistical significance, while the  $z$  score for Nicolaus and the passage exceeds the 0.01 level of significance.

Since there are no significant  $z$  scores for Josephus and the sample from *Vita*, there are no odds against Josephan authorship of the passage. Conversely, the total odds are  $1,500,000 \times 100 = 150,000,000:1$  against Nicolaus' having written the passage.

It is clear that the marker words are effective in differentiating between texts written by Nicolaus and Josephus. I have suggested elsewhere that total odds against single authorship that are in excess of 1,000,000:1 should be persuasive.<sup>42</sup> On the basis of the marker words, I have obtained total odds of 2,000,000:1 against Josephus' having written a passage by Nicolaus, and total odds of 150,000,000:1 against Nicolaus' having written a passage by Josephus. The marker words are also reliable: in neither case were there any odds against the proper author.

<sup>41</sup> The sample begins on *LCL* 1.140 with the fourth word of the seventh line from the top:  $\kappa\omicron\iota\tau\acute{\omega}\nu\acute{\alpha}$ .

<sup>42</sup> Williams, *Stylometric Authorship Studies* (above, n. 13), 20.

## III

Having reached this point, I may now report on the usages of the marker words in *BJ* 1.225-273 and *AJ* 14.280-369.

*BJ* 1.225-273

In this passage, there are 2132 words. The marker group appears 58 times, for a rate of 0.0272. The results, when *z* scores are determined by testing this marker group rate against the rates found in the aggregate texts for Nicolaus and Josephus, are: (a) Nicolaus' rate of 0.0095 and the rate in *BJ* 1.225-273 produce a *z* score of 6.73; (b) Josephus' rate of 0.0248 and the rate in *BJ* 1.225-273 produce a *z* score of 0.65. The reader will recall that the 0.05 level of significance is demarcated by a *z* score of 1.96 or above, while the 0.01 level of significance is demarcated by a *z* score of 2.58 or above. Thus, it is apparent that the use of the marker group in *BJ* 1.225-273 is consistent with Josephan usage, since the *z* score for the Josephan rate and the rate in *BJ* 1.225-273 falls short of both levels of significance. Assuming that Josephus used material by Nicolaus in the production of the passage, it appears that the material was rewritten to a great extent. On the basis of a *z* score well above 5.0 when comparing the use of the marker group by Nicolaus and in the passage, the odds against Nicolaus' having written the passage as it stands exceed one and one-half million to one.

This finding is underscored by an evaluation of the use of  $\kappa\alpha\iota$  in *BJ* 1.225-273. The word appears 89 times in the 2132 words of the passage, for a rate of 0.0417. The *z* score results are: (a) Nicolaus' rate of 0.0655 and the rate in *BJ* 1.225-273 produce a *z* score of 4.18; (b) Josephus' rate of 0.0482 and the rate in *BJ* 1.225-273 produce a *z* score of 1.30. Thus, there are no odds against *BJ* 1.225-273 representing Josephan wording. On the other hand, the *z* score for Nicolaus' rate of usage of  $\kappa\alpha\iota$  and that found in the passage is above 4.0. Such a score means that on the basis of the use of  $\kappa\alpha\iota$  by Nicolaus and in the passage, the odds against Nicolaus' having written the passage as it stands are more than twenty thousand to one.

In sum, there are no odds against Josephus' having written *BJ* 1.225-273. Conversely, the total odds against Nicolaus' having written the passage as it stands are  $1,500,000 \times 20,000 = 30,000,000,000:1$ .

*AJ* 14.280-369

In this passage, there are 3213 words. The marker group appears 63 times, for a rate of 0.0196. The results, when *z* scores are determined by testing this rate against the rates found in the aggregate texts for Nicolaus and Josephus, are: (a) Nicolaus' rate of 0.0095 and the rate in *AJ* 14.280-369 produce a *z* score of 4.59; (b) Josephus' rate of 0.0248 and the rate in *AJ* 14.280-369 produce a *z* score of 1.69. It is apparent that the use of the marker group in *AJ* 14.280-369 is consistent with Josephan usage, since the *z* score for the Josephan rate and the rate in *AJ* 14.280-369 falls short of both levels of significance. On the basis of a *z* score

above 4.0 for the use of the marker group by Nicolaus and in the passage, the odds against Nicolaus' having written the passage as it stands are 20,000:1.

The word  $\kappa\alpha\iota$  appears 185 times in the 3213 words of *AJ* 14.280-369, for a rate of 0.0576. The  $z$  score results in this case are: (a) Nicolaus' rate of 0.0655 and the rate in *AJ* 14.280-369 produce a  $z$  score of 1.60; (b) Josephus' rate of 0.0482 and the rate in *AJ* 14.280-369 produce a  $z$  score of 2.12. The latter  $z$  score exceeds the demarcation of the 0.05 level of significance (1.96), and on this basis there are 20:1 odds against Josephus' having written *AJ* 14.280-369.

In sum, while the marker group gives 20,000:1 odds against Nicolaus' having written *AJ* 14.280-369, the marker word  $\kappa\alpha\iota$  provides 20:1 odds against Josephus' having written the passage. We seem to observe in this passage, therefore, a blending of the characteristic usages of Josephus and Nicolaus.

#### IV

By way of conclusion, I offer the following observations:

(1) The stylometric evidence offers general support for the position of D.R. Schwartz: *AJ* 14.280-369 seems to stand closer to Nicolaus' style than does *BJ* 1.225-273. The total odds against authorship by Nicolaus fall from 30,000,000,000:1 in regard to the *BJ* passage to but 20,000:1 for the *AJ* passage.

(2) There is no stylometric evidence, however, that *AJ* 14.280-369 was copied more or less directly from Nicolaus. Rather, given the evidence of the three words in the marker group, extensive rewriting apparently took place, i.e., to the level of skeletal sentence structure. This result coheres with previous evidence that Josephus' practice was to rewrite his sources, not to copy them.<sup>43</sup>

(3) Though it must remain a tentative observation, there is no stylometric evidence that Josephus surrendered the authorship of *BJ* 1.225-273 to his assistants.<sup>44</sup> It appears that at least some function words are used in *BJ* 1.225-273 in

<sup>43</sup> Cf. L.H. Feldman: "Josephus shows through his thorough rewriting of the 'Letter of Aristeeas' [that] he did not copy slavishly but revised ... what he found"; "when we definitely know Josephus' source, as in his restatement of the 'Letter of Aristeeas', we see that he can rework his source with considerable thoroughness", *op. cit.* (above, n. 5), 404, 554. See A. Pelletier, *Flavius Josèphe: adapteur de la lettre d'Aristée* (Paris 1962).

<sup>44</sup> To evaluate this matter more directly, a slightly different stylometric method must be employed. I plan to return to this issue at a later time.

ways that are consistent with characteristic Josephan usages. Thus it appears that Josephus, using Nicolaus, wrote all or most of the passage himself.<sup>45</sup>

University of Georgia

---

<sup>45</sup> This observation supports the position of T. Rajak, who argues that Josephus probably had a basic facility in Greek even before he surrendered to the Romans, that his knowledge of Greek must have improved during the years from his surrender to the writing of *BJ* given that he would have had so much contact with Greek users, and that therefore “it would be rash ... to suppose that he [Josephus] would not be fit, when eventually he came to the Greek *War*, at the very least to collaborate fruitfully with his assistants, and to take the ultimate responsibility for substance and style alike” (*Josephus. The Historian and his Society* [Philadelphia 1983], 62-63).