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## Fame more fickle than fortune: On the distribution of literary eminence

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### Abstract

Rather than being distributed normally, a number of phenomena – e.g., income, scientific productivity, the frequency with which words are used – are distributed in a skewed or J-shaped fashion. For example, the number of people receiving an income of at least  $X$  decreases exponentially as  $X$  increases. Literary fame, as defined by the number of books devoted to an author, was investigated for 602 British poets, 108 French poets, and 51 American poets. Unsurprisingly, it was found that fame, so defined, is allocated in an extremely skewed fashion: A very large number of books are devoted to a very small number of authors. The distribution of literary fame is much more skewed than the distribution of income or scientific productivity. More surprisingly, a simple equation accounts almost perfectly for the distribution of literary fame. Literary fame does not follow Lotka's Law or Zipf's Law very closely but is almost perfectly described by an equation first developed by Yule. Causes and consequences of the allocation of literary fame are discussed.

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### 1. Introduction

Anyone familiar with literary studies knows that a few authors receive a lot of critical attention, whereas others receive almost none. Thus, there are thousands of books and articles about John Milton but hardly any about Edward Benlowes. One wonders if Milton is really a better poet than Benlowes by so many orders of magnitude. Without an objective method of measuring literary merit, this is a difficult question to answer. A second question is easy to answer: How is literary fame distributed? That is, is fame distributed in a way that can be captured by a simple equation?

Many phenomena are distributed in a Gaussian or bell-shaped manner; examples are height, weight, or intelligence. Most of us are of medium height, while very few are extremely tall or extremely short. For phenomena distributed in a Gaussian fashion, the distribution is symmetrical about the mean or average of the

population, with about 96% of cases falling within  $\pm 2$  standard deviations of the mean.

## 2. Pareto distributions

Some phenomena, most notably fame and fortune, are distributed in a quite different way. Pareto (1897) gathered considerable evidence that income is distributed in a hyperbolic or J-shaped fashion. According to him, the number of people,  $N$ , earning an income of at least  $X$  is given by the equation,

$$N = a/X^b, \quad (1)$$

where  $a$  is an arbitrary scaling constant and  $b = 1.5$ . An equation of this form yields a distribution similar to the one shown in Fig. 1 below. If we take logs of both sides of Eq. (1), we obtain

$$\log N = \log a - b \cdot \log X \quad (2)$$

Fig. 2 below shows a graph of such a function. In this case,  $b$  gives the slope of the straight line relating  $\log N$  to  $\log X$ . In other words, the Pareto equations say that a huge number of people have small incomes and a small number have huge incomes. More precisely, as income increases, the number of people earning that much decreases in an exponential fashion. Pareto argued that income must really be distributed in an extremely skewed bell-shaped fashion. However, we can only observe the distribution above some cutoff point. Below that point, an individual would not earn enough to survive. Such a person would either starve to death or have his income brought up to the cutoff by welfare payments.

Lotka's Law concerns scientific productivity but has the same form as Pareto's equation (Lotka, 1926): The number of scientists,  $N$ , publishing  $X$  articles during a period of time is given by Eq. (1), where  $a$  is a scaling constant varying from discipline to discipline, and  $b = 1.88$ . (When Lotka's Law is cited,  $b$  is usually rounded up to 2.) Scientific productivity is even more skewed than the distribution of income. The larger the value of  $b$ , the more skewed the distribution is. To give an example of what Lotka's Law means, if  $a = 10,000$ , we would expect 10,000 scientists to publish only one article, 100 to publish 10, and only one to publish 100. Surprisingly, this very simple equation describes scientific productivity quite well. Price (1963) proposed a slightly more complex equation but is best known for what has come to be called Price's Law: If there are  $N$  scientists in a given discipline, half of the papers in that discipline will be produced by  $\sqrt{N}$  scientists. A consequence is that scientific disciplines become more elitist as their size increases. For an area composed of 25 scientists, 5 will produce half of the articles, whereas for one composed of 100 scientists, 10 will produce half of the output.

Scientific productivity is highly correlated with scientific creativity, so Lotka's and Price's Laws bear on the question of fame. The correlation between number of publications and number of citations of a scientist's work ranges from 0.47 to 0.76 (Simonton, 1988), and number of citations is by far the best predictor of scientific

distinction – e.g., winning the Nobel Prize (Rushton, 1984). Zuckerman (1977) found that American recipients of the Nobel Prize have, on average, twice as many publications as a matched sample of scientists eminent enough to be listed in *American Men of Science*. Dennis (1954a) reports that the average number of publications by scientists elected to the U.S. National Academy of Sciences is 203. For comparison, he drew a sample of scientists listed in the Royal Society's *Catalog of Scientific Literature*. Only 105 had contributed more than 50 publications and 30% had only one publication each. The output of eminent scientists is indeed prodigious. For example, Einstein had 248 publications, Poincaré 530 (Simonton, 1988), and Wundt 491 (Boring, 1957). Boring calculated that, given the 53,735 pages that Wundt published between 1853 and 1920, he wrote at an average of one word every two minutes for 24 hours a day during that period.

Zipf (1949) investigated a number of phenomena distributed in a hyperbolic or Pareto fashion. Best known are his findings concerning the distribution of word types in running text. If the frequency of occurrence of a word is plotted against its rank (with the most frequent word being given a rank of 1 and so on) on log-log paper, we obtain a curve with a slope of  $-1$  which fits the data almost perfectly. Thus, frequency,  $F$ , is related to rank,  $R$ , by the equation,

$$\log F = \log a - b \cdot \log R, \quad (3)$$

where  $a$  is the  $y$ -axis intercept and  $b$  is the slope of the line relating  $\log F$  with  $\log R$ . As Zipf (1949: 514) points out, this is Lotka's Law expressed in different terms. Note that Eqs. (2) and (3) have exactly the same form. Zipf's Law deals with ranks, whereas Lotka's Law deals with frequencies. The equation is the same in both cases, but the exponent,  $b$ , is different with ranks as opposed to frequencies. Lotka's Law (with  $b = 2$  in Eq. (1) or (2)) re-expressed in terms of ranks yields  $b = 1$  for Eq. (3). Pareto's Law re-expressed in terms of ranks is obtained by setting  $b = 0.67$  in Eq. (3) (Zipf, 1949: 489). The same exponent ( $b = 1$ ) that describes the relationship between frequency of words and their rank also describes the population of cities and their rank order in terms of size (Zipf, 1949). In several other cases, Zipf found  $b = 0.5$  – e.g., length of articles in the *Encyclopedia Britannica* and, contrary to Pareto, income.

Yule (1924) was the first to work out the details of distributions such as those of Lotka and Pareto.<sup>1</sup> When dealing with very large numbers, another parameter must be added:

$$N = a/X^b \cdot c^x \quad (4)$$

If logs are taken,

$$\log N = \log a - b \cdot \log X + X \cdot \log c. \quad (5)$$

<sup>1</sup>Yule did this work in connection with describing the number of species in biological genera. Surprisingly, he did not build upon or even cite this paper in his later book (Yule, 1944) on the distribution of word frequencies in literature.

As Simon (1957) points out,  $c$  is usually so close to 1 that the term  $c^x$  can safely be ignored. As we shall see below,  $c^x$  cannot be ignored in describing literary fame.

### 3. Relevance to literary fame

There is some reason to believe that literary fame may be distributed according to equations similar to those described above. Van Peer (1994) explicitly argues that something like Lotka's Law must apply to literary fame. In fact, he elevates such a skewed distribution to the status of a law of literary history. W.H. Auden observed that, because of their very large amount of output, "The chances are that, in the course of his life time, the major poet will write more bad poems than the minor" (quoted by Bennett, 1980: 15). However, I am aware of no quantitative studies of the relationship between productivity and literary eminence.

Quantitative evidence is available about composers. Simonton (1977) found that the best predictor of a composer's eminence was how much he wrote. Extremely eminent composers tend to be just as prodigious in their output as scientists. For example, Bach has over 1,000 extant compositions filling 46 volumes (Albert, 1975). To produce this much, he had to write an average of 20 pages of music per day. At eight hours a day, it would take someone a lifetime just to copy Bach's compositions by hand (Simonton, 1984).

In a study of composers of eighteenth-century American secular music, Dennis (1955) found that 64% of the compositions were written by the 10% of composers who were the most productive. Moles (1958) found that 250 composers are responsible for virtually 100% of regularly performed classical music. Only 16 composers are responsible for 50% of the works performed. As Simonton (1983) notes, this conforms as closely to Price's Law as possible, since  $\sqrt{250} = 15.8$ .

Zipf (1949: 533–534) reports an investigation of the fame of 2100 musical composers as assessed by the length of biographical articles in Cobbett's (1929) *Cyclopedic Survey of Chamber Music*. His results were described by the equation,

$$\log(\text{Fame}) = 3.7 - 1.289 \cdot \log(\text{Rank}).$$

Zipf had expected a slope of 1.0 rather than 1.289. The latter indicates a more steeply increasing exponential curve than would be expected from Lotka's Law.

## 4. Study 1

### 4.1. Method

The 602 poets listed in the *Oxford Books of English Verse* for Middle English and the sixteenth through twentieth centuries (Chambers, 1932; Grierson and Bullough, 1934; Hayward, 1964; Larkin, 1973; Sisam and Sisam, 1970; Smith, 1926)

were chosen for study.<sup>2</sup> The measure of fame was the number of books in the Harvard University Union Catalogue under the subject heading for each name.<sup>3</sup> These are almost exclusively books *about* the author; however, some editions of the author's works with critical introductions or notes are also included. There are also a negligible number of misclassifications – i.e., books *by* the author.

In making the tabulations, it became clear that it gives a poet an advantage also to be famous in a second line of work – e.g., drama, novels, statesmanship. Preliminary analyses discarding such authors showed that (1) it did not make much difference in the results, and (2) decisions as to who to exclude were in general too subjective to be reliable. In only two cases – Henry VIII and Elizabeth I – were authors penalized for having a second job. In these two cases, only books concerning their poetry were counted.

The index of fame analyzed was the binary log of the number of books about the author plus one. (The log of zero is, of course, undefined so it was necessary to add a small constant.) This index was analyzed against the descending rank (the author having the most books getting a rank of 1 and so on). In the case of ties, the mean rank was assigned.

#### 4.2. Results

The distribution of fame is extremely skewed. We find a total of 34,516 books about the 602 authors. Of these, 9118 books are about Shakespeare, 1280 about Milton, and 1096 about Chaucer. At the other end of the scale, 134 of the poets (22.3%) have no books devoted to them. Shakespeare alone is responsible for 26.4% of the books. Price's Law would lead us to expect that  $\sqrt{602} \doteq 25$  authors should be responsible for 50% of the books. However, the top 25 authors in fact account for 64.8% of the books. The top 12 authors account for almost exactly 50% of the books. Thus, literary fame is much more unevenly distributed than wealth or scientific productivity. For the data at hand, half of the books are about  $2.57\sqrt{N}$  or  $N^{0.389} = 12$  of the authors as opposed to the  $\sqrt{N}$  or  $N^{0.5} = 25$  of the authors predicted by Price's Law.

Though it is unevenly divided, literary fame is distributed in a very orderly fashion. Fig. 1 shows the data – number of books vs. rank – before conversion to logs. Note both the relative smoothness of the curve and its extreme exponential decrease. Fig. 2 shows the same data plotted on log-log coordinates. For the data in Fig. 2, Zipf's equation works out to be

$$\log(\text{Fame}) = 16.40 - 1.736 \cdot \log(\text{Rank}).$$

<sup>2</sup> The Oxford anthologies were used because of their comprehensiveness and also because Oxford University Press has published an analogous anthology for French poetry, which was investigated in a study reported later in this article.

<sup>3</sup> Harvard has the largest university library in the world, and its catalogue is organized so as to make tabulations of the sort reported upon in this paper relatively straightforward. There is no reason to expect other than negligible differences had the holdings of European university libraries been tabulated. In any event, I did not have access to the catalogues of such libraries.

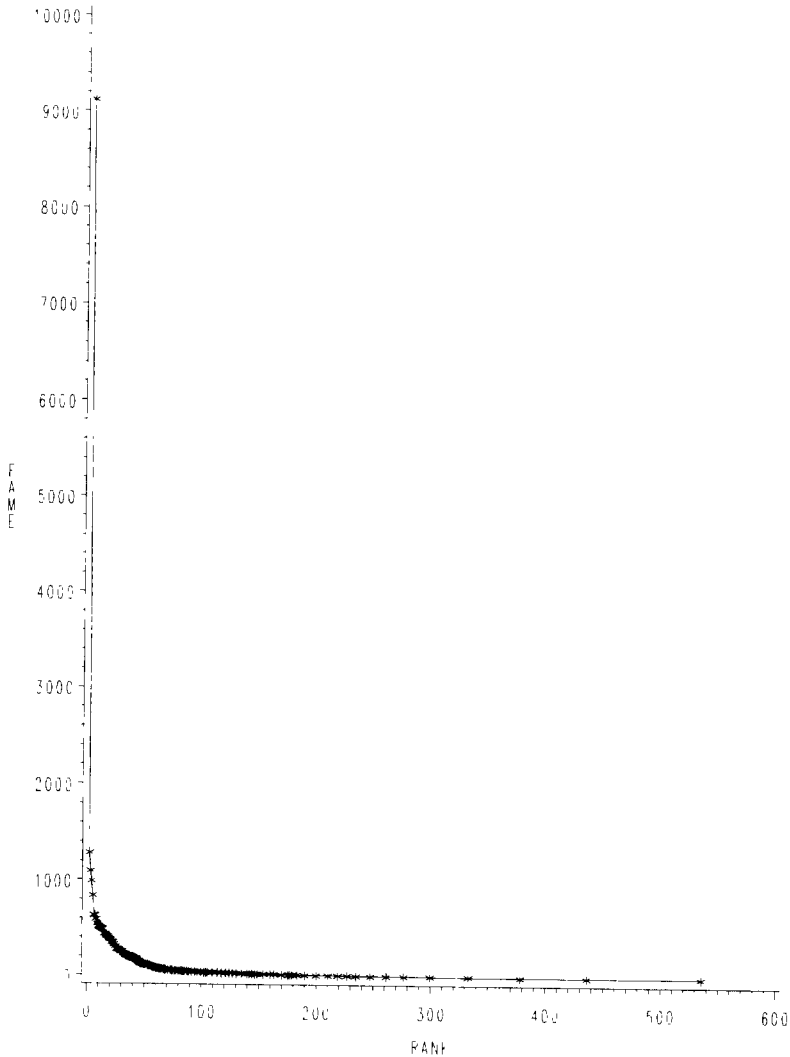


Fig. 1. Fame (number of books about a poet) of British poets plotted against rank order of fame.

The fit of the equation is shown by the dashed line in Fig. 2. The fit is quite good:  $F(1,600) = 9,976.41$ ,  $p < 0.0001$ , <sup>4</sup>  $R^2 = 0.943$ . ( $R^2$  tells us how well the data are fit by the equation. An  $R^2$  of 1.00 indicates a perfect fit, whereas an  $R^2$  of 0.00 means no fit at all.) From either Zipf's Law or Lotka's Law, we would expect the slope to be  $-1.0$  rather than the steeper  $-1.736$  that is found. Thus, we have further evidence that literary fame is distributed more inequitably than we would

<sup>4</sup> For all of the  $F$ -tests reported in this article,  $p < 10^{-32}$ . That is, the probability of obtaining such a large  $F$  by chance is far less than 1 in a billion, billion, billion.

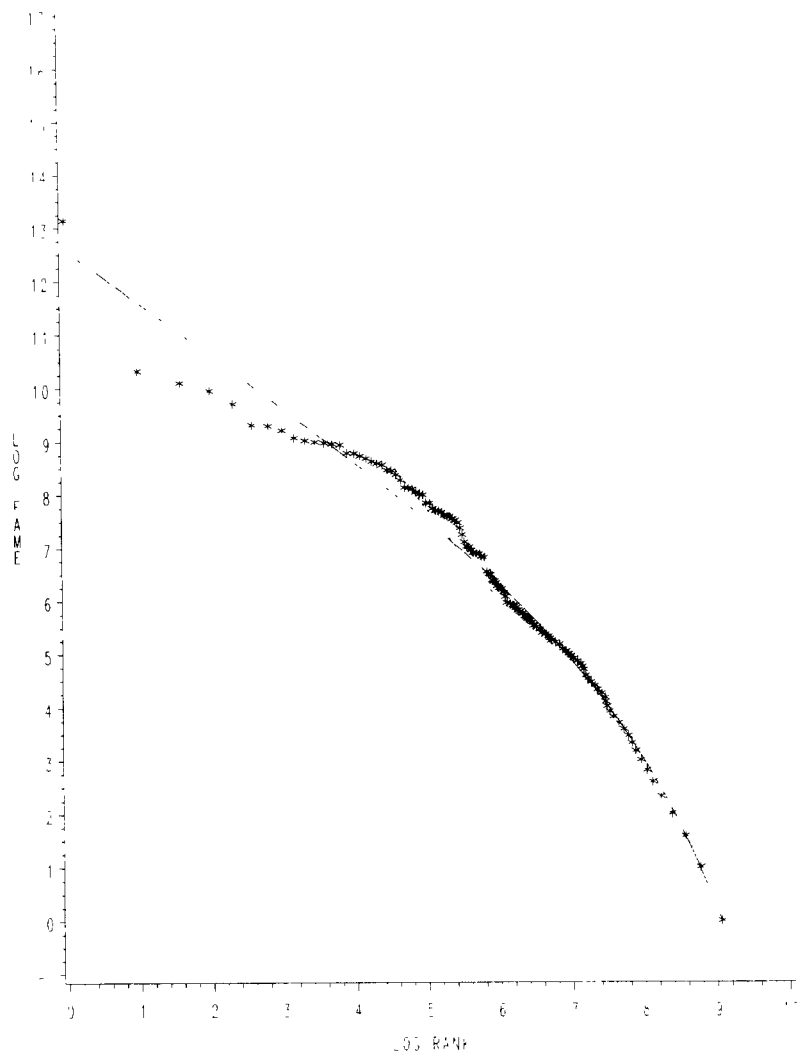


Fig. 2. The data from Fig. 1 (fame of British poets) plotted on log-log coordinates. The fit of Zipf's equation (-----) and of Yule's equation (——) is indicated.

have expected from laws governing scientific productivity. It is certainly distributed far more inequitably than income: Pareto's Law would lead us to expect a slope of  $-0.667$ .

A glance at Fig. 2 shows that Zipf's or Lotka's Law wildly overestimates the number of books about highly eminent poets. If we work out the mathematics, we see that the equation thinks that Shakespeare deserves to have over 87,000 books rather than the 'mere' 9,118 that are in fact devoted to him. The reason that  $R^2$  is so high in spite of such overestimation is that the equation provides an extremely good fit across most of the range. If we split the poets into a highly eminent group

(the top 32) and a less eminent group and fit equations to the two groups, we find quite different slopes. For the highly eminent group, we obtain

$$\log(\text{Fame}) = 11.71 - 0.761 \cdot \log(\text{Rank}).$$

However, the fit is not very good:  $F(1,32) = 242.93$ ,  $p < 0.0001$ ,  $R^2 = 0.89$ . For the less eminent group, we obtain

$$\log(\text{Fame}) = 19.26 - 2.08 \cdot \log(\text{Rank}),$$

with  $F(1,568) = 24,444.33$ ,  $p < 0.0001$ ,  $R^2 = 0.977$ . Thus, among highly eminent poets, fame is distributed approximately as wealth ( $b = 0.761$  as compared with Pareto's  $b = 0.667$  for income). Among the less eminent, fame is far more inequitably distributed ( $b = 2.08$ ).

However, the Yule equation gives us an even better fit across the entire range:

$$\log(\text{Fame}) = 12.603 - 0.976 \cdot \log(\text{Rank}) + 0.995^{\text{Rank}}$$

In this case, the fit is almost perfect,  $F(1,600) = 188,754.79$ ,  $p < 0.0001$ ,  $R^2 = 0.997$ . The fit of this equation is shown by the solid line in Fig. 2. We can use the test proposed by Meng et al. (1992) as implemented by a program developed by Clarke and McKenzie (in press) to see if the predictive value of the equations is significantly different. If we compare the Zipf equation with the Yule equation, we obtain  $z = 35.32$ ,  $p < 0.0001$ , indicating that the Yule equation provides a much better fit.

## 5. Study 2

In order to test the generality of the findings of Study 1, books about the 108 French poets included in the *Oxford Book of French Verse* (Jones, 1957) were tabulated. The procedure was the same as followed in Study 1. A total of 7,787 books were located. The distribution of these books more closely follows Price's Law, with 53% of them being about  $\sqrt{108} \doteq 10$  authors. The distribution is less skewed than the one found in Study 1. The top author, Voltaire, has 706 books. At the other end of the scale, only 6 or 5.6% of the authors have no books devoted to them. However, it should be noted that the present sample consists of a more elitist sample than the British series – 108 as opposed to 602 poets covering about the same time period.

The distribution is shown on log-log coordinates in Fig. 3. Zipf's equation provides a significant fit:

$$\log(\text{Fame}) = 13.35 - 1.69 \cdot \log(\text{Rank}),$$

$F(1,106) = 643.32$ ,  $p < 0.0001$ ,  $R^2 = 0.859$ . The slope of  $-1.69$  is comparable to that found in Study 1. As may be seen in Fig. 3, the equation again overestimates the number of books about highly eminent poets.

Once more, the Yule equation,

$$\log(\text{Fame}) = 9.664 - 0.345 \cdot \log(\text{Rank}) + 0.956^{\text{Rank}},$$

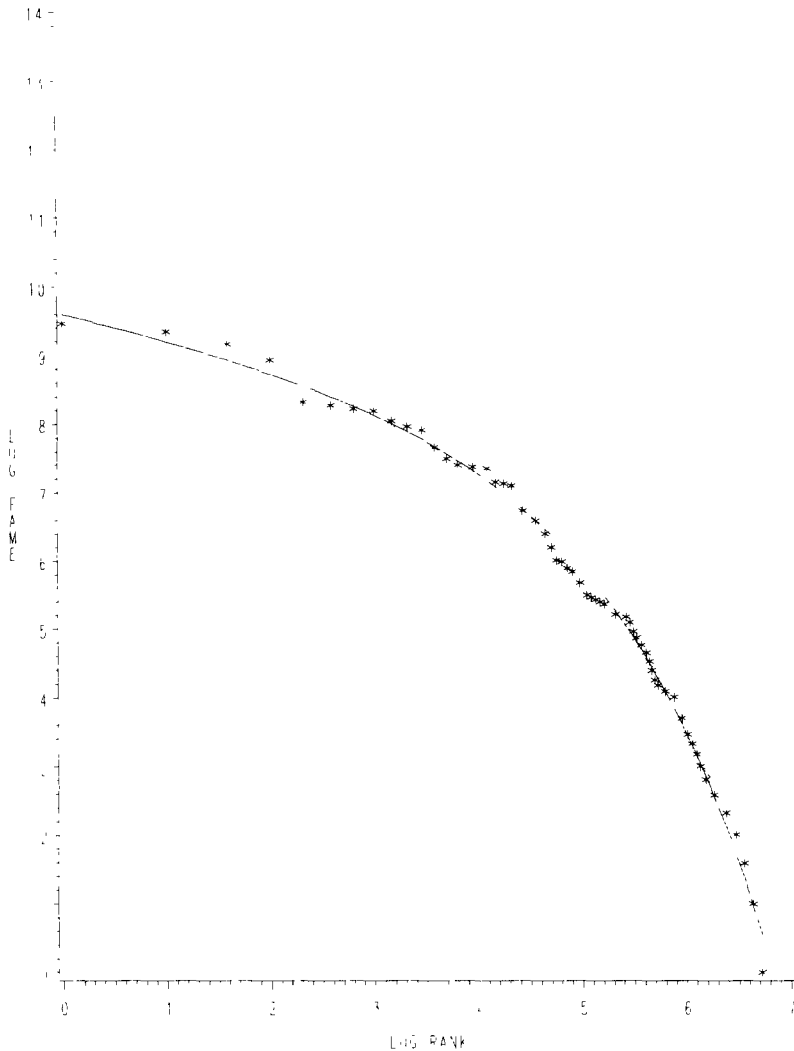


Fig. 3. Fame of French poets plotted against rank order of fame on log-log coordinates. The fit of Zipf's equation (-----) and of Yule's equation (——) is indicated.

provides a much better fit:  $F(1,106) = 17,501.48$ ,  $p < 0.0001$ ,  $R^2 = 0.994$ . Meng et al.'s test gives  $z = 16.05$ ,  $p < 0.0001$  when the two equations are compared.

### 6. Study 3

As another test of generality, books about the 51 American poets studied by Martindale (1990) were tabulated. The poets were selected from Ellmann (1976),

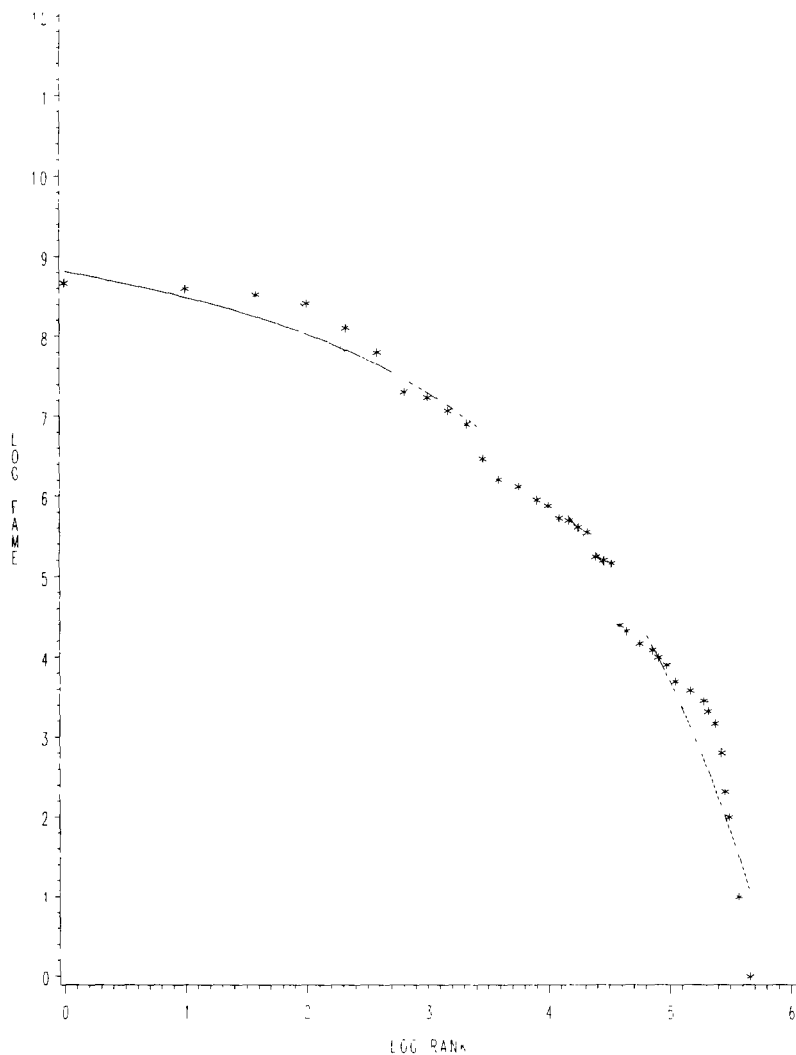


Fig. 4. Fame of American poets plotted against rank order of fame on log-log coordinates. The fit of Zipf's equation (-----) and of Yule's equation (——) is indicated.

Markham (1934), Untermeyer (1931), and Vendler (1985) to give a sample of eminent American poets born between 1750 and 1949. The 3,609 books about these poets are distributed in a more skewed fashion than we would expect from Price's Law, with the top  $\sqrt{51} \doteq 7$  accounting for 60% rather than 50% of the total. The distribution is shown in Fig. 4.

Zipf's equation,

$$\log(\text{Fame}) = 11.55 - 1.60 \cdot \log(\text{Rank}),$$

is significant,  $F(1,49) = 236.30$ ,  $p < 0.0001$ ,  $R^2 = 0.83$ . The slope of  $-1.6$  is comparable to what was found with British and French poetry and appreciably steeper than we would expect from Zipf's or Lotka's Laws. As shown in Fig. 4, the equation overestimates at both the high and low ends of the range.

The Yule equation,

$$\log(\text{Fame}) = 8.953 - 0.19 \cdot \log(\text{Rank}) + 0.912^{\text{Rank}},$$

shows a better fit:  $F(1,49) = 1,320.44$ ,  $p < 0.0001$ ,  $R^2 = 0.964$ . This is confirmed by Meng et al.'s test:  $z = 5.76$ ,  $p < 0.0001$ .

## 7. Discussion

Literary fame is distributed in an extremely skewed fashion. If we use Zipf's equation, we see that it is more inequitably distributed than wealth (Pareto), scientific productivity (Lotka), or word frequencies (Zipf). However, Zipf's equation does not really provide a very good description of the distribution. In the upper reaches of eminence, fame is distributed in a fashion similar to wealth; whereas in its lower ranges the distribution is markedly more skewed. An equation first investigated by Yule (1924) captures the distribution of fame across its entire range far better than the equations investigated by Zipf, Lotka, and Pareto.

Our results are clear, but the cause of them is not immediately obvious. The simplest explanation would be that fame may be due to more or less random factors. A possible cause of skewed distributions has been called 'accumulative advantage' (Allison, 1980). The more famous one is, the easier it is to become even more famous. Thus, it is very difficult to get a first novel published. If it is published, it is unlikely to receive critical attention unless it was published by the 'right' publisher (Van Rees, 1983). If the first novel is successful, it is easy to publish another. Success causes success. Thus, a prime determinant of how much attention a writer gets from literary critics is how much attention he has already gotten from other critics (Verdaasdonk, 1983). In economics, the analogue of accumulative advantage is called increasing returns: Once a product becomes popular enough, it can come to dominate a market (Arthur, 1989, 1990). This can happen even if the product is no better than its competitors. In video recording, Beta actually has some advantages over VHS; however, the latter came to dominate the U.S. market. Slightly more people owned VHS recorders, so there was a slightly greater incentive to produce products for them. Over time, more VHS tapes led to more VHS recorders. The process accelerated until VHS completely dominated the market. A more striking example concerns why all clocks move in a clockwise rather than counter-clockwise direction. Either direction would do, and both types of clocks were made during the Renaissance. Presumably, more or less random factors led to a complete dominance of clockwise clocks. If we had an objective measure, it might turn out that Shakespeare is not a whit better than any other poet, that he owes his fame to chance and the law of increasing returns. To

anyone who has read very much poetry, this possibility does not seem at all plausible, though.

Economics also helps to shed light on why literary fame in its upper reaches is more equitably distributed than in its lower ranges, for why Yule's equation describes the data better than Zipf's. In economics, the general rule is not increasing returns but decreasing returns. For every car that General Motors sells, there is one less customer for another General Motors car: The market saturates beyond a certain point. In the case of books about poets, beyond a certain point, the law of diminishing returns sets in. Because there are already so many books about Shakespeare, there is more 'profit' to be had from writing one about Milton or Byron.

Psychological factors are also no doubt important. The more books there are about a given author, the more difficult it becomes to write a book saying anything new or interesting about the author. From the perspective of readers, habituation or satiation will certainly be a factor (compare Martindale, 1990). Holding constant intrinsic interestingness, the more books one has read about, say, Shakespeare, the less interesting the next one will seem to be. Sociological factors are also no doubt of importance. In order to show that they are competent, literary critics must give the impression that they can distinguish good literature from bad. Verdaasdonk (1985) argues that this leads them to assign fame in a very skewed fashion: the fewer authors they see as good, the more discriminating they appear to be.

It could be argued that literary fame is a product of two main factors. First, the quality of poets' works is in fact distributed in a skewed fashion such that there are a few very good poets, quite a few who are adequate, and a large number who are really not very good. Second, critics amplify these differences so that 'the rich get richer and the poor get poorer'.<sup>5</sup>

Let us consider the first factor. Dennis (1954b) proposed a simple explanation for distributions such as those discussed in this article. In our case, his argument would be that the potential for literary fame is normally distributed. However, unless one is above some cutoff point, he or she will receive no fame at all. Thus, according to Dennis, graphs such as Fig. 1 represent the upper tail of a normal distribution. As Simon (1954) quickly pointed out, graphs such as Fig. 1 are far, far too skewed to be accounted for in such a fashion.

Creative productivity seems to be based upon the presence of several factors, none of which is especially rare. The problem is that they must *all* be present. If one is lacking, the person will not be creative (Eysenck, 1993; Martindale, 1989). Thus, to be creative, one needs the potential for creative thinking, ambition, interest in his or her endeavor, and so on. As far as we know, these factors are distributed in a normal or Gaussian fashion (Eysenck, 1993). However, if *all* of the

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<sup>5</sup> Of course, literary merit is not an immutable quantity like mass or distance. Perceived quality varies with time and place, but it is not plausible that it is completely in the eye of the beholder. The tastes of literary critics do vary considerably across time but, rather than being capricious, tend to follow lawful patterns (Martindale, 1990; Rosengren, 1985).

factors must be present, they are combined in a multiplicative rather than an additive fashion. This results in an extremely skewed distribution (Burt, 1943; Shockley, 1957; Simonton, 1987). Such a distribution has a peak, but is skewed much more in one direction than in the other. The assumption is that those below the peak do not have sufficient creativity to produce anything. The result is a hyperbolic distribution of the sort described in this article.

By way of contrast, activities where success can be had by various routes can be described as arising from addition of normally distributed factors. A simple example would be college grades. High grades can be obtained by being very intelligent *or* by working very hard *or* by taking easy courses *or* by cheating. As a result, college grades tend to be distributed in a Gaussian fashion. The distribution of income is less skewed than the distribution of fame. The probable cause is that income is determined by both multiplicative and additive factors. To be rich, one must have both the desire to be rich and the opportunity. However, opportunity can be attained either by inheritance *or* by hard work, etc.

Even if actual literary merit is skewed, it does not seem plausible that it is skewed as much as fame. We know from studies of science that citation frequency is more skewed or elitist than the distribution of publications (Allison, 1980b; Allison et al., 1982). Merton (1968) called this the Matthew effect, after the verses from Matthew 25:29, “Unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath”. If we had an objective way of determining literary quality, it does not seem at all likely that we would find Shakespeare (with 9,118 books) to be 44 times better than Marlowe (with 205 books) or 4,559 times better than John Cleveland (with 2 books). Accumulative advantages may certainly explain part of the critical magnification of fame. The audience for books about Shakespeare is larger than that for books about Marlowe. Thus, more books on Shakespeare are published. This makes him even more famous in a vicious circle.

It may also be that we perceive literary quality in a systematically distorted way. If people are asked to judge the perceived intensity of a stimulus,  $S$ , we find that  $S$  varies as a function of physical intensity,  $I$ , as follows:

$$S = k \cdot I^p$$

where  $k$  is a constant and  $p$  is a power that varies according to sensory modality (Stevens, 1976). For example,  $p = 0.3$  for judgments of the brightness of lights (perceived intensity increases more slowly than physical intensity),  $p = 1.0$  for judgments of length (perceived and actual length have a 1:1 relationship), and  $p = 3$  for shock (perceived intensity is an exponentially increasing function of physical intensity). If literary merit is transformed into fame by a psychophysical ‘shock of recognition’ (Wilson, 1943), the greater an author’s merit, the more it would be amplified by readers.

Whatever the causes of the distribution of fame, one clear consequence is that the canon of great authors is fairly immutable in its upper ranges. In terms of number of books, the leaders are so far ahead that it is hard to see how neglected authors could catch up. For even Milton to surpass Shakespeare, we should need

to publish about 78 books per year on Milton in each of the next 100 years, or 7,838 books on Milton all published next year. Neither is going to happen. For more neglected authors, the odds are far more formidable. Cleveland is certainly a neglected author, but to fix this in any meaningful way, scholars are going to have to write at least a few dozen books about him.

It should be noted that we can view the canon from another perspective. From an objective or static point of view, it is fairly frozen in its upper ranges. Harvard does have 1,218 books about Milton. However, if nobody reads them, they do not reflect Milton's current impact value. It would be an interesting project to examine library circulation records for books by or about the poets investigated in this article. Another worthwhile project would be to examine the number of books published about the poets on a decade by decade basis. Rosengren (1985) has shown that the attention paid to an author by critics tends to rise to a crest and then settle down to a lower level.<sup>6</sup> I expect that a Zipf or a Yule distribution would describe the data emerging from such studies but that the rank ordering of authors would be rather different.

Another consequence of the distribution of fame is that it distorts our vision of literary history. I have elsewhere argued that literature evolves in a gradual evolutionary fashion and presented very clear quantitative evidence that this is the case (Martindale, 1990). One reason that this was not blatantly obvious a long time ago is the way narrative literary histories are written. A large amount of space is devoted to famous authors and rather little or none at all to the less famous. Thus, the 'missing links' that carried the influence of an earlier poet to a later one are glossed over or left completely unmentioned. By the same token, neglect of women writers – e.g., Mary Herbert or Anne Finch – can certainly distort our perception of what really happened in literary history.

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<sup>6</sup> Cf. Rosengren (1987) on the 'missing links' carrying the influence of an earlier poet to a later one; see Rosengren (1983: 128–132) for quantitative data about neglect of women in the literary tradition.

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