www.pbpayne.com/wp-content/uploads/2017/01/Vaticanus-distigme-obelos-chi-square.pdf.

Chi-square Data Confirming that the Eight Bars with Characteristic Features in *Vaticanus* are not simply Paragraphoi but Mark Blocks of Added Text

This study supplements the article being published in *New Testament Studies* 63 (2017) 604-625, Philip B. Payne, "Vaticanus Distigme-obelos Symbols Marking Added Text, Including 1 Corinthians 14.34–5." This *NTS* article with twelve colour photographs will be downloadable free in September 2017 from https://www.cambridge.org/core/journals/new-testament-studies/open-access. Downloads are free since Christians for Biblical Equality paid to make it an Open Access article permitting unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited. This *NTS* article identifies eight bars in the NT of *Vaticanus* that are adjacent to a two-dot distigme (a symbol marking the location of textual variants throughout *Vaticanus*) in the margin and combine two distinctive physical characteristics. First, each extends approximately twice as far into the margin as the average extension into the margin of the other twenty bars adjacent to two-dot distigme. Second, each is approximately one third longer than the average length of the other bars adjacent to a distigme. In order to discuss these bars without predisposing a particular interpretation of them, they are identified simply as 'characteristic bars'.

What is the statistical probability that in a random distribution all eight characteristic bars following distigmai in Codex Vaticanus B (henceforth *Vaticanus*) would be at the location of a textual variant at least three words long that is cited in NA^{28}'s apparatus? Using Matthew as a conservative baseline, the probability that all eight *Vaticanus* lines would coincide with the location of a multi-word variant listed in NA^{28} is one in 31.8^8 = 1,045,723,722,517.[1]

[1] By the author's count NA^{28}'s apparatus contains only 168 multi-word variants in Matthew. Compared to the 5,343 Vaticanus lines in Matthew, this is fewer than one in

Since distigmai mark the location of textual variants, however, lines following distigmai in *Vaticanus* are more likely to coincide with textual variants, including multi-word variants, than random lines are. So, this author compared the occurrence of multi-word variants in lines following these eight characteristic bars adjacent to distigmai (eight of eight) to the occurrence of multi-word variants in lines following the remaining twenty undisputed paragraphos bars adjacent to distigmai (two of twenty).[2] The dramatic difference between multi-word textual variants occurring following 100% of the distigme + characteristic bars but only 10% of the distigme + undisputed paragraphoi led to the research hypothesis that characteristic bars following distigmai mark the location of multi-word textual variants.

The chi-square probability test is the proper procedure to evaluate the significance of these results. In this case, the chi-square test determines if there is a statistically significant difference in the occurrence of multi-word NA[28] variants in the lines following these eight distigmai adjacent to a characteristic bar than in the lines following the twenty distigmai adjacent to an undisputed paragraphos. The chi-square test determines the probability that the null hypothesis (the opposite of the research hypothesis) is correct. The null hypothesis is that characteristic bars adjacent to distigmai do *not* correlate with multi-word textual variants significantly more than do bars that do not share these characteristics (namely, undisputed paragraphoi) adjacent to distigmai.

This chi-square test compares the eight-out-of-eight, 100%, frequency of multi-word variants following a distigme adjacent to a bar that both extends into the margin

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31.8 Vaticanus lines. Matthew is probably at the high end of how frequently multi-word variants occur because NA[28], 792–799, lists more papyri of Matthew (twenty-four) than of any other NT book except John (thirty). Furthermore, variant readings due to harmonisation, which are often multi-word, are more frequent in the synoptic Gospels than any other part of the NT. Accordingly, five of the eight multi-word variants marked by distigme-obelos symbols are in the synoptic Gospels, two are from Matthew, and three are inter-synoptic harmonisations.

[2] The two are Mark 14.70 (1301 B) and Acts 14.18 (1403 B). Both bars are short, only about 3 mm long, and neither extends much into the margin, only about 1mm.

noticeably farther than most other bars adjacent to a distigme and is noticeably longer than most other bars adjacent to a distigme to only two multi-word variants following a distigme adjacent to the remaining twenty bars. To prevent overestimation of statistical significance when the number of occurrences is small, this chi-square test includes Yates's correction. This chi-square test result is: $\chi^2 = 16.432$, d.f. = 1, $p < .0001$.[3]

This, the standard probability test, shows the probability that the null hypothesis is correct is far less than one in ten thousand. In this case, the null hypothesis is that characteristic bars adjacent to distigmai do *not* correlate with multi-word textual variants significantly more than do bars that do not share these characteristics adjacent to distigmai. A chi-square showing the probability of something happening randomly as one in twenty is regarded as statistically significant, namely strong enough to reject the null hypothesis. This test's chi-square value rejects the null hypothesis at a statistical probability over 500 times greater than the generally-accepted threshold to reject the null hypothesis. This test gives strong confirmation the research hypothesis is correct that characteristic bars following distigmai mark the location of multi-word textual variants. This test also justifies distinguishing the eight characteristic bars from paragraphoi.

Making the case even stronger, a gap follows all seven apparently original distigme-obelos symbols at the exact point where a multi-word addition begins. This identifies their location over sixteen times more precisely than simply somewhere in the line.[4]

All this shows to a high degree of probability that these characteristic bars are not simply paragraphoi that merely by chance share the following five characteristic traits:

1. Each occurs immediately after a distigme.
2. Each extends noticeably farther into the margin than most bars adjacent to distigmai.
3. Each is noticeably longer than most bars adjacent to distigmai.
4. Each occurs at the location of a widely recognized, multi-word addition.

[3] 'd.f.' = 'degrees of freedom.' 'p' = 'probability.'

[4] There are 694 letters in the 42 lines of Vaticanus 1236 column A, Matthew's first column of narrative text, an average of 16.5 letters per line.

5. A gap at the precise location of this addition follows all seven apparently original characteristic bars.

None of the other twenty bars adjacent to a distigme, which fulfils the first characteristic, share more than two of the remaining four characteristics. The combination of distigme + characteristic bar + gap *always* occurs at the exact point of a multi-word block of widely-acknowledged added text. Mere coincidence cannot adequately explain this.

All eight characteristic bars occur at the location of the same kinds of additions that scribe B marked with similarly shaped obeloi where the LXX added text to the MT. Since these eight characteristic horizontal bars are distinguishable in both form and function from paragraphoi, since their primary function of identifying the location of blocks of added text is the standard function of obeloi, and since this is not a function of paragraphoi, they should be recognised as obeloi. Since a distigme identifies a textual variant, and since an obelos identifies a specific category of textual variant, text that was added after the original composition, ‘distigme-obelos’ is the most appropriate name for this symbol. This conclusion is compatible with the possibility that some or all distigme-obelos symbols, as a secondary function, mark a paragraph break and that this may have influenced the obelos position.