

Comment on “How Science Survived: Medieval Manuscripts’ ‘Demography’ and Classic Texts’ Extinction”

Georges Declercq

Exciting though it may seem, the mathematical model developed by Cisne (Reports, 25 February 2005, p. 1305) to analyze the transmission of texts and manuscripts from Antiquity and the Middle Ages does not hold up to scrutiny. It seriously underestimates the losses, thus leading to conclusions that are unwarranted.

Cisne (1) introduced a mathematical model from population biology—the Verhulst equation of logistic growth—as a way of studying the transmission of ancient texts and medieval manuscripts. After testing this model on the works of the Venerable Bede (735 A.D.), he claimed that more texts and manuscripts survived than was previously thought.

Cisne’s figures suggest a two in seven survival rate for Carolingian manuscripts of Bede’s most popular textbook, *De Temporum Ratione* (DTR), which would imply a total population of just under 300 copies in the ninth century. This appears to be a serious underestimate for a book of this vintage. DTR was a cornerstone of Carolingian education. Ever since Charlemagne placed the study of calendars on the curriculum in 789 A.D., the work has been heavily copied, frequently excerpted, and often rearranged in anthologies (2–4). The limiting size was therefore well above 300. The Carolingian empire alone included 180 cathedrals and 700 monasteries (and hence 880 libraries) (5). Including England and Ireland, the saturation level rises at least to 1000. Moreover, the surviving evidence shows that many libraries had multiple copies of this standard textbook (4). The losses must consequently be far greater than the model indicates, the more so as textbooks were subject to hard wear and misuse by students (3).

In the absence of quantitatively based figures, Cisne used three instances of cohort survivorship to crosscheck his estimates. All three suggest figures similar to those obtained by the model. However, the first example (Tours) is not valid because it is based not on real figures but on a guess by a paleographer. The other two (Bobbio and Exeter) are

anecdotal and not representative, for there are other cases that contradict his figures (6, 7). Moreover, both instances concern the survival rate of manuscripts from particular libraries, whereas the model purports to address the survival of manuscripts of individual texts. Nevertheless, library figures can be interesting. In Great Britain, more than 6000 medieval books from some 500 libraries are still identifiable today, but they are unevenly distributed: Nearly half of these books come from only 14 libraries, whereas there are more than 400 libraries from which we have only between 1 and 10 books (8). These figures show that, contrary to Cisne’s assertion, the losses must be tremendous and practically immeasurable.

The assumptions on which the model is based are equally problematic. A constant environment, “death rate,” and limiting size make no sense in the case of manuscripts (9). According to Cisne, these assumptions nonetheless apply to what he calls “ideologically neutral” texts such as Bede’s technical works, which seem to fit the model, in contrast to a religious work by the same author, which does not. To explain this contrast, there is no need to invoke a vague concept, which certainly does not apply to DTR, whose main subject was the highly controversial issue of Easter reckoning (10).

The manuscript evidence of most texts circulating in the Carolingian period will show an exponential growth in the ninth century, not only because the official promotion of learning and the introduction of a new unified script stimulated the production of manuscripts, but also because the vast majority of pre-Carolingian manuscripts ultimately disappeared as their script rapidly became unfamiliar, thus accentuating the trend. Only 500 manuscripts survive for the Merovingian period (500 to 750 A.D.), versus 7000 for the Carolingian empire (751 to 900 A.D.) (11). Moreover, many works current in Carolingian times were outdated by the 12th

century. The numbers of surviving manuscripts consequently taper off, as these “old” works could maintain themselves only to a certain extent in their traditional monastic environment (2, 12).

As DTR and Bede’s other technical works follow this general trend, the cumulative age distribution of the surviving manuscripts will inevitably take the form of a somewhat sigmoidal curve. This shape apparently suggested to Cisne the potential applicability of the logistic growth equation. Nobody will dispute that the curve reflects the transmission dynamics of the text, and thus the number of manuscripts that were once in existence. Given the uncertainties, though, it is virtually impossible to estimate even roughly what proportion of manuscripts has survived, let alone to determine exactly the fraction of manuscripts surviving from any time in the past; Cisne’s supporting material contains an equation that assumes just that. The far-reaching conclusions he draws from his model, not only regarding the survival of manuscripts but also concerning that of the texts themselves and even of science in general, are therefore not warranted.

References and Notes

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Department of History, Vrije Universiteit Brussel, Pleinlaan 2, Brussels, B-1050, Belgium. E-mail: georges.declercq@vub.ac.be