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NUMBERS IN GREEK POETRY AND HISTORIOGRAPHY: QUANTIFYING FEHLING

In May 2000 a modern Pheidippides, one Serge Légaré, a 39-year-old experienced marathon-runner from Québec, running in the National Capital Marathon in Ottawa, Canada, collapsed and died, tragically, just after crossing the finish line. The newspaper report on this incident noted as an element of special poignancy the fact that the runner who died had just turned in a personal best time in marathon competition of 3 hours, 3 minutes, and 3 seconds![1]

If this report were found in the writings of an ancient historian, the improbably perfect symmetry of these numbers, together with the prominence in them of the notoriously magic and religious number three, would be taken immediately as reason to discount the numbers as 'typical' or 'formulaic'—numbers resulting not from a process of real counting or precise measurement, but from a human desire for literary and symbolic patterning. One might think by analogy of Virgil's figure for the interval between Aeneas' landing in Latium and the foundation of Rome by his remote descendants Romulus and Remus. In the first book of the *Aeneid*, Jupiter promises Venus that Aeneas shall rule for three years in Latium, after which his son Ascanius shall rule for thirty years in Alba Longa, and his descendants, the Alban kings, for a further 300 years: 333 years altogether (Verg. *Aen.* 1.265–74). In this case the context—an epic poem recounting the prehistory of the Roman people—dictates a universal reaction of scepticism concerning the reality of these numbers. No scholar would argue that Virgil had a reliable historical basis for this chronology of a series of events for which no contemporary written records existed.

A modern marathon race, on the other hand, is run with the utmost care for the fairness of every aspect of the event, and the accuracy of the measurements of time taken is ensured by the use of the most precise instruments that modern technology can supply as well as by the reputation of the sponsoring organizations. Knowing this, readers of the report quoted above have no difficulty in accepting that the apparent patterning in the race time of the unfortunate runner is no more than the kind of coincidence that occasionally causes the bill for a cart full of groceries at the

[1] The first report on the incident ('Man dies after crossing Ottawa marathon's finish line', *National Post*, Monday, 15 May 2000, A1) gave the time as 'three hours, three minutes, three seconds'; a slightly different finishing time—'three hours and two minutes and 55 seconds'—was given in a follow-up article the next day ('Marathon runner died "very happy," says his coach', *National Post*, Tuesday, 16 May 2000, A3). The official list of finishing times published on the National Capital Marathon website (www.ncm.ca) gives two times for every runner, a 'gun time' (measured from the time of the starting gun) and a 'real time' (measured from the moment when each runner actually crossed the starting line), separated usually by several seconds, because of the large number of runners (1,140) in the race. For the runner in question (Serge Légaré of Lac St-Charles, Québec) the times were, respectively, 3:03:02.2 and 3:02:55.3. Obviously, the time quoted by the second newspaper report was the real time, rounded to the nearest whole second. The first time quoted must have been the result of either a rounding up to the next highest whole second or perhaps a too-hurried look at the list which picked up the hours and minutes from the first column and the last figure from the second. It is, of course, perfectly possible that a runner might finish a marathon race in exactly 3:03:03. If in fact the improbably perfect-sounding 3:03:03 was in this case the result of a rounding up or a mistake, this illustrates very well the tendency of the twenty-first-century A.D. human mind, no less than that of the fifth century B.C., to round numbers up or down according to certain basic patterns.

supermarket to add up to exactly $100.00! The reliability of a single figure cannot be determined without putting it into its context.

How does this apply to the matter of the use of numbers by Greek poets and historians? To answer this question, we must go back thirty years to the publication (in 1971) of Detlev Fehling's book, *Die Quellenangaben bei Herodot*, which shocked the community of ancient historians by its sustained attack on the veracity of Herodotus. Fehling contended that the degree of patterning to be found in various aspects of Herodotus' history, especially the source citations, was significantly too tidy to be believed, and that some at least of his source citations were inherently incredible, so that there was no alternative to assuming Herodotus guilty of massive fabrication of evidence.[2] The last chapter of Fehling's book went on to apply the same critical method to the numbers in Herodotus. According to Fehling, Herodotus showed a suspicious level of preference for 'typical' or 'formulaic' numbers. This crucial term Fehling took over from an earlier work by the Dutch scholar J. W S. Blom, whose observations he believed had been insufficiently noticed, perhaps because the book was published in a language read by comparatively few people. Neither Fehling nor Blom defines the terms 'typical' or 'formulaic' numbers as clearly as one would like: Fehling's definition is 'numbers of the kind habitually chosen when a number has to be invented for a story', while for Blom 'typische getallen' are those which 'niet op een reële bazis steunen'.[3] By extrapolation from these two discussions I would propose the following serviceable definition: a 'typical' or 'formulaic' number is one that is not 'real' (that is, does not represent the result of a real attempt to count or measure the phenomenon in question); 'typical' or 'formulaic' numbers are particularly common in poetry, and in magical and religious contexts.

In the thirty-year period since the first appearance of Fehling's book, and most particularly in the past decade, since the publication of an English translation[4] made its arguments accessible to a wider public, various defenders of Herodotus have attempted to refute Fehling's main attack on the veracity of the source citations.[5] The

[2] Detlev Fehling, *Die Quellenangaben bei Herodot: Studien zur Erzählkunst Herodots* (Berlin, 1971). An English translation of a significantly updated version of Fehling's book was published in 1989 under the title, *Herodotus and his Sources: Citation, Invention and Narrative Art*, trans. J. G. Howie (Leeds, 1989). Since Fehling estimates that 'about ten to fifteen percent' of the revised German manuscript on which the translation was based was new (1989 edn, vii), detailed references will be made here to the 1989 English edition. The main thesis of the book is summarized on p. 9 of that edition.

[3] Fehling's discussion of Herodotus' numbers is contained in ch. 4 of his book (216–39), entitled, 'Typical numbers and their use in Herodotus'. He states in the first footnote that this chapter is an attempt to make more fully known, in the context of his argument concerning Herodotus' invention of source citations, with which it coheres, the conclusions reached by J. W. S. Blom, *De Typische Getallen bij Homeros en Herodotus* (Nijmegen, 1936) on the use of the numbers 3, 7, and 9 in Homer and Herodotus. Fehling appears to employ synonymously the terms 'typical numbers', 'formulaic numbers', and 'stereotyped numbers' (most clearly to be seen in the first three paragraphs of p. 217 of the 1989 edition = 155–6 of the 1971 edition, where the corresponding German terms are, respectively, 'typische Zahlen', 'Formelzahlen', and 'stereotypen Zahlen'). See further below, note 6.

[4] See n. 2 above.

[5] G. S. Shrimpton, *History and Memory in Ancient Greece* (Montreal and Kingston, 1997) well reviews previous responses to Fehling before offering his own contribution to the discussion (Appendix 1, 'Herodotus' source citations', 229–65). He singles out for particular mention among works critical of Fehling W. K. Pritchett, *The Liar School of Herodotus* (Amsterdam, 1993). Fehling's preface to the 1989 English edition of his work ([n. 2], vii and note 1) comments on the response to his book in the period 1971–83.

chapter on Herodotus' numbers, however, has received less critical attention. One of the purposes of this article is to put the study of Herodotus' numbers on a firmer and more rational basis by attempting to quantify the degree of formulaic preference they show. Fehling's treatment of the subject was highly impressionistic: he simply pointed to a selection of cases of numbers which conformed to his (rather loose) definition of 'typical' numbers.[6] This is equivalent to looking at the case of apparently patterned numbers described above and stigmatizing it as suspicious, without paying sufficient attention to the context. A more rational approach requires that one look first at what proportion of the numbers in Herodotus' history deserve to be labelled 'typical' in Fehling's sense, and then go on to compare Herodotus' practice in this respect with that of some other ancient historians. In addition, it is surely desirable to define more clearly the characteristics of 'typical' or 'formulaic' number usage, by compiling some data on the use of numbers in Greek narrative poetry.

This article, therefore, will present some data concerning the use of numbers in two groups of literary works: on the one hand, eight works of epic poetry by a number of different authors, and on the other, four historical works, by Herodotus and three other authors. I assume that everyone will accept the intuitive likelihood that a Greek poet, describing events of a time long past in the idiom of an oral poetic tradition, would have felt freer than a prose historian to choose the numbers in his narrative for purely literary effect. Such a lack of constraint from clearly remembered recent events would seem likely to result in a pattern of number use that is highly 'typical', in the terms specified by Fehling. Greek historical writers, on the other hand, might be expected to be significantly less 'typical' or 'formulaic' in their number use. If one could define clearly the characteristics of poetic number use on the one hand and historical number use on the other, it should be possible to compare Herodotus to both poets and historians, and thus to determine with which group he has more in common.

This article will set forth some quantified data that may make it possible to reassess the validity of Fehling's argument that Herodotus' numbers show a pronounced tendency to be 'typical' or 'formulaic'. In the process, however, it should be possible to identify some major differences between the practice of Greek poets and that of Greek historians in using numbers, and to see more clearly where and to what extent these overlap.

A word first of all on the choice of authors included in this study. Narrative poetry seemed the obvious analogue to prose history, and Homer—particularly the *Iliad*, with its focus on war—the closest poetic comparator to the historical works. The analysis set forth here included not only the two Homeric poems but also Hesiod's

[6] As noted above, the closest Fehling comes to a definition of 'typical' numbers seems to be the statement that they are 'numbers of the kind habitually chosen when a number has to be invented for a story' (217). He goes on to say, 'The criterion for inclusion in this category is a large enough collection of parallels' (217). He found the 'most obviously formulaic numbers' (in German *Formelzahlen*—an alternative term for *typische Zahlen*) used by Herodotus to be 3, 7, and 10; more rarely 12, and—'in quite specific types of context'—5 and 6 (217). He then set out some 'principles of variation' by which an author can make his use of 'typical' or 'formulaic' numbers more varied, and noted ruefully thereafter, 'The different principles of variation that could conceivably be invoked might enable a determined commentator with the aid of a little sleight of hand to call practically any number a typical one'—a fact that poses 'obvious dangers for the verifiability of the theory' (219). He proposed to avoid this problem by restricting himself to 'the clearest examples' of the phenomenon (219). Blom (n. 3) treated only the numbers 3, 7, and 9, with some multiples of each.

Theogony, *Works and Days*, *Shield of Heracles*, and Fragments, as well as the *Homeric Hymns*. An eighth work, from a much later date, has also been included—Apollonius Rhodius' *Argonautica*—in the hope that this may make it possible to distinguish between features characteristic of poets in general and features typical of archaic literature. The sample of historians analysed includes Thucydides, Xenophon (*Hellenica*), and Diodorus, in addition to Herodotus. It thus contains historians of different dates and considerably varying historiographic methods and purposes. The quantification and analysis of number use in any work is a laborious business, beginning with the extraction from the text of every instance of a number, and going on to code each number in several ways so as to facilitate the manipulation of these data for many different purposes. The poetic works in this study have been analysed in their entirety. Among the historians, data have been compiled from the whole text of Thucydides and Xenophon's *Hellenica*, whereas for Herodotus and Diodorus only a large and representative sample—about half of Herodotus and six of the surviving fifteen complete books of Diodorus—has been processed.[7] Because of the incompleteness in the samples of these two authors' text included in the analysis being presented here, the results are necessarily provisional rather than final.

What aspects of the use of numbers might be expected to vary significantly from one author to another, or between two different genres of writing? First of all, writers might differ in the amount of numerical information they choose to give. Thus the overall frequency of numbers in the various works needs to be ascertained. Second, the range and distribution of numbers might vary: one author might use more high numbers than another, or a more varied range of numbers. A preference for 'typical' numbers is a characteristic that would fall under this heading. Third, the relative frequency of different types of numbers might vary: one author might use more ordinals or more numeric compounds (words like δεκαταῖος ['on the tenth day'] or τριπλάσιος ['threefold'], which can replace a simple ordinal or cardinal). Fourth, the degree to which the numbers are qualified by words such as 'about', 'approximately', 'more than', 'not less than' might vary.[8]

Here are some of the results of the investigation of these possible variables. Let us look at them in order.

[7] This study included Herodotus 1.1–130, 3.1–160 [all], 4.1–87, 5.1–88, 6.1–140 [all], 7.1–144; and Diodorus books 1, 2, 11, 14, 17, and 20. The sample of Herodotus was chosen to include both early periods of history and parts of the Persian War narrative, as well as a significant amount of ethnographic material. The Diodorus books were selected so as to span a wide variety of different source traditions.

[8] A thorough discussion of how qualification is used with numbers will be found in C. Rubincam, 'Qualification of numerals in Thucydides', *AJAH* 4 (1979), 77–95. The analysis there given distinguishes three main types of qualifying expressions used with numbers: '(i) "approximating" expressions—those that indicate some unspecified degree of uncertainty and/or imprecision felt by the writer or speaker concerning the number mentioned; (ii) "comparative" expressions—those that imply a comparison between a real figure, which is not specified, and another figure which does not claim to be exact but is said to lie at some distance above or below the real figure; and (iii) "emphatic" expressions—those that simply emphasize how large or small the stated figure is' (78). Examples of type (i) would be: in English, 'about', 'approximately' and in Greek, περί, μάλιστα; of type (ii): in English, 'more than', 'not less than', and in Greek, πλείους, οὐκ ἐλάσσους; of type (iii): in English, 'only', and in Greek, μόνος. The analysis carried out for the present article identified also a fourth type of qualification, expressed by alternative numbers (see below, n. 9).

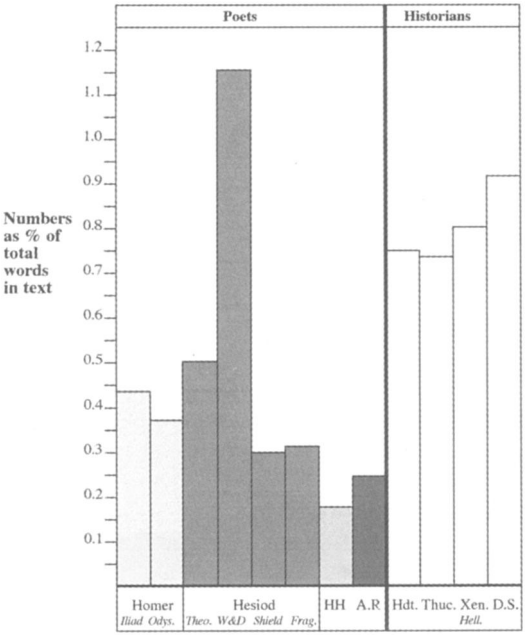

FIGURE 1 Overall frequency of numbers in different works.

I. OVERALL FREQUENCY OF NUMBERS.

Figure 1 shows the frequency of numbers as a percentage of all the words in each work.[9] In this graph, as in most of the others, the titles of the works analysed are

[9] The database of numbers used in this analysis was compiled in the following ways. For each of the eight poetic works, numbers were extracted from the relevant computer-compiled concordance in the Olms series (Joseph R. Tebben, *Concordantia Homerica, Part I, Odyssea* [Hildesheim, 1994] and *Part II, Ilias* [Hildesheim, 1998]; id., *A Computer Concordance to Hesiod* [Hildesheim, 1977] and *A Computer Concordance to the Homeric Hymns* [Hildesheim, 1977]; Manolis Papathomopoulos, *Apollonii Rhodii Argonauticorum Concordantia* [Hildesheim, 1996]), and compiled into a file of all the occurrences of each number in order. Every occurrence of a number was coded within this file for the following factors: (i) the type of number (that is, cardinal, ordinal, or numeric compound [defined above, p. 451, and in n. 17]), (ii) the subject category of the thing to which the number referred (TIME, DISTANCE/SIZE, MILITARY [i.e. individual people, ships, groups acting in a military capacity], POPULATION [i.e. individual people and groups acting in a non-military capacity], MONEY, MISCELLANEOUS), (iii) whether the number was qualified (by an approximating expression [e.g. *περί*], or a comparative expression [e.g. *πλείους*], or as an alternative number [e.g. 'the army marched 5 *or* 6 stades'], or by an emphatic expression [e.g. *μόνος*]). For the historical texts a different process was used: a researcher read through each text and extracted the numbers, which were then compiled into a database of the same kind.

The total word counts in each text required for the calculation of the percentage of numbers in each were taken from the *TLG Canon* (L. Berkowitz [ed.], *Thesaurus Linguae Graecae Canon of Greek Authors and Works from Homer to A.D. 200* [Irvine, CA, 1977[1]; New York, 1986[2]). For Herodotus and Diodorus an estimate had to be made of what proportion of the whole text the sample constituted. It was calculated that the Herodotus sample (consisting of 1.1–130, 3.1–160 [all], 4.1–87, 5.1–88, 6.1–140 [all], 7.1–144) amounted to approximately half of the total text, while the Diodorus sample was roughly estimated as 6/15 of the total.

placed along the horizontal axis, first the poets (beginning with Homer and finishing with Apollonius) and then the historians, arranged in order of date of composition.[10]

As one might expect, the historical works display a significantly higher frequency of numbers than most of the poetic works: the percentage of all the words in the text constituted by numbers ranges for the historical authors between a high of 0.89 per cent in Diodorus and a low of 0.72 per cent in Thucydides, while all but one of the poetic works fall between 0.5 per cent (the *Theogony*) and 0.17 per cent (the *Homeric Hymns*). The obvious exception to this generalization is Hesiod's *Works and Days*, which has a higher frequency of numbers (1.15 per cent) than any of the historians. Clearly, the 'almanac' element of this work, which requires the poet to label many specific days or periods within each month as either auspicious or inauspicious for a certain activity, leads to an extraordinarily high frequency of number use.[11]

II. RANGE AND DISTRIBUTION OF NUMBERS.

The crudest indication of the range of numbers used in any work is given by the highest numbers contained in it. Table 1 displays both the highest and the next-highest number in each work. Most of the poetic works go up to 10,000 and no further. The two exceptions, tending in opposite directions, are the *Works and Days* and the *Shield of Heracles*: the former goes as high as 30,000 in one instance, while the highest number in the latter work is only twelve.[12] If one looks in detail at the various poets' use of the word μύριος, several features leap to the eye which indicate that the word has often not much definite numeric content.[13] Thus the use of the singular of μύριος with a collective noun denoting something that cannot readily be counted (such as the πένθος . . . μύριον which Achilles attributes to his mother at *Il.* 18.88) defies easy translation and seems clearly to mean no more than 'an unimaginably large quantity'. Another indication of the indefinite quality of μύριος is the fact that the word is sometimes modified by μάλα (as, for example, at *Od.* 15.556, 16.121, 17.422, 19.78). More specifically, in two different conversations in the hut of

A decision was made for the purposes of this analysis to exclude the number 'one' from the statistics. This was done in order to obviate the need to deal with the following problematic variables: (i) the frequent use of a single unit of measurement without an explicit number (e.g. 'the truce lasted for *a year*'; 'the payment amounted to *a talent*')—since one cannot locate these occurrences in a printed concordance or in the *TLG* databank by a keyword search on the number words, it is easy to miss them; (ii) the ordinal πρῶτος is often used without real numeric content, that is, not as part of a fully numeric series (e.g. 'X was the *first* person to do this'; '*first* they attacked, but then they retreated')—the discrimination of which instances of πρῶτος should be included and which excluded was too difficult to make on a consistent basis.

[10] The traditional dates of composition have been used (e.g. the Homeric poems have been placed before those of Hesiod), regardless of modern arguments in favour of other sequences.

[11] It might be argued that the *Works and Days* should have been excluded from the analysis because of this significant non-narrative aspect. I considered it preferable to include it to see where and to what extent this factor made a difference.

[12] It is worth noting that there are significantly fewer numbers in the *Shield of Heracles* than in any of the other three parts of the Hesiodic corpus (only ten, as compared with thirty-five in the *Theogony*, sixty-eight in the *Works and Days*, and thirty-four in the Fragments).

[13] The standard Greek lexica distinguish two forms: μυρίος and μύριος, the former (with paroxytone accent) having the indefinite meaning, 'numberless', 'infinite in number', the latter (with proparoxytone accent) the definite numerical sense, 'ten thousand'. Since this distinction is not observed in the manuscripts (see LSJ[9], s.vv., attributing the distinction to the grammarians), and would in any case be perceptible only in the nominative and accusative masculine and neuter forms, it seems to me legitimate to approach the question of the definiteness of μύριος without prejudice.

TABLE 1. Highest and next-highest numbers in each author/work

Author (+ work)	Highest number	Next-highest number
Homer, *Iliad*	10,000 [18×] *Il.* 1.2, 2.272, 2.468, 4.434, 5.860, 9.699, 12.327, 14.148, 15.632, 16.190, 17.220, 18.88, 20.282, 21.320, 22.472, 23.29	9,000 [2×] *Il.* 5.860, 4.148, 23.134, 24.639
Homer, *Odyssey*	10,000 [16×] *Od.* 2.16, 8.110, 10.9, 10.120, 11.282,	11.632, 12.97, 15.316, 15.367, 15.416, 15.452, 15.556, 16.121, 17.422, 19.78, 24.283
Hesiod, *Theog.*	3,000 [1×] *Theog.* 364	300 [1×] *Theog.* 715
Hesiod, *W&D*	30,000 [1×] *W&D* 252	10,000 [1×] *W&D* 100
Hesiod, *Shield*	12 [1×] *Shield* 162	
Hesiod, Frags.	10,000 [3×] Frags. 43.21, 26.37, 278.3	100 [1×] 43.22
Hom. Hymns	10,000 [2×] *HH* 3.55, 4.24	100 [1×] *HH* 2.12
Ap. Rhod. *Argon.*	10,000 [17×] *Argon.* 1.259, 1.455, 1.576, 1.682, 1.844, 2.813, 2.1082, 2.1120, 3.212, 4.151, 4.274, 4.560, 4.613, 4.646, 4.1283, 4.1420, 4.1765	400 [1×] *Argon.* 2.974
Herodotus	4,000,000 [1×] Hdt. 7.28.2	1,700,000 [1×] Hdt. 7.60.1
Thucydides	150,000 [1×] Thuc. 2.98.3	40,000 [1×] Thuc. 5.63.2
Xen. *Hell.*	*{120,000 [1×] Xen. *Hell.* 1.5.21} 20,000 [1×] Xen. *Hell.* 6.1.19	*{100,000 [1×] Xen. *Hell.* 1.1.37} 10,000 [9×] Xen. *Hell.* 5.2.17, 5.2.20, 5.2.37, 6.1.8, 6.4.29, 7.1.38, 7.4.2, 7.4.32, 7.4.34
Diodorus	32,000,000 [1×] Diod. Sic. 1.49.2	7,000,000 [1×] Diod. Sic. 1.31.8

*The two numbers so marked come from sections of the *Hellenica* which are generally believed to be later interpolations into Xenophon's text. I have therefore listed also the two next highest numbers (see n. 15).

Eumaeus the swineherd (*Od.* 17.121 and 245–253), Telemachus first tells the disguised Odysseus that the enemies in his own house number μύριοι, and then, 150 lines later, proceeds to enumerate for his newly revealed father all the different contingents of suitors, which add up to a total of 118 men. Even if one adds in an

TABLE 2. Proportional distribution (as per cent) of numbers in each author/work

Author (+ work)	Range				
	2–20	21–100	101–1,000	1,001–10,000	>10,000
Homer, *Iliad* T = 501	84	10	1	4	–
Homer, *Odyssey* T = 325	90	4	1	5	–
Hesiod, *Theog.* T = 35	74	20	3	3	–
Hesiod, *W&D* T = 68	84	13	–	1.5	1.5
Hesiod, *Shield* T = 10	100	–	–	–	–
Hesiod, Frags. T = 34	88	3	–	9	–
Hom. Hymns T = 29	89	3	–	7	–
Ap. Rhod. *Argon.* T = 100	81	2	–	17	–
Herodotus T = 732	67	14	14	5	0.3
Thucydides T = 1164	47	23	22	8	0.6
Xen. *Hell.* T = 545	57	20	15	8	0.6
Diodorus T = 1492	35	18	19	16	12

equal number of servants and supporters, this is still far short of 10,000. Similarly, when the battle yell emitted by a god (Ares at *Il.* 5.860 and Poseidon at *Il.* 15.148) is described as 'a yell such as might be given by 9,000 or 10,000 men',[14] the large gap between the two numbers offered as alternative estimates shows that the poet is thinking in no very precise terms. The very wide interval that separates 10,000 from the next largest number in almost all the poetic texts is another indication that μύριος significantly exceeds the capacity of the poet and his heroes to imagine a definite large quantity.

The number series used by all the historians continues considerably beyond the 10,000 that is the standard upper limit for the poets. This is not surprising, nor yet the further observation that the upper limit of quantification is highest in the works of those historians—Herodotus and Diodorus—who deal extensively with the empires of

[14] In these two passages alone Homer substitutes the form δεκάχιλοι for the usual μύριοι, no doubt for the sake of the rhyming formula which expresses the alternative, ἐννεάχιλοι ἢ δεκάχιλοι. On the use of alternative numbers as a variation on approximating qualification, see below, p. 461, and n. 23.

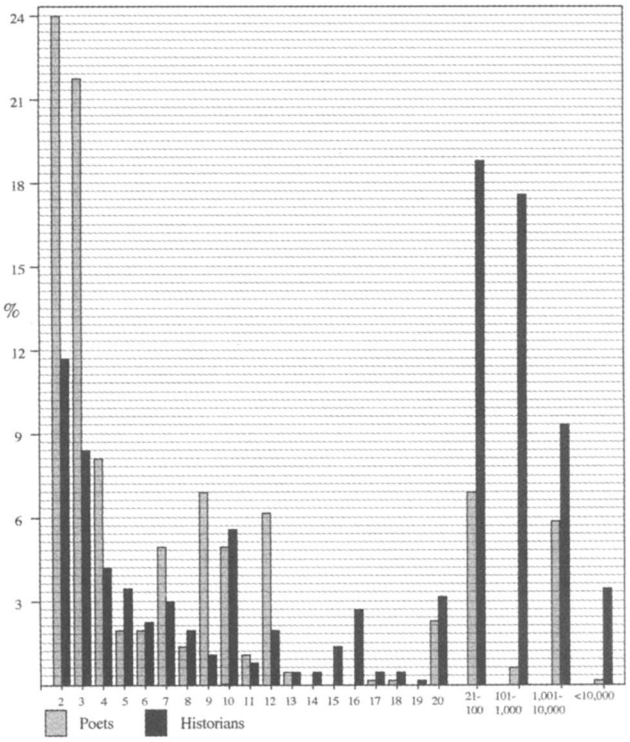

FIGURE 2 Proportional distribution of numbers.

the Near East and Carthage. It is particularly striking that the level of the highest and next-highest numbers in Xenophon's *Hellenica* drops significantly if one discounts the high numbers of Carthaginian troops contained in two passages that are generally believed to be interpolations into the text of Book 1.[15]

Distribution of numbers within the range may also vary significantly. Table 2 displays the percentage of the numbers in each work falling in each of the following ranges: 2–20, 21–100, 101–1,000, 1,001–10,000, over 10,000. The patterns of frequency are basically similar in all eight of the poetic works. The majority of the numbers are concentrated in the lowest range, 2–20: the percentage figures range from 100 per cent in the *Shield of Heracles* down to 74 per cent in the *Theogony*, whereas for the historians the range is from 67 per cent in Herodotus to 35 per cent in Diodorus.

[15] Note that the highest and second-highest numbers given here for Herodotus and Diodorus are based on incomplete samples of the numbers in these texts (see above, n. 7, for details). Obviously, the completion of the analysis of these two historians' works will not change the fact that they rank significantly above Thucydides and Xenophon's *Hellenica* in the range of numbers they use, although their actual highest and second-highest numbers may change, and possibly their relative rank-order. Both the highest and the second-highest numbers in Xenophon's *Hellenica* come from the series of chronological notes in Books 1 and 2 which many scholars believe to be later insertions by someone else into Xenophon's text (see D. Lotze, 'Die chronologischen Interpolationen in Xenophons Hellenika', *Philologus* 106 [1962], 1–13). I have therefore listed in Table 1 in addition the two highest numbers from the certainly Xenophontic text, which are significantly lower (20,000 and 10,000).

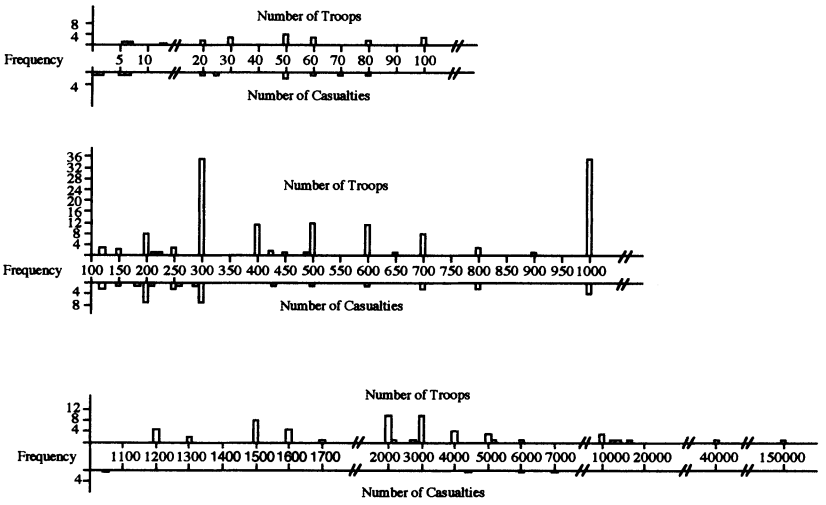

FIGURE 3 Numbers of troops and numbers of casualties in Thucydides.

Figure 2 displays the data on the peaks of number preference for the poets as compared with the historians. In the lowest range (2–20) contrasting bars represent the percentage distribution of each number in the two genres of literature. In the higher ranges, all the numbers in each genre are lumped together. The poets show a significantly different distribution from the historians. Although I have taken 20 as the upper limit of my lowest numerical range, in fact, the dense concentration of numbers in the poetic texts goes no higher than 13. In the Hesiodic corpus and the *Homeric Hymns* there are no numbers between 14 and 20, while above 20 only 50, 100, 1,000, and 10,000 occur three times or more. In the Homeric poems also 50, 100, and 10,000 are the commonest numbers in the range above 20. It is noteworthy that all the cases in Homer of 30, 40, 60, 80, and 90 are ship numbers from the Catalogue in *Iliad* 2. The historians, by contrast, show a much more even distribution of numbers across all ranges.

Figure 3 presents a detailed picture of a subset of these data in one of the historians, namely the numbers applied by Thucydides to two different categories of people engaged in military activity. The vertical bars rising above the horizontal axis represent numbers of people going into battle or being sent off on a campaign. The other set of vertical bars, which descends from the horizontal axis, represents numbers of battle casualties (individuals killed or captured in battle). This analysis was done as part of a study published a number of years ago in which it was argued that Thucydides' casualty figures showed a degree of patterning that made it impossible to believe that most of them were actual body-counts. First of all, the predominance of multiples of 10, 100, and 1,000 in the different parts of the scale makes it obvious that most of the numbers must be rounded to nodal points on the decimal scale. Secondly, the occurrence of significant peaks at 200, 300, and 1,000, among the casualty figures no less than among the people going into battle, suggests that most of the casualty figures were no more than estimates made by participants. Otherwise, it is impossible to explain how their pattern of peaks happens to mirror that of the numbers of men going into battle. If the casualty figures were mere estimates by participants in the

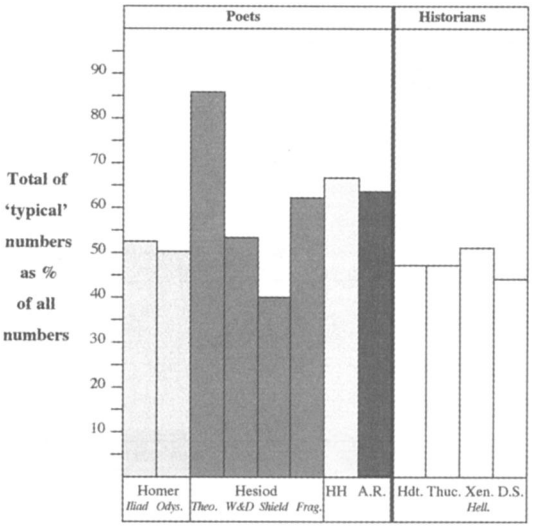

FIGURE 4 Preference for 'typical' numbers.

battles, it is easy to explain the patterns on the assumption that these people (Thucydides' informants) tended to think in terms of groups of the same magnitudes as the standard small detachments used in marshalling troops for a campaign or a battle.[16]

Figure 4 shows the results of an attempt to look at Fehling's 'typical' numbers. It shows the percentage of all the numbers in each work constituted by the incidence of the most prominent of the 'typical' numbers, as follows: three, 30, 300, 3,000; five, 50, 500, 5,000; seven, 70, 700, 7,000; nine, 90, 900; ten, 100, 1,000, 10,000; and twelve, 120. Are there significant differences between the poets and the historians in this respect? At first glance, it appears that the differences between individuals in each group are as great as, or greater than, those between the two different genres of literature. Both the highest and the lowest figures are found among the poetic works: the *Theogony* has the highest percentage of 'typical' numbers (85.7 per cent) and the *Shield of Heracles* the lowest (40 per cent). However, if the figures for all the poetic works and those for all the historical works are averaged, the average for the former group (58.89 per cent) is significantly higher than that for the latter (47.1 per cent), and the figures for all but two of the poetic works (the *Odyssey* and the *Shield*) are higher than the highest figure in the historians' group (Xenophon's 51 per cent). Thus these data do bear out the general assumption, which seems intuitively likely, that history as a genre is less

[16] This is a brief summary of the argument presented in C. Rubincam, 'Casualty figures in the battle descriptions of Thucydides', *TAPA* 121 (1991), 181–98. That article started from the following premise: 'Since the notorious caprice of war hardly mowed down its victims in regular swaths, any obvious patterns in these casualty figures demand explanation and may constitute *prima facie* evidence of regularizing action by someone (Thucydides and/or his informants)' (182). It concluded that, while Thucydides 'did not . . . indulge in the kind of wild and absurd inflation of numbers that so besmirched the reputation of some other ancient historians, . . . he was nonetheless limited necessarily by the primitive state of fifth-century B.C. "information science" and there are some grounds for believing that Thucydides' casualty figures may not always be a straightforward product of what one recent writer [Simon Hornblower, *Thucydides* (Baltimore 1987), 43] has called "Thucydides the tape-recorder" ' (190).

inclined to use 'typical' numbers than poetry. If we look, however, at the comparison between Herodotus and the other historians in respect of their preference for 'typical' numbers, the result is a surprise. Fehling restricts his argument concerning 'typical' numbers to Herodotus, making no comparisons with other historians, but it is surely an unstated assumption of his argument that other historians use fewer numbers of this kind than the one he is attacking. One would expect, therefore, that Herodotus would be unique in using the highest percentage of 'typical' numbers among the historians, and thus displaying a pattern of number use closest to that of the poets. In fact, it transpires that Thucydides ranks equal to Herodotus in his preference for 'typical' numbers (both stand at 46.9 per cent), while Xenophon is four points ahead of them both (at 51 per cent). Thus the data confirm that poets in general tend to use 'typical' numbers more frequently than historians, but there is a considerable variation between the degree of 'typical' preference shown in different poetic works (the highest and lowest scores are separated by 45 percentage points), and a somewhat smaller variation in this respect between different historians (Xenophon, *Hellenica*, and Thucydides are separated by only seven percentage points). One might have expected a clearer division in this aspect of number use to appear between the poets and the historians, and Fehling's argument would surely suggest that Herodotus ought to be uniquely high among the historians, and in the same range as the poets. In fact, he ranks lower than all the poetic works save one (the *Shield*).

III. RELATIVE FREQUENCY OF DIFFERENT TYPES OF NUMBERS.

Figure 5 shows how the relative frequency with which cardinals, ordinals, and numeric compounds are used varies in different works.[17] Clearly the poets use a higher proportion of both ordinals and compounds than the historians. This I take to be a result of the elaborate and formulaic style of Greek epic poetry. Thus the exigencies of the epic metre make it useful for the poet to have several ways of saying the same thing, each with a different metrical value, and the rich encrustation of archaic language tends to preserve elaborate turns of phrase that would sound out of place in the less formal idiom of prose.[18] It is noteworthy, however, that Apollonius, the one Hellenistic poet included in the study, has the highest proportion of cardinals among the poets—a percentage slightly higher than that in Herodotus, the earliest of the historians—and furthermore, that the proportion of ordinals + compounds drops continuously from the earliest to the latest of the historians. This suggests that over time Greek numeric style became somewhat simpler, and that this simplification affected even a poet writing in the archaizing language of epic poetry.[19] *Works and Days* presents a unique profile in the relative proportions of its cardinals to ordinals and compounds: it is the only work in the whole group in which the cardinal numbers are a smaller percentage than either of the other two types. This is clearly due to the

[17] A 'numeric compound' is a word that does not belong to either the regular cardinal or the regular ordinal series, such as ἐννῆμαρ ('for a period of nine days', Homer *Il.* 1.53), or τριταῖος ('on the third day', Thuc. 1.61), or πεντηκοντακάρηνος ('fifty-headed', Hes. *Theog.* 312).

[18] The precise definition of the Homeric formula remains a subject of controversy (well summarized by J. Russo, 'The formula', in I. Morris and B. Powell [edd.], *A New Companion to Homer* [Leiden, 1995], 238–61), but the tendency of early Greek poetic language to preserve idioms which were no longer current in contemporary speech is hardly controversial.

[19] On formulae in the language of Apollonios, see Marco Fantuzzi, 'Homeric formularity in the *Argonautica* of Apollonius of Rhodes', in Theodore D. Papanghelis and Antonios Rengakis (edd.), *A Companion to Apollonius Rhodius* (Leiden, 2001), 171–92.

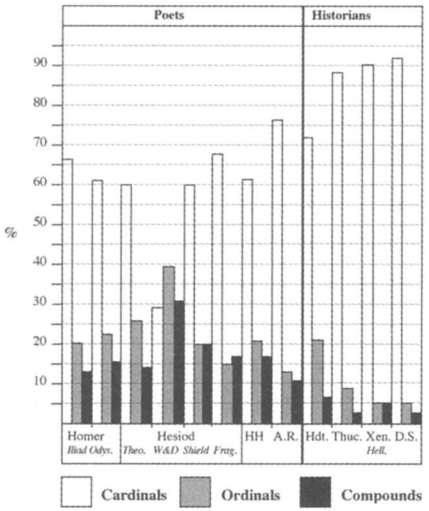

FIGURE 5 Relative incidence of number types.

special nature of its subject matter: the poet makes unusually full use of both ordinals and compounds in setting out his recommended and prohibited activities for different days of the month.[20]

IV. RELATIVE FREQUENCY OF QUALIFICATION OF NUMBERS.

Qualification is an aspect of number use that often goes unnoticed, as readers tend to concentrate on the numbers themselves, ignoring the verbal frame used by many authors to put a particular spin on the numbers. Reasons for qualifying numbers are many and complex. A writer may want to indicate that he does not know the exact number, or has doubts about the accuracy or precision of the number he has heard. In either of these cases, a word meaning 'about' or 'approximately' is regularly attached to the number. On the other hand, a comparative expression may be used with a number to specify an upper or lower limit (Thuc. 8.65.3: '*no more than* 5,000 men' should share in governing Athens under the oligarchic regime introduced in 411 B.C.), or to emphasize the magnitude of a number (Thuc. 7.27.5: '*more than* 20,000 slaves' ran away from Athens during the latter half of the Peloponnesian War to take refuge with the enemy at Decelea).[21]

One would expect qualification to be much less frequent in the poets than in the historians, inasmuch as only a writer with some self-consciousness about the accuracy

[20] It is significant that the nineteen ordinals and fourteen compounds in the category of TIME make up together thirty-three of the sixty-eight numbers in the *Works and Days* (i.e. almost 50 per cent). In specifying days of the month as auspicious or inauspicious for certain activities, Hesiod sometimes uses the regular ordinal series (τέταρτος, πέμπτος, etc.), but sometimes he prefers a parallel series of compounds (τετράς, πεμπτάς, etc.).

[21] A full discussion of the general phenomenon of numeral qualification and of these and other examples will be found in C. Rubincam, 'Qualification of numerals in Thucydides', *AJAH* 4 (1979), 77–95. The article cited in n. 16 discusses qualification as a significant aspect of Thucydides' casualty figures. C. Rubincam, 'Thucydides 1.74.1 and the use of ἐς with numerals', *CP* 74 (1979), 327–37, analyses in detail the use of one particular qualifying word by Thucydides.

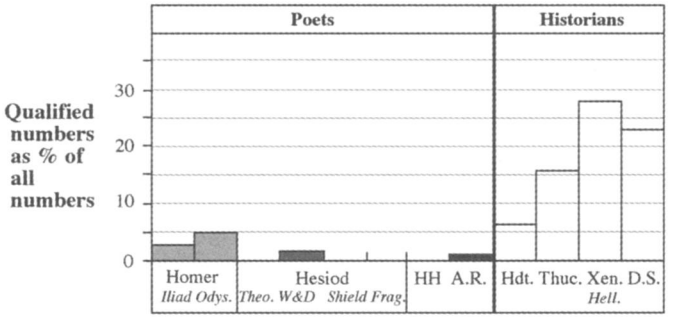

FIGURE 6 Incidence of qualification with numbers.

or precision of a number will trouble to qualify it. Another way of formulating this difference might be to say that a poet's choice of a number is dictated by a combination of tradition (as embodied in earlier poetic versions of the story) and literary considerations (the desire to make the narrative as impressive as possible). A historian, on the other hand, is operating in a more critical mode in which he cannot shrug off variations between different versions of a story, and will try (where possible) to test the credibility of the narrative told to him against other relevant knowledge. The use of qualification with numbers is a convenient means by which he can express succinctly the result of this process.

A look at the data (Figure 6) shows indeed that poets qualify numbers far less than historians. A very few qualified numbers are found in the two Homeric poems, the *Works and Days*, and the *Argonautica*.[22] The other poems have none. Homer's commonest method by far of qualifying a number is to use an alternative form ('9,000 and/or 10,000')—a type of qualification that continues to be used by the fifth- and fourth-century historians, but seems to become less common in later historical literature.[23] The historical works show considerable variation in their overall rates of qualification, the highest being Xenophon, *Hellenica* (33 per cent), the lowest Herodotus (7 per cent). One might expect to see a clear development through time towards an ever-higher percentage of qualified numbers, but no such simple picture emerges from the data: Diodorus' rate of qualification is lower than Xenophon's, but higher

[22] The *Iliad* has one instance each of comparative qualification (*Il.* 10. 253: Odysseus observes that '*more than* two parts of the night have passed') and emphatic qualification (*Il.* 5.641: *only* six ships took part in Tlepolemos' expedition), and eight cases of alternative qualification (*Il.* 1.128, 2.346, 3.363, 5.860, 8.233, 9.379, 14.148, 22.349). The *Odyssey* has four cases of emphatic qualification (*Od.* 3.424, 4.496, 14.94, 16.245), seven cases of alternative qualification (*Od.* 2.374, 3.115, 4.588, 5.306 and 484, 9.71, 19.192), and one case of alternative numbers also qualified by an emphatic expression (*Od.* 12.154: Odysseus tells his men it is not right for 'one or two only' to know of Circe's advice to him). The *Works and Days* has one case of comparative qualification (696: '*not much less than* 30 years'), as does the *Argonautica* (2.974–975: '*up to* four times 100 streams' [of the Thermodon River]).

[23] The following instances of alternative qualification are found in the database of historic text studied here (see above, note 7): Hdt. 1.1.3, 1.30.1, 3.42.1, 3.148.2, 5.51.1; Thuc. 3.24.2, 3.76.1, 4.8.6, 4.38.3, 4.124.4, 5.10.9, 6.97.1, 6.101.6, 7.2.4, 7.38.1, 7.79.6, 8.74.2, 8.99.1; Xen. *Hell.* 2.4.5, 2.4.6, 2.4.34, 3.2.10, 3.3.9, 3.5.20, 4.1.20, 4.5.12, 4.5.15, 4.5.17, 4.56.5, 5.1.21, 5.1.23, 6.5.19, 6.5.30; Diod. Sic. 1.72.2, 14.71.3.

than Thucydides'. A finer analysis suggests that there are other significant variables which need to be investigated in more detail.[24]

To sum up, we have looked at four major aspects of number use by a sample of Greek poets and historians. How far has the attempt to distinguish poetic from historiographic usage been successful? The situation is clearly much more complex than might have been expected. By no means all the factors surveyed prove to be reliable criteria by which the poets' and the historians' usage can be infallibly distinguished. As a general rule, historians use numbers significantly more frequently than poets. They also use a larger range of numbers, and show less marked preference for 'typical' numbers of the kind discussed by Fehling. Historians use more cardinal numbers and correspondingly fewer ordinals and compounds, and they attach qualifying expressions to numbers much more frequently than poets do.

What of the specific question concerning the status of Herodotus raised by Fehling's assertion that Herodotus had a particularly marked preference for 'typical' numbers? Fehling did not express his statement in terms of statistics. I have attempted to translate it into more specific and numeric terms—Herodotus used 'typical' numbers (that is, the numbers 3, 5, 7, 9, 10, and 12 and their respective multiples in the series of 10s, 100s, and 1,000s) significantly more often than other Greek historians—so as to measure its validity by looking at the numerical data resulting from an analysis of number use in a sample of eight poetic works and four works of history. The answer that emerges from this analysis is somewhat surprising: not only is Herodotus' preference for 'typical' numbers lower than that of all but one of the poetic works; it is also lower than Xenophon's and equal to that of Thucydides!

Thus we arrive at a general picture of number usage in the Greek poets and historians which is much more graduated than one might have expected from reading Fehling's chapter on Herodotus' numbers. While there are some factors that clearly distinguish the samples of poets and historians, there is a considerable overlap between the two groups in many respects. Thus Herodotus is by no means the only historian who shows evidence of some preference for Fehling's 'typical' numbers in his narrative, and this particular kind of patterning is by no means the only kind to be observed in the historians' practice. What this shows, I believe, is not that Herodotus and the other three historians surveyed were careless and dishonest in their historiographic method, but rather that in a culture in which it was difficult or impossible to measure or count accurately many things that we, in the twenty-first-century Western world, routinely quantify, even the most conscientious historian had to make do often with numbers that were mere approximations. In such a situation the rhetorical patterns that recommend themselves to creative writers will naturally have had a freer rein.

Situations of this kind abound still in our world, in which for one reason or another a writer cannot or does not wish to obtain a precise and accurate figure for some phenomenon s/he is describing. The compiling of a database of all the numbers in a Greek historical work is a lengthy and laborious business. Lacking such a means of analysing a particular writer's numeric practice, one may be forgiven for making impressionistic statements. Only once one has taken the trouble to compile the data

[24] Thus there is considerable variation in the proportions of the different types of qualification (approximating, comparative, alternative, emphatic—as defined above, n. 9) used in different historical works, as well as in the rate of qualification applied to numbers in different subject categories (enumerated above, n. 9).

does it become possible to translate those impressionistic statements into numeric terms and put them to a more rigorous test.[25]

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[25] This article is an offshoot of an ongoing major research project, which aims to quantify the use of numbers in the works of the major Greek historians. As my database undergoes revision and expansion, more comparisons between authors and between different works by the same author will be possible. A monograph currently in preparation will provide a fuller publication of this project's results.

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