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R. P. DUNCAN-JONES

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The Ages of Aurelius Isidorus

April 297	35
April 308	37
August 308	40
before June 309	45
June 309	40

(P. Cair. Isid. p. 394)

*I. Introduction**

Census-returns from developing countries frequently show a preponderance of ages reckoned in fives or tens, even at the present day.[1] It is obvious that the true proportion of individuals with ages reckoned in fives in any population must normally be about one-fifth of the total (20 %), since there is no reason why on average more

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BACHI (1951) = R. BACHI, The Tendency to Round off Age-returns: Measurement and Correction, Bulletin of the International Statistical Institute 33 pt. 4, 1951, 195–222.

ERE = R. P. DUNCAN-JONES, The Economy of the Roman Empire: Quantitative Studies, 1974.

HARKNESS (1896) = A. G. HARKNESS, Age at Marriage and at Death in the Roman Empire, TAPhA 27, 1896, 35–72.

LEVISON (1898) = W. LEVISON, Die Beurkundung des Civilstandes im Altertum. Ein Beitrag zur Geschichte der Bevölkerungsstatistik, BJ 102, 1898, 1–82.

MÓCSY (1966) = A. MÓCSY, Die Unkenntnis des Lebensalters im römischen Reich, AAnt Hung 14, 1966, 387–421.

SZILAGYI, (13–19) = J. SZILAGYI, AArchHung 13, 1961, 125–155; 14, 1962, 297–396; 15, 1963, 129–224; 17, 1965, 302–334; 18, 1966, 235–277; 19, 1967, 25–59.

[1] See Appendix III, BACHI (1951) and n. 3 below.

should have ages ending in one digit than in another. But we often find a much higher proportion than 20% reported in age-figures for developing countries. For instance in the Turkish census of 1945, 58% of all adults gave their age as a multiple of five years.[2] The usual reason for the deviation observed in modern censuses is ignorance of exact age, which encourages the use of approximations reckoned in fives or tens.[3] This is also clearly illustrated in antiquity. Aurelius Isidorus, a prosperous Egyptian landowner whose case is quoted above, manifestly does not know how old he is. He even grows younger at one point, his age dropping from 45 years before June 309 to 40 at that date; and in four years out of five his age appears as a multiple of five.

Another symptom of deficient education which is particularly marked in developing countries is illiteracy. Like age-rounding, illiteracy is usually more pronounced among women than among men, reflecting their reduced educational opportunities. The excess proportion of fives in the census-returns for a sample of developing countries correlates significantly with the proportion of illiterates in those countries.[4] This suggests that illiteracy and ignorance of age are often allied phenomena.[5] They need not be coextensive, since illiteracy is still found to a significant extent in some countries whose published age-distributions show no deviation from the norm.[6] But there appear to be few instances in available modern evidence where heavy age-rounding is not accompanied by a significant degree of illiteracy (Appendix III).

This has interesting implications for our interpretation of age-evidence from the Roman Empire. More than 40,000 extant inscriptions give the age at death of members of the Roman population. Almost every part of this substantial sample shows a very large excess of ages divisible by five.[7] The tendency is least pronounced

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[2] Methods of Appraisal of Quality of Basic Data for Population Estimates (Manuals on methods of estimating population, no. 2, United Nations ST/SOA Series A, Population Studies no. 23), 1955, 35 and 41.

[3] In India census-takers have also had to contend with difficulties caused by individuals with religious reasons for concealing their true age: see J. HUTTON, in: Census of India 1931, 1, 1, 81. Nevertheless the chief cause of age-rounding there was ignorance (op. cit. cf. 84–5).

[4] See Appendix III.

[5] Isidorus, who was called *agrammatos* and had to declare his property through an intermediary for this reason (P. Cair. Isid. 4, 5), was evidently illiterate (cf. H. C. YOUTIE, HSCPh 75, 1971, 172).

[6] The absence of age-rounding can be difficult to establish from published age-data, since these are sometimes deliberately smoothed, in order to eliminate heaping at particular digits. This is explicitly the case with the published figures for the census of India in 1951 (Demographic Yearbook 1955, p. 320, n. 28; for unsmoothed Indian data, showing extreme rounding tendencies, cf. n. 3 above.)

[7] The evidence comes from the western half of the Empire and mainly belongs to the first three centuries A. D. The age-data, published in SZILAGYI (13–19, 1961–7), has already

in members of the leisured class, and is usually more pronounced in women than in men. After allowing for the difficulties of reckoning in Roman numerals and the awkwardness of Roman dating-systems, it is still difficult to avoid the conclusion that this population, like most modern populations where age-rounding is endemic, was probably characterised by widespread illiteracy. This impression is strengthened by evidence from Roman Egypt, which shows a substantial proportion of the propertied class as signing documents through intermediaries, apparently because of incapacity to sign their names.[8] But the tombstone figures offer grounds for a more pessimistic view of the state of literacy in the mass of Roman society than the one usually adopted.[9]

We cannot translate age-rounding propensities of different social strata into varying degrees of illiteracy, since the relation between ignorance of age and illiteracy is not linear. Nevertheless, sustained patterns of variation in age-rounding give the index a clear importance as a regional and social indicator. Tombstones from one area for example show that the accuracy of age-information progressively deteriorated with increasing distance from the provincial capital.[10] And social variation in age-rounding sometimes suggests wide gaps between the educational standards of different classes. The hierarchy of attainment is what we would expect for the most part. But the quantitative differences illuminate social variation in more detail than other available evidence. And age-rounding data whose hierarchy reverses expected social gradations may offer material for further investigation.

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been utilised for a study of rounding by MÓCSY (1966), partly also building on work by LEVISON (1898). (Cf. M. CLAUSS, Chiron 3, 1973, 395–417, at 396–8, and Antiquités Africaines 9, 1975, 109–10.) A new statistical approach has been adopted here, because of weaknesses of the aggregative method used by MÓCSY and LEVISON (see p. 337 and Appendix I below). The present survey also considers comparative data from more recent periods (section VI), and makes a more extensive social and regional analysis of the Roman evidence. MÓCSY did not distinguish between the sexes, and utilised all age-evidence from 20 upwards. There are compelling reasons for selecting a more restricted age-span; rounding intensifies at the top of the age-spectrum (Appendix I), with the result that in samples with no upper age-limit it will appear greatest where there happens to be a large proportion of high ages. For differences between the present results and those of MÓCSY, see Table 9, Appendix I.

Over 2,000 ages of persons with Greek names are collected by B. E. RICHARDSON, Old Age among the Greeks, 1933, 231–3; 277–360. Unfortunately the sample is an amalgam of evidence from all over the Mediterranean and has little usefulness as it stands.

[8] R. CALDERINI, Aegyptus 30, 1950, 14–41. Over two-thirds of known applicants for the corn-dole in third-century Oxyrhynchus were illiterate (cf. J. D. THOMAS, CR 26, 1976, 111). H. C. YOUTIE emphasises the theoretical possibility that a person unlettered in Greek may still have been literate in Egyptian. But this can hardly be true of all the evidence for illiteracy in Egypt (HSCPh 75, 1971, 161–76; GRBS 12, 1971, 239–261).

[9] For current views, see C. M. CIPOLLA, Literacy and Development in the West, 1969, 38–9; cf. H. I. MARROU, Histoire de l'éducation dans l'antiquité[6], 1965.

[10] See section IV below.

Peculiarities of the Roman evidence

Roman numerals are notoriously clumsy, difficult to reckon in and prone to induce error. And the dating system which identified each year by the names of consuls could only be used to compute the lapse of years in conjunction with a list of consuls.[11] Dating by years of the Emperor was more practical, but still inferior to a continuous numerical series, especially when reigns were short.[12]

Such obstacles may have made age-reckoning difficult, even for those who were perfectly able to identify the year of their birth. Consequently, deficient awareness of age in Roman populations might be to some extent the fault of clumsy Roman chronography, not a reflection of limited education. Quite apart from this, we know that the Romans used five-year periods (*lustra*) for reckoning time in some contexts.[13] Ages reckoned in fives might derive from this practice, and thus be a stylistic peculiarity rather than a token of restricted age-awareness.

Hence there are two possible objections to interpreting the Roman age-rounding evidence on a par with similar evidence from the twentieth century. But neither of these arguments is strong. We see from social analysis of this evidence that members of the upper class were regularly capable of achieving near-accurate statement of age, despite the barriers that have been mentioned.[14] Perhaps more important, parts of the Empire where continuous numerical dating was practised show little perceptible sign of better age-accuracy than other areas.[15] And the range of regional and social variation in age-rounding is so great that the phenomenon cannot be chiefly ascribed to limitations of numerical and dating systems that were effectively shared by the society as a whole.

There are two main reasons for thinking that *lustra* were not a dominant influence on Roman age-rounding.[16] First, age-rounding is very marked in many

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[11] For use of this method of reckoning age at a legal hearing, see Apuleius, apol. 89. For use of consular dates under the Empire see also H. DESSAU, ILS III index 5.

[12] For dating by years of the Emperor, cf. ILS III index 3 and P. BURETH, Les titulatures impériales dans les papyrus, les ostraca et les inscriptions d'Égypte, 1964.

[13] Cf. TLL s. v. lustrum. For this suggestion, cf. R. ÉTIENNE – G. FABRE, in: Recherches sur les structures sociales dans l'antiquité classique, 1970, 81–97.

[14] See section II below.

[15] Of the 1621 inscriptions from Mauretania Caesariensis and Mauretania Sitifensis listed in the first part of CIL VIII (nos. 8367–9987), approximately 170 or 10.5 % contain dating by the year of the province (see CIL VIII, part 5, pp. 179–182). This proportion of dating indications is exceptionally high. Rounding in Mauretania was on average about the same as in Africa and Numidia, significantly higher than in Italy, Rome or Gaul (see Table 8).

[16] It is also worth noticing that Roman soldiers, although prone to round their ages (Tables 3 & 4), showed very little tendency to think in fives when recording their length of service, about which direct official information was available. For the span 3–27 years, periods of service divisible by 5 made up 23.4 % of data at Rome, 21.7 % in Germany and 22.1 % in Africa. The deviations from a normal distribution are almost negligible (data in LEVISON [1898] 22).

modern and post-mediaeval societies which are not known to have had five-year cycles.[17] *A priori,* its occurrence in a given society is more likely to be due to whatever general cause governs the other cases than to any special local factor. Secondly, if the *lustrum* dominated the Roman evidence, preference for 5 should be comparable in frequency to preference for 0. But there is actually a marked discrepancy, as in the modern evidence. There is no predilection for five-year intervals as distinct from ten-year intervals which is not also found in societies where the institution of the *lustrum* is unknown. In fact preference for 5 compared with preference for 0 is significantly weaker in Roman evidence than in some of the modern countries where age-rounding occurs (see Table 1).[18]

Table 1

Ages ending in 5 as proportion of ages ending in 0 (range 23–82)

	Males + females
Roman Empire	
1. Africa	.909
2. City of Rome	.840
3. Italian cities	.763
4. Spanish cities	.718
Modern evidence	
5. Ceylon 1963	1.067
6. Brazil 1950	.944
7. Guatemala 1950	.943
8. Mexico 1970	.939
9. Nicaragua 1963	.920
10. Egypt 1947	.865
11. Iran 1966	.808
12. Morocco 1960	.717

Sources: 1–2: HARKNESS (1896); 3–4: SZILAGYI 14, 301; 15, 147; 5–12: see Appendix III.

Analysis

The index-figures for rounding are calculated as follows. A separate percentile analysis has been made of the proportion of ages divisible by 5 in each of the four decades from 23 to 62. The results are averaged to produce an overall percentage for the sample. The deviation from a normal proportion of ages divisible by 5 is then placed on a scale running from 0 to 100 by subtracting 20 from the percentage and multiplying the result by 1.25. For example where the actual percentage of fives is 24, the deviation will be registered as $(24–20) \times 1.25 = 5$; where the percentage is 84, the deviation will register as $(84 - 20) \times 1.25 = 80$. (See also Appendix I).

[17] See section VI.

[18] Two of the countries listed in Appendix III have been omitted from Table 1, Turkey because age-data is not available above 65, and Iraq because the age-data shows strong secondary heaping at ages ending in 7, which makes it atypical.

II. Class-differences in age-rounding

Age-rounding is most prevalent among those of servile birth and troops of low status, and least prevalent among town-councillors, the highest social group present in our evidence. Its incidence thus appears to be an inverse reflection of social and educational advantages, not a random function. Evidence from Italy shows the following pattern:

Table 2
Age-rounding by males in Italy (excluding Rome)

	Rounding index (sample in brackets)
Town-councillors	15.1 (75)
Civilian citizens and *incerti*	42.8 (904)
Fleet-troops (Italy and Rome)	47.2 (299)
Freedmen and slaves in Italy	49.5 (117)

Sources: SZILAGYI 14, 298–301; 15, 133–41; 149–50; LEVISON 44. The main data from SZILAGYI comes from his samples for ‹small› communities in Italy, and Ostia, Puteoli, Aquileia and Mediolanum.

In terms of accurate age-awareness, these figures mirror the social hierarchy, with members of the propertied class far above the level of other citizens, and citizens in general somewhat above such non-citizens as fleet soldiers and slaves. The deviation from accuracy by Italian town-councillors is about one-third that of the adjacent group. It should probably be regarded as an authentic indication of the age-awareness of upper-class citizens in Italy. Such evidence about town-councillors as is found in Africa suggests a very similar picture: the rounding index for town-councillors, magistrates and flamens is 17.5 (N = 34). This is about one-third of the overall average for males in Africa and Numidia (51.4).[19]

Evidence at Rome for females shows a similar pattern of social differentation.

Table 3
Age-rounding by women at Rome

	Rounding (sample in brackets)
Women of citizen birth and *incerti*	48.9 (1003)
Freedwomen	52.9 (279)
Slaves (first 3 decades)	(58.8) (89)

Sources: SZILAGYI 15, 131; 149; 150.

Evidence for males at Rome is rather indeterminate.

[19] The other main class-variant ascertainable in Africa refers to soldiers at Lambaesis: their rounding is 2 points below that of male civilians at the same town (54.4, N = 270, compared with 56.4, N = 189). The difference is relatively minor.

Table 4
Age-rounding by men at Rome

	Rounding (sample in brackets)
Land-troops	37.9 (408)
Civilians and *incerti*	48.4 (1271)
Freedmen	47.4 (295)
Slaves	48.5 (132)

Sources: See Table 3 (land-troops from LEVISON 29).

The only clear division here is between land-troops and civilians. The troops, whose title to citizen birth is unequivocal, show rounding 10 or 11 points lower than the others. The civilian figures reveal no significant variation between the three different groups. They are thus at variance both with the figures for Italy and with the corresponding female figures for Rome, where the gap between those of citizen birth and slaves is substantial. The male figures nevertheless seem to imply, not for the first time, that the citizen body at Rome contained a large, and perhaps overwhelmingly large, freedman element.[20] (As noted by WEAVER and L. R. TAYLOR, many freedmen did not explicitly describe themselves as such in their epitaphs; such individuals appear as citizens or *incerti* in the sample derived from SZILAGYI.)[21]

Despite blurring in the male figures from Rome, the impression conveyed by the class-differences in age-rounding is one of significant reflection of social variation. Freedmen are shown as having the advantage over slaves, free-born citizens over freedmen, and legionaries and praetorians over other citizens. But the greatest variant is the much greater age-accuracy of town-councillors compared with all others, which is clearly seen in both Italy and Africa. Since the age-accuracy of town-councillors is still imperfect, the pattern would almost certainly extend further in the direction of perfect age-accuracy if we possessed usable evidence about senators and equestrians.[22]

III. Age-rounding related to sex

The dominant sex-related trend in the Roman evidence is that within a given sample women round their ages more than men. The same tendency is found in all

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[20] Cf. H. SOLIN, Beiträge zur Kenntnis der griechischen Personennamen in Rom (Comment. Hum. Litt., Soc. Sci. Fenn. 48), 1971, 135–6.

[21] L. R. TAYLOR, AJPh 82, 1961, 113–132, at 118 and 123; P. R. C. WEAVER, Familia Caesaris, 1972, 83–6.

[22] The standing legislation about the minimum age of office-holders at Rome (the *leges annales*) could only have been effective if members of the Senate were normally in a position to know their own ages accurately. Cf. J. MORRIS, Listy filologické 87, 1964, 316–337; 88, 1965, 22–31; G. V. SUMBER, Phoenix 25, 1971, 246–271; 357–371.

the twentieth century evidence from censuses examined here (Appendix III). It is paralleled if not explained by the fact that illiteracy is normally higher among women, in countries where it is at all widespread (Appendix III).

Higher age-rounding by women is found in 7 of the 10 provinces or groups of provinces that are considered (see Table 5). In the three areas with the opposite pattern, Gaul, Germany and Noricum, the female samples are relatively small (232, 45 and 169). By themselves the samples for these areas hardly provide convincing evidence that age-rounding was inherently less in females than in males. Their patterns may easily derive from social or chronological discontinuities within the available evidence.

Higher age-rounding by women is also found in the city of Rome, which yields a sample of over 3,000 inscriptions within the relevant age-span. Somewhat curiously, aggregate female rounding is slightly below the male level in the Italian sample (with 2,000 inscriptions taken from a cross-section of ‹small› communities, together with Ostia, Puteoli, Aquileia and Milan). The cross-section, which constitutes two-thirds of the material, actually shows female rounding 1.4 points higher than the male level (42.1 compared with 40.7). But the evidence from the 4 individual cities reverses the position in the sample taken in aggregate. The difference of 0.8 points between the sexes is not large, however, and it may be due to some social imbalance between the samples for the sexes. Only a minority of Italian tombstones include age-information[23] and so there might be some overall discontinuity between the social composition of the two age-samples.

Sex-differentials can best be studied within homogeneous samples whose composition is clearly defined. By this criterion the most reliable evidence is that referring to freedmen and slaves at Rome. There freedwomen round their ages by 5.5 points more than freedmen, while women slaves appear to round age by 10 points more than men. The evidence for women slaves is based on the first 3 decades only, but this should be a minimum, as the tendency appears to have been even higher in the fourth decade.

Aggregate sex-differences in the main Mediterranean areas appear to have been very much less than in the slave and freedman milieu in Rome. Excess rounding by women is 0.8 in Africa and Numidia and 1.8 in Spain (in Italy and Gaul the hierarchy of the sexes is even reversed, but this may be due to inadequate evidence). Only in the northern provinces are extreme differences between female and male age-rounding found. The discrepancy is 16.1 in Moesia and 11.1 in Pannonia. Where the differences are so great they may indicate a serious social discontinuity. The male figures may predominantly refer to a Romanized military population, and the female figures to a much less Romanized native population.

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[23] Cf. I. KAJANTO, On the Problem of the Average Duration of Life in the Roman Empire (Ann. Ac. Sci. Fenn., ser. B 153, 2), 1968, 9.

Table 5
Excess age-rounding by women

Moesia	16.1
Pannonia	11.1
Dacia	3.8
Rome	3.2
Dalmatia	2.7
Mauretania	2.5
Spain	1.8
Africa and Numidia	0.8

Sources: see Table 9.

The levels of excess rounding by females in Rome's Mediterranean territories appear low by comparison with most of the modern data studied below. The average difference in 10 modern countries in the post-war period is 8.2 and the maximum (in Turkey) is as high as 20.8 (Appendix III). Thus in comparative terms the educational differences between the sexes implied by the main Roman figures seem modest, except in the case of the servile classes.

IV. Local variation

The one area of the Empire from which sustained evidence for regional variation in age-rounding has survived is Africa. The accidents of epigraphic survival have left a particularly large sample of inscriptions from this area and one that is being continually enlarged by excavation. There is no reason to think that variation would have been less acute in other parts of the Empire, though the patterns may have been different from those in Africa.

The African evidence identified by town has been broken into three regional samples based on distance from the capital at Carthage. The analysis shows that age-awareness tended to deteriorate the further a town was from the capital.

Table 6
Local variation in citizen age-rounding in Africa and Numidia

Area	Males (sample in brackets)	Females (sample in brackets)
Carthage	46.0 (192)	51.4 (174)
Zone 1 (Towns 1–200 km from Carthage)	39.4 (560)	38.0 (440)
Zone 2 (Towns 201–300 km from Carthage)	46.4 (689)	47.9 (627)
Zone 3 (Towns 301–400 km from Carthage)	59.2 (1574)	60.4 (1200)

Sources: SZILAGYI 17, 315 ff.; 18, 235 ff.; 19, 27.
Towns in Zone 1: Sicca and Ucubi, Thugga, Mactar, Uchi Maius, Mustis, Masculula, Maxula, Thibursicum Bure, Simitthus; Zone 2: Thubursicu Numidarum, Madauros, Theveste, Ammaedara, Thibilis, Calama, Thala, Thagaste; Zone 3: Lambaesis, Cirtan colonies, Celtianis, Tiddis, Sigus, Mastar, Arsacal, Thamugadi.

The figures for the three zones outside Carthage show a steady diminution in age-accuracy with increasing distance from the capital. Age-rounding is about 20 points higher in Numidia (Zone 3) than in Zeugitana (Zone 1). The trend is fully sustained by the three biggest local samples within the three zones.

Table 7
Age-rounding in the largest local sample in each zone

	Males (sample in brackets)	Females (sample in brackets)
Sicca and Ucubi (Zone 1)	25.6 (172)	33.3 (135)
Thubursicu Numidarum (Zone 2)	41.5 (183)	53.6 (162)
Cirtan colonies (Zone 3)	57.3 (389)	59.4 (350)

Sources: SZILAGYI 17, 316; 320; 309.

Thus age-awareness seems to have been most accurate in areas near the capital, and least accurate in the more remote areas. It is unlikely that this tendency, which is very strongly marked, can be due to social variation in the groups commemorated on tombstones in different areas. The samples which are quite large in aggregate are drawn from a number of different towns in each area, and the overall tendency is corroborated by individual local figures. Mention of age was almost universal on African tombstones,[24] and the surviving evidence is likely to represent in aggregate a cross-section of the groups able to afford tombstones.

The position at Carthage however is inconsistent with the rest of the African regional evidence. We know that Carthage was an important centre of learning and higher education under the Roman Empire.[25] Some of the inhabitants at least must have enjoyed high educational standards. And if, as was apparently the case, age-awareness on average improved the closer an African town was to the capital, we might expect age-accuracy at the capital itself to be high. But the figures for Carthage show relatively poor age-accuracy, with rounding by citizens comparable with the average for Africa as a whole (for males 46.0 compared with 51.4, for females 51.4 compared with 52.2).[26] Age-rounding by the two sexes at Carthage was respectively $6^1/_2$ and $13^1/_2$ points higher than in towns in Zone 1.

In trying to account for this, two considerations are worth noting.

1. Average rounding by citizens at Carthage is actually higher than that shown by slaves (for males 46.0 compared with 43.6; the evidence for women slaves can only be analysed in the first two decades, but these likewise show lower rounding than the corresponding decades for citizen women at Carthage).[27] This discrepancy suggests that the surviving evidence for citizen ages at Carthage must refer to a relatively low social stratum, since slaves and ex-slaves normally rounded their ages more than those of citizen birth (see section III above).

[24] See note 23. [25] Cf. A. AUDOLLENT, Carthage romaine, 1901, 691 ff.
[26] SZILAGYI 17, 315 (all inhabitants); 19, 27 (slaves).
[27] See n. 26.

2. Age-rounding at Rome was significantly higher than in the rest of Italy on average (5 points higher for males, 8 points higher for females, Table 8 below). It seems from this and other indications that the city's population visible in inscriptions may have predominantly consisted of ill-educated employees or ex-employees of great households (cf. p. 339 above). The composition of the population visible at Carthage may have been similar, seeing that Carthage was the capital of a major province, and a city of great size by ancient standards. Furthermore, both towns may have owed part of their growth to the influx of migrants from the countryside.

If the rhetoricians and teachers of Carthage leave no mark on the quality of surviving age-statistics, the same is true of the teachers of Rome. The only case where a city known as a centre of learning shows good age-accuracy (whether by chance or otherwise) is Sicca Veneria. Sicca was the birthplace of Arnobius, the celebrated Christian apologist, as well as of the medical writer Caelius Aurelianus, and the rhetorician Tuticius Proculus.[28] As already noted, male age-rounding here is strikingly low, with an index of 25.6. This is only half the national average for Africa, and is almost within sight of the average for town-councillors in Africa, 17.5. The sample of 172 male ages is of respectable size for a single city. But even if the Sicca index-figure is an authentic indication of a good state of numeracy, it is still likely to refer to social classes who are not properly represented in the samples from Rome and Carthage.

V. Variation between different parts of the Empire

Table 8
Regional variation in age-rounding

	Male rounding (sample in brackets)	Female rounding (sample in brackets)
Italy without Rome	42.6 (1213)	41.8 (789)
Gaul	44.1 (311)	43.1 (232)
Rome	47.0 (2337)	50.2 (1371)
Africa and Numidia	51.4 (3110)	52.2 (2490)
Mauretania	51.6 (298)	54.1 (162)
Dalmatia	53.3 (358)	56.0 (229)
Spain	56.6 (721)	58.4 (615)
Moesia	57.2 (193)	73.3 (80)
Germany	57.3 (350)	20.7 (45)
Dacia	61.2 (134)	65.0 (87)
Pannonia	64.8 (489)	75.9 (211)
Noricum	82.1 (206)	77.3 (169)

Sources: see Table 9.

[28] P. DE LABRIOLLE. Dict. hist. eccl. 4, 548; RE s. v. Caelius Aurelianus; A. R. BIRLEY in: T. A. DOREY (ed.), Latin Biography, 1967, 132–3. For Sicca, RE s. v., and CABROL-LECLERQ, Dict. d'arch. chrét., s. v. Kef.

The male index figures for different parts of the Empire vary overall by a factor of two. This suggests very marked differences in age-awareness. But only Africa and Italy offer samples large enough to appear representative. In all other areas the number of cases available may be too small to provide secure documentation of average local rounding levels. It remains striking that rounding appears most extreme in the northern frontier provinces, Noricum, Pannonia, Dacia, Moesia and Germany. These provinces, which were certainly among the most backward parts of the Empire in terms of Romanisation, may well have had generally low levels of education. But the vagaries of the existing evidence seem to introduce distortion at the top of the scale. Here the Gallic provinces have a rounding index for males which is 7 points lower than that of any other provincial area. Although one part of Gaul, Narbonensis, was heavily settled and highly Romanised, it is unlikely that the Gallic provinces as a whole enjoyed educational levels superior to those in any other province.[29] Since most of the evidence comes from four leading towns, Lugdunum, Burdigala, Vienna and Arelate, the sample need not give an accurate picture of the position in Gaul as a whole.[30]

This is a case in which the distortions of the evidence can be readily surmised; they are less easy to detect elsewhere. But in general provincial samples with less than 1,000 ages for males within the age-range 23–62 are hazardous indexes. It is doubtful for instance whether the differential of 5 points between Spain and Africa really indicates that age-rounding was greater (e. g.) in Baetica than in Africa. Two important Spanish towns, Gades and Emerita, together show male rounding of 42.1, which is comparable with the better African levels.[31]

The only differentials which are relatively well documented are those between Italy, Rome and Africa. The figures for Italy and Rome differ by 5 points. Insofar as the difference in Italy's favour is significant, it probably implies that the social composition of the Rome sample is inferior to that of the Italian sample, as has already been suggested. Since only a minority of tombstones from the Italian peninsula as a whole include age-information, social discontinuities of this kind are quite possible.[32] The difference between Italy and Africa is more striking, with male age-rounding almost 10 points higher in Africa. Age-statement was the general rule on African tombstones, and consequently the available cross-section should be representative.[33] Since most provinces show higher age-rounding than Africa, the evidence as a whole suggests that age-awareness was generally weaker in the pro-

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[29] The recent suggestion that the Gallic provinces represented a ‹developed› area in contrast to ‹under-developed› areas such af Africa is not convincing (A. DEMAN, in: H. TEMPORINI (ed.), ANDRW II 3, 1975, 3–97, at 6–13).

[30] SZILAGYI 13, 134–140.

[31] SZILAGYI 15, 144–5. The combined sample for males is only 71.

[32] N. 23.

[33] N. 23.

vinces than in Italy. It thus reproduces on a larger scale the pattern of differences between central and outlying areas already found within the African provinces.[34]

VI. Parallel evidence

The age-evidence from Roman tombstones is restricted to those able to afford a stone plaque. Though some tombstones could be relatively cheap, they often accompanied monuments whose cost was substantial, and it is unlikely that those living in poverty could generally afford them.[35] Granted the enormous inequalities of Roman society, a large part (perhaps the majority in some areas) of the Roman population is therefore probably unrepresented in tombstone evidence.[36] Since age-awareness is most defective at the bottom of the visible part of the social pyramid (section II), the defects are almost bound to have been greater among the submerged portion.

This social limitation makes direct comparisons with other age-rounding evidence rather hazardous. Available comparative material usually refers to whole populations, not to restricted social categories. Differing systems of year-reckoning may also obstruct comparisons.

The most useful fact demonstrated by other evidence is the existence of an apparent link between illiteracy and age-rounding. This is strongly suggested by the high correlation between rounding and illiteracy in a number of modern countries.[37] The existence of such a link is highly plausible in itself. Total illiteracy limits the possibilities of establishing one's age to remembering it oneself, or finding it out from verbal information provided by someone else. The least vexing procedure is to rely on memory, which grows increasingly fallible, and may easily encourage a resort to approximation.

However despite overall correlations, the ratio between age-rounding and illiteracy in the modern evidence differs considerably from one country to another.

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[34] Similar variations emerge clearly from modern evidence. One illustration is provided by the Turkish census of 1945 (see n. 2), which shows the following differences in age-rounding (the calculations follow the standard format described on p. 337).

	Males	Females
Cities over 30,000	11.6	30.8
Provincial & district capitals	16.5	48.2
Other areas (mainly rural)	34.7	66.2

And the urban/rural rounding figures in the Ceylon census of 1963 are 12.6/18.0 for males, and 18.2/24.2 for females (age-distributions in Demographic Yearbook 1971, 219–220).

[35] ERE 131.

[36] Cf. ERE 3–5.

[37] See Appendix III. The correlation for males is above the minimum for P = .1, while that for females is above the minimum for P = .02.

Modern procedures of documentation are inimical to continued ignorance of age even where populations remain largely illiterate. Once birth-certificates become the norm, age can be accurately computed no matter what the educational deficiencies of the individual may be. Differences in the availability of efficient birth records may be the most important reason for the very wide variation among the modern figures, where the ratios between rounding and illiteracy range from $^{71}/_{68}$ to $^{6}/_{54}$.

Comparisons may be more clear-cut when we look at ‹traditional› societies whose systems of birth registration were probably little more effective than that of Rome.[38] Pistoia in northern Italy proves to have had a rounding index of 42.4 for both sexes at the time of a census in the early 15th century.[39] This is substantial in itself, but it is probably low compared with most Roman evidence for single towns, granted that the poor are not usually included in the Roman material. The only Roman towns with substantial samples that show lower index-levels for the combined population are Sicca and Ucubi (28.9) and Puteoli (39.0).[40] Censuses at two Campanian towns show quite high age-rounding in the Renaissance period: the index levels at Pozzuoli (ancient Puteoli) in 1489 were 72.9 for males and 70.6 for females.[41] At Sorrento in 1561 the indices were 60.7 for males and 73.6 for females.[42] These are much higher than most levels in Roman Italy, and higher in particular than the figure for ancient Puteoli already mentioned. Even granted the disparity between the social base of the respective samples, this evidence from the Renaissance may suggest that in these districts educational levels had not yet significantly improved over those of the Roman period. Some figures for later periods which come from northern Europe suggest a progressive improvement in age-awareness. The register of deaths of Geneva shows rounding of 54.5 in 1560–1600, 44.5 in 1601–1700, and 23.4 in 1701–1800. Other eighteenth century figures are similarly low. The rounding index for age-records at three parishes at Liège in 1740 is 26.2; while registers for three parishes in Paris at about the same date show a level of 15.3.[43]

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[38] There was nevertheless some recording of births in the Roman Empire (cf. LEVISON [1898]). For declarations of birth by Roman citizens and by non-citizens in Roman Egypt, see bibliography in O. MONTEVECCHI, La Papirologia, 1973, 180. See also BGU XI 2020 and cf. J. M. CARTER, Bull. Inst. Class. Stud. 14, 1965, 51–57.

[39] D. HERLIHY, Mediaeval and Renaissance Pistoia, 1967, 283–6. The total of individuals of known age at Pistoia in 1427 is 15, 775; 6, 524 are between 23 and 62.

[40] SZILAGYI 17, 316; 15, 134.

[41] The samples for the ages 23–62 are: M 485, F 392; age-data in K. J. BELOCH, Bevölkerungsgeschichte Italiens 1, 1937, 29–31.

[42] Samples for the ages 23–62 are: M 631, F 609 (BELOCH, loc. cit.).

[43] Sources cited in R. MOLS, Introduction à la démographie historique des villes d'Europe du XIV^{e} au XVIII^{e} siècles, 3, 1956, 203–6. It is essential to notice that MOLS' summary is dislocated in such a way that the age 20 appears as 19, 21 as 20, 22 as 21 and so on.

Conclusion

Northern Europe appears to have achieved very much better awareness of age by the eighteenth century than that shown by an economically privileged sector of the population of the Roman Empire. Typical Roman levels compare unfavourably even with most figures from modern developing countries where rounding is evident. No direct inference can be made about the degree of illiteracy that Roman figures for age-rounding may imply, since present-day evidence for rounding propensities appears contaminated in varying degrees by the efficiency of modern governments in recording births. Nevertheless it is very striking that in modern cases where rounding exceeds an index level of 30 (the Roman average by area is much higher, about 55), illiteracy of 70 % or more is also found (Appendix III).

Unless this guide is completely misleading, it would appear that a substantial proportion of those commemorated on Roman tombstones might have had difficulty in reading their epitaphs, or at least difficulty in writing their names. Aurelius Isidorus, a prosperous landowner of early fourth century Egypt, not only showed woeful ignorance of his own age but was also incapable of signing his own name.[44] Egyptian parallels suggest that his case was not at all unusual.[45] Inability to write was no barrier to obtaining high local office in Roman Egypt.[46] The intrusion of illiterates or the semi-literate into such positions is surely a mark of a society characterised by massive ignorance of letters. Some of the practices of Roman Egypt reflect and illuminate for us conditions in parts of the Empire where documentation is much less explicit. Evidence for age-rounding in Egypt suggests that its case is by no means atypical.[47]

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[44] See n. 5.

[45] For example, one man is recorded as aged:

	Discrepancy with previous age
36 on 25 October 107 B. C.	–
30 on 16 August 104	−9 years
35 on 12 April 101	+2 years
40 on 18 November 99	+3 years

Another appears as:

45 on 27 February AD 310	–
50 on 3 April 317	−2 years
58 in June 327	−2 years
and still 58 in October 328	−1 year.

(A. CALDERINI, Rassegna ital. di ling. e lett. class. 2, 1920, 317–325, at 321 and 325.)

[46] For illiterate town-clerks in Egypt, see YOUTIE (cited in n. 8). Illiteracy was no bar to performing the duties of a decurion (Cod. Iust. 10, 32, 6, 293).

[47] In the digital analysis provided by BACHI (1951) 196 n. 5, 75 % of the 250 ages are multiples of five. Unfortunately the standard work on the census does not contain a single-year summary of the age-evidence (M. HOMBERT – C. PRÉAUX, Recherches sur le recensement dans l'Égypte romaine, 1952; for age-pyramid, see 159).

Appendix I

Methods of analysing age-rounding

(i) The rounding analyses of LEVISON (1898) and MÓCSY (1966) were based on a single percentile analysis of the proportion of ages divisible by 5 within each sample. This was simple to calculate, since it meant totalling ages not divisible by 5, then ages divisible by 5, and dividing one into the other. The method, however, has a serious drawback which neither scholar seems to have noticed. The Roman age-evidence (like comparable evidence from more recent periods) shows two tendencies which conflict:

1. Rounding is more prevalent at high than at low ages (thus in Africa [HARKNESS] 55 % of ages of males from 23 to 32 are divisible by 5, whereas the proportion in the range 53–62 is 67 %; for Rome [SZILAGYI] the figures are 43 and 68 %).

2. Age-evidence is less abundant at high than at low ages within the adult life-span.

Since rounding is most intense where data is least abundant, a single aggregative analysis of ages divisible by 5 as a proportion of the whole will tend to underrepresent actual rounding tendencies. It will also cause them to be modulated by the curve of the surviving age-evidence. A sample that contains few high ages will display less age-rounding overall than a sample which is in all other respects identical but contains many high ages. An aggregative analysis will register a large but spurious difference between the age-rounding propensities shown in these two cases. This limitation results in some serious distortions, most notably a substantial underrepresentation, in MÓCSY's analysis, of age-rounding tendencies at the city of Rome, where the proportion of high ages recorded happens to be very small (see Table 9). The vulnerability of the aggregative analysis to differences in age-patterns is also shown in a relatively high correlation between the rounding indices that it produces and the average ages in each sample (see section ii below).

A different procedure has been adopted here which largely circumvents the weaknesses of the aggregative method. A separate percentile analysis of rounding has been carried out in each decade, and the final index figure is derived from the average of these percentages. If 100 individuals are recorded in the decade 53–62, but 500 in the decade 23–32, equal weight will be given to both groups of data by this method, whereas the aggregative method will virtually submerge the smaller group of data by combining it with the larger. The object is to assess *propensity* to round ages; only an analysis decade by decade can take account of the actual tendencies that exist in the different parts of the age-spectrum. The chief drawback is that in a few cases there is too little data to make a useable analysis of the highest decade, and it becomes necessary to reduce the range of ages that is considered.

It is only possible to reject the accuracy of age-statements made in multiples of

5 when they exceed 20% of the total. Consequently the disputable area is the remaining 80% of ages. For convenience the excess proportion of ages divisible by 5 is converted here to a scale stretching from 0 to 100 by subtracting 20 from the percentage, then multiplying by 1.25. This means for example that where the actual percentage of fives is 24, the deviation will register as $(24-20) \times 1.25 = 5$. (The same device for producing a scale from 0 to 100 is used in MÓCSY [1966], but applied to all ages from 20 in aggregate, without distinction of sex. LEVISON [1898] gave a single percentile analysis of all ages, and of all ages from 21, distinguishing ages divisible by 10 from those divisible by 5.)

The formula is applied to a restricted age-range selected by the U.S. Census Bureau for studying excess representation figures in the U.S. Census of 1910. The range comprises 40 years stretching from 23 to 62 inclusive. (G. C. WHIPPLE, Vital Statistics: an Introduction to the Science of Demography², 1923, 180–1.) It avoids the period of childhood where inaccuracy may be inherently less, because of the shorter span, and the period of old age, where rounding tendencies are extreme. The sexes have been analysed separately and reveal different propensities to age-rounding. The span 23–62 is used in all the analyses of ancient and modern evidence

Table 9
Regional age-rounding related to average age

	Male rounding	Female rounding	Average age (M)	Average age (F)	MÓCSY index (M+F)	Average age (M+F)
Italy without Rome[1]	42.6	41.8	29.3	25.9	39	28.1
Gaul	44.1	43.1	30.6	26.9	41	29.4
Rome	47.0	50.2	23.9	23.0	35	22.6
Africa & Numidia[2]	51.4	52.2	49.2	47.1	54	47.9
Mauretania[3]	51.6	54.1	39.6	35.9		
Dalmatia	53.3	56.0	29.7	27.0	53	28.7
Spain	56.6	58.4	38.8	34.3	55	36.3
Moesia	57.2	73.3	42.3	31.3	66	39.1
Germany	57.3	20.7	29.0	29.5	50	31.4
Dacia	61.2	65.0	37.1	31.9	56	35.9
Pannonia	64.8	75.9	37.1	31.5	70	35.6
Noricum	82.1	77.3	36.1	35.9	80	32.3

Sources: cols. 1, 2: SZILAGYI (passim); cols. 3, 4, 6: SZILAGYI (résumé in K. K. ERY, Alba Regia 10, 1969, 64–6); col. 5: MÓCSY (1966).

1. Italian rounding index based on data for ‹small› communities and Aquileia, Milan, Ostia, Puteoli (SZILAGYI 14, 301; 133–4; 298–9).
2. SZILAGYI rounding evidence for ‹small› communities omitted because data includes Mauretania (SZILAGYI 19, 26).
3. Rounding data for Mauretania taken from LEVISON 60 because SZILAGYI data is conflated with evidence from Africa (see n. 2).

given here (with the exception of Table 1 above, where 23–82 is used instead). Unless otherwise specified, all statements about sample-size refer exclusively to this age-range.

(ii) The correlation between average age and average age-rounding inherent in MÓCSY's figures is .4736 where .5214 is required for P = .1. The relationship using the present method of analysis is much lower: .2685 (males) and .2585 (females), where .4973 is required for P = .1 (the figures on which this is based are shown in Table 9 below).

Appendix II

Chronology

SZILAGYI, on whose tabulations the present analyses are based, divided his material into two chronological groups, the earlier being before A. D. 200, the later after this date. However, not only is it often very difficult to date funerary inscriptions with any accuracy, but the year 200 seems unsuitable as a watershed. In Africa, which contributes 40 % of the age-evidence, it can be virtually impossible to differentiate second from third century funerary inscriptions: many examples in a careful recent study remain classified as ‹A. D. 100/300› (J. M. LASSERRE, Recherches sur la chronologie des épitaphes paiennes de l'Afrique, Antiquités Africaines 7, 1973, 7–151).

Tests of the rounding shown by SZILAGYI's chronological samples do little to create confidence in their validity. The results often appear more or less random. In cross-sections of communities in Italy and Spain, and in two African communities investigated individually, the male rounding tendency appears to rise between ‹early› and ‹late› periods, while the female appears to fall. (Italy, cross-section: ‹early› M 37.6, F 45.4; ‹late› M 43.0, F 39.6 [SZILAGYI 14, 301; here as elsewhere the communities which SZILAGYI groups together as ‹small› are merely those where evidence is scanty, and they actually include some important towns]. Spain, cross-section: ‹early› M 56.3, F 64.5; ‹late› M 59.5, F 57.1 [SZILAGYI 15, 147]. Lambaesis: ‹early› M 46.2, F 64.2; ‹late› M 60.9, F 57.6 [SZILAGYI 17, 311]. Celtianis: ‹early› M 63.6, F 65.5; ‹late› M 67.0, F 62.3 [SZILAGYI 17, 313].) In other African communities the opposite occurs. (The four Cirtan colonies: ‹early› M 61.7, F 57.2; ‹late› M 50.6, F 65.0 [SZILAGYI 17, 309].) At Rome the indexes for both sexes ‹rise›, whereas at Carthage the female index falls. (Rome: ‹early› M 48.2, F 49.2; ‹late› M 66.7, F 54.3 [SZILAGYI 15, 131]. Carthage: ‹early› M 48.4, F 52.6; ‹late› M 49.4, F 50.8 [SZILAGYI 17, 315].) Further analyses are provided by MÓCSY 398–403, using the aggregative method of analysis (see Appendix 1).

Because of these uncertainties SZILAGYI's samples have been treated here en bloc, without any attempt to distinguish early from late evidence. Even if accurate dating were easier, it remains doubtful how far the evidence would be susceptible to

useful sub-division in this way. Subdivision reduces many samples to dangerously small size, and the social base from which age-evidence comes may have altered between the early and the late Empire. The material that we have must represent a series of crude random cross-sections; but the fact that it so often reveals consistent patterns of regional and social differentiation is enough to justify analysis en bloc.

Nevertheless, the likely dispersal of the evidence should not be exaggerated. In most areas the bulk of the evidence belongs to the period of the Principate, that is, the first three centuries A. D. This means in practice a primary concentration within the period A. D. 100–250. Tombstones specifying age are rare in most areas before the late first century A. D. (there are almost none in the epigraphy of Pompeii, published and unpublished, which ceases in A. D. 79). And inscriptions of any kind from the second half of the third century are usually few (cf. ERE 351, Table 11).

Appendix III

Age-rounding and illiteracy in ten modern countries

Table 10

	Rounding (ages 23–62)		Illiteracy from age 15 (per cent)	
	M	F	M	F
1. Egypt 1947	74.9	80.4	68.5	91.3
2. Morocco 1960	53.1	67.4	78.1	94.0
3. Iran 1966	35.8	44.2	67.2	87.8
4. Iraq 1957	26.1	32.2	76.1	94.7
5. Nicaragua 1963	22.6	24.0	49.9	50.8
6. Turkey 1965	21.8	42.6	35.5	72.6
7. Guatemala 1950	20.9	32.3	65.6	75.6
8. Ceylon 1963	19.5	27.6	14.6	36.1
9. Mexico 1970	12.7	16.0	20.6	27.0
10. Brazil 1950	10.5	12.9	45.2	55.8
Average	29.8	38.0	52.1	68.6

Sources (CSS = Compendium of Social Statistics 1967 [UN Statistical Office], 1968; DY = Demographic Yearbook): 1: DY 1955, 276; World Illiteracy at Mid-century, UNESCO, 1957, 53; 2: DY 1963, 660; CSS 311; 3: DY 1971, 223; 1970, 588; 4: DY 1963, 670; CSS 323; 5: DY 1971, 200; CSS 317; 6: DY 1971, 244; 1970, 589; 7: DY 1955, 301; 1960, 438; 8: DY 1971, 218; 1970, 587; 9: DY 1971, 199; 1970, 586; 10: DY 1955, 313; CSS 319.

1. Correlation between age-rounding and illiteracy for the ten countries shown is better than P = .1 for males and better than P = .02 for females (.5950, where the threshold is .5494, and .7206, where the threshold is .7155).

2. If Egypt and Ceylon are omitted from the sample, both correlations are better than P = .05 (.7185 for males, and .7565 for females, where the threshold is .7067).

Appendix IV

Post-mediaeval evidence for age-rounding

Table 11
(ages 23–62)

	M+F	M	F
1. Pistoia census 1427	42.4	–	–
2. Pozzuoli census 1489	-	72.9	70.6
3. Sorrento census 1561	–	60.7	73.6
4. Geneva deaths 1560–1600	54.5	–	–
5. Geneva deaths 1601–1700	44.5	–	–
6. Geneva deaths 1701–1800	23.4	–	–
7. Liège deaths 1740	26.2	–	–
8. Paris deaths *c.* 1750	15.3	–	–

Sources: 1: n. 39; 2–3: nn. 41–2; 4–8: n. 43.

Addendum

Using evidence from LEVISON (1898), W. SUDER suggests, mainly on the basis of one inscription, that ages could be rounded even in cases where the material for an accurate age-computation was cited in the epitaph. In CIL VI 3453 a soldier who was recruited at the age of 22, served for 23 years, and lived a further 24 years, 3 months and 11 days (totalling 69 years, 3 months and 11 days) is described as dying at 70. But this is not a demonstrable case of rounding, since the first two statistics were evidently elided, containing no information about time-periods of less than a year. It would be perfectly consistent with what is stated in the inscription for the soldier to have actually been recruited (e.g.) at the age of 22 years and 9 months, in which case he would have died at the age of 70 as the epitaph states.

The use of *centum* in the metrical epitaph in CIL VIII 28082 (if it refers to the individual named elsewhere in the inscription as dying at 83, which may not be the case) is presumably poetic licence (SUDER gives the lower figure as 93). The epitaph of a distinguished doctor which gives his life-span as 70 years, and his date of birth as 5 March A. D. 87, may well be (and probably is) accurate in what it says (CIL XI 3943). It is only when the number of ages divisible by 5 in a sample of a certain size significantly exceeds statistical expectation that we can reject any part of the round-figure evidence. It must always be the case that about one-fifth of the population which survived earliest infancy died at an age which is divisible by five, and there is no reason why the doctor should not belong to this category.

SUDER further implies, in criticising MÓCSY (1966), that the true percentage of ages divisible by five in the Roman population may have significantly exceeded 20%

(p. 227). This is effectively impossible, since it would require a significant part of that 80% of the population destined by the law of averages to die at ages indivisible by five, to perish instead at ages divisible by five. Only the regular execution or suicide of individuals who had completed so many *lustra* could create an imbalance of this kind. The absurdity of this postulate is obvious, (W. SUDER, RSA 5, 1975 [1976], 217–228, at 221 and 227.)