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“Every Woman Counts”: A Gender-Analysis of Numeracy in the Low Countries during the Early Modern Period

The process of economic growth before the Industrial Revolution of the eighteenth century has become a hot issue among economic and social historians for some time. The idea that the pre-1800 economy was static has been replaced by a rapidly burgeoning literature stressing the many forms of dynamic change then taking place in the European economy, resulting in a genuine process of economic development—albeit one that was relatively slow and spatially uneven. One of the underlying factors was the investment in human capital. Recent studies have documented the gradual rise of literacy at the time, and recent theoretical literature has suggested the central role played by human capital in the transition from premodern to modern economic growth. According to quantitative studies performed by economic historians, literacy has long been considered the most important indicator of human capital. Peoples’ ability to sign their names, usually on marriage acts, has often been the most trustworthy indicator. Other forms of measurement, such as the number of books produced and/or bought, have received attention as well. What was the price of human capital, in terms of, say, the skill premium?¹

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1 See the review of the debate about economic progress in van Zanden, “The Revolt of the Early Modernists: An Assessment,” *Economic History Review*, LV (2002), 595–623. Jaime Reis,

Such alternative strategies emerged because of the problems encountered with literacy as a benchmark. Are people who can sign contracts really capable of reading and writing? Moreover, what does such a capability mean for market exchange, and what good does it do on the labor market? Is it really an adequate proxy for the human capital that is essential for economic development, or are other dimensions, like numeracy, more important? The skills of counting and calculating seem to be more accurate indicators of the ability to function in a market environment than a mere signature. In most cases, however, numeracy of this sort has no direct measure, but research suggests that “age heaping”—the tendency of people to round off their ages to a number ending with a five or a zero—can serve as a proxy for the degree to which people could count and calculate.²

This idea is at least sixty years old. At first, demographers considered age heaping to be a major problem, distorting their “true” age pyramids. For example, the officials who compiled the Indonesian census of 1930 refused to publish the results of the age structure because of the extremely high levels of age heaping that they found. Researchers gradually established methods to suppress the phenomenon. One such method was to ask for year of birth rather than age, or to check results against other documentation,

“Economic Growth, Human Capital Formation and Consumption in Western Europe before 1800,” in Robert C. Allen, Tommy Bengtsson, and Martin Dribe (eds.), *Living Standards in the Past* (New York, 2005), 195–227; Eltjo Buringh and van Zanden, “Charting the ‘Rise of the West’: Manuscripts and Printed Books in Europe, A Long-Term Perspective from the Sixth through Eighteenth Centuries,” *Journal of Economic History*, LXIX (2009), 409–445. On growth theory, see Robert E. Lucas, *Lectures on Economic Growth* (New Delhi, 2002); *idem*, “On the Mechanics of Economic Development,” *Journal of Monetary Economics*, XXII (1988), 3–42; Paul M. Romer, “Increasing Returns and Long-Run Growth,” *Journal of Political Economy*, XCIV (1986), 1002–1037. New research views human capital as crucial to economic growth in the long run. See van Zanden, “De timmerman, de boekdrukker en het ontstaan van de Europese kenniseconomie,” *Tijdschrift voor Sociale en Economische Geschiedenis*, II (2005), 105–121; Adrianus Maria van der Woude, “De alfabetisering,” in *Algemene Geschiedenis Der Nederlanden* (Bussum, 1980); Erika Kuyppers, “Lezen en schrijven: Onderzoek naar het alfabetiseringsniveau in zeventiende-eeuws Amsterdam,” *Tijdschrift voor sociale geschiedenis*, XXIII (1997), 490–523; Margaret Spufford, “Literacy, Trade and Religion in the Commercial Centres of Europe,” in Carel A. Davids and Jan Lucassen (eds.), *A Miracle Mirrored: The Dutch Republic in European Perspective* (New York, 1995), 229–283.

2 All Swedish males could produce a signature, but their active knowledge was limited. See Reis, “Economic Growth”; Anders Nilsson, Lars Petterson, and Patrick Svensson, “Agrarian Transition and Literacy: The Case of Nineteenth Century Sweden,” *European Review of Economic History*, III (1999), 79–96.

say, birth certificates. However, when scholars realized that the degree of age heaping was an important source of information in itself, they began to devise measures to establish its level. Most recently, Baten and others have started to collect this kind of information on a much wider, even global, scale. Moreover, A’Hearn, Baten, and Crayen systematically compared different ways of measuring age heaping. Researching the relationship between literacy and numeracy in both past and present-day societies, they concluded that the close relationship between the two indicators permits age heaping to be used as an alternative for estimating literacy—or human capital in its broadest sense—whenever primary data are lacking. By measuring the degree of age heaping—that is, comparing the number of people who know their exact age with those who “guesstimate” it to end on a five or a zero—scholars can derive new insights from “mistakes” in historical sources, even in previously neglected material.³

This article employs such a method to chart and analyze the long-term development of human capital in the Low Countries during the late medieval and early modern period. The Low Countries are reputed to have had an early start in the accumulation of human capital—one of the reasons for its strong economic performance from the fifteenth to the seventeenth century—and to have enjoyed close levels of human capital in town and coun-

3 Robert J. Myers, “Accuracy of Age Reporting in the 1950 United States Census.” *Journal of the American Statistical Association*, XLIX (1954), 826–831. For age heaping in the Indonesian census, see S.n., *Volkstelling 1930: Voorlopige uitkomsten* (Batavia, 1931). Roberto Bachi, “The Tendency to Round off Age Returns: Measurement and Correction,” *Bulletin of the International Statistical Institute*, XXXIII (1951), 195–221; Brian A’Hearn, Jörg Baten, and Dorothee Crayen, “Quantifying Quantitative Literacy: Age Heaping and the History of Human Capital,” *Journal of Economic History*, LXIX (2009), 783–808; Crayen and Baten, “Numeracy, Inequality, Age Heaping, and Economic Growth: New Estimation Strategies for Western Europe and the U.S. (17th–19th Centuries),” working paper (Univ. of Tuebingen, 2006). The close relationship between literacy and numeracy is well known among statisticians who work with population censuses. The United Nations checks the reliability of population census data by looking at patterns of age heaping. The recent interest in this phenomenon among historians is due to the work of Baten’s research group at the University of Tuebingen, which has begun to compile a worldwide database, dating back to the early nineteenth century (and, for some parts of Europe and Latin America, even earlier). Reis, “Is Education a Good Proxy for Human Capital? Measurement and Distributional Issues in Portugal during the 19th Century,” Working Paper presented at the European Social Science History Conference (ESSHC), Lisbon, 2008 ([http://www2.iisg.nl/esshc/programme .asp?selyear?9&pap?6569](http://www2.iisg.nl/esshc/programme.asp?selyear?9&pap?6569)) (2008). See also Joel Mokyr, *Why Ireland Starved: A Quantitative and Analytical History of the Irish Economy, 1800–1850* (London, 1983), 246; Richard Duncan-Jones, *Structure and Scale in the Roman Economy* (New York, 1990), 79–92.

tryside, suggesting that the countryside may have become market-oriented at an early stage. This high level of human-capital formation appears to have been related to the marriage pattern found in the Low Countries, which stimulated investment in the human capital of both men and women (a hypothesis explained in more detail in another publication). The literature therefore suggests that the gender gap in human capital was slight because of the relatively equal position of men and women within marriage and household, and because of women's integration into market activities. Recent insights from economics show the role of women to be a strategic variable in economic development; women's empowerment not only affects demographic behavior (strong human-capital formation among women tends to result in a decline in fertility) but also human-capital formation in the next generation (via the choice for the quality versus the quantity of offspring). Though these ideas stem from a long and rich historiographical tradition, they have not yet been tested systematically; placing these new data for the Low Countries within an international perspective may well be a first step.⁴

The literature about gender and human capital is currently dominated by a debate about the extent to which men and women were familiar with the alphabet. The popular image of men evincing a (much) higher level of human capital than women is usually based on the fact that at least 20 percent more men than women signed contracts. The age-heaping results in this article, however, warrant a considerable revision to the accepted view, while further refining the relationship between numeracy and literacy and offering comparisons with other parts of Europe whenever possible.⁵

THE AGE-HEAPING METHOD The age-heaping method can be illustrated with a few examples. The famous Catasto of 1427—

4 Van der Woude, "De alfabetisering," 257–264; De Moor and van Zanden, "Girl Power: The European Marriage Pattern (EMP) and Labour Markets in the North Sea Region in the Late Medieval and Early Modern Period," *Economic History Review*, LXIII (2010), 1–33; *idem*, *Vrouwen en de geboorte van het kapitalisme in West-Europa* (Amsterdam, 2006), 67–92; T. Paul Schultz, "Demand for Children in Low Income Countries," in Mark R. Rosenzweig and Oded Stark (eds.), *Handbook of Population and Family Economics* (Amsterdam, 1997), 350–422.

5 Kuijpers, "Lezen en schrijven," 490–523; Alain Derville, "L'alphabétisation du peuple à la fin du Moyen Âge," *Revue du Nord*, XXVI (1984), 759–772; Simon Hart, *Geschrift en getal: Een keuze uit de demografisch-, economisch- en sociaal-historische studien op grond van de amsterdamsche en zaanse archivalia, 1600–1800* (Dordrecht, 1976).

a detailed census of the population of Tuscany—is the basis for Figure 1. The vast majority of ages shown for those between twenty-three and sixty-two years old (the age group usually central in age-heaping research) are clearly approximations, given the remarkable number of them ending in zero and the scarcity of those ending in nine, one, etc. This effect seems to be stronger among women than men, although the differences are not dramatic. Less prominent are the peaks on the fives, though the concentration at that point seems to increase with age. This unnatural heaping has nothing to do with peaks in fertility but everything to do with the people’s inability to report their exact age. The measurement of the degree to which a population resorts to age heaping is supposedly related to its numeracy—its ability to count and calculate. Herlihy and Klapisch-Zuber, on whose data the figure for Tuscany is based, show that age heaping varies by social position (the elite round off less than the poor do) and by place of residence (those in the city fare better than those in the countryside), which shows that it is not a mere coincidence, due to, say, carelessness in the survey, but a clear social and economic characteristic.⁶

The age-heaping literature usually assumes that rounding off is an “unconscious” reflex, a sign of genuine lack of knowledge. It is by no means impossible, however, deliberately to report a wrong, rounded-off, age. In societies where old age is highly respected, a systematic tendency for people to overestimate their ages might not be unusual at all, though this pattern may not be evident in our sources. By the same token, when local notables of Holland’s cities and villages were interviewed in 1514, the younger representatives appeared to raise their ages to augment their status and authority. Elsewhere, Danneel reports that the age of orphan girls in Ghent was commonly inflated to qualify them to serve as apprentices, and motives for deflating one’s age are not difficult to imagine either. Similarly, ideas about what constitutes a good age or a good number might lead to over-representations. Superstition can also disturb age pyramids: In Figure 2, the absence of girls aged thirteen in 1422 Reims is telling (see further).

6 David Herlihy and Christine Klapisch-Zuber, *Tuscans and Their Families: A Study of the Florentine Catasto of 1427* (New Haven, 1985), 656–663; http://unstats.un.org/unsd/demographic/products/dyb/DYBcensus/V1_Notes1c.pdf; Mokyr, *Why Ireland Starved*, 264; Duncan-Jones, *Structure and Scale*, 84.

The predilection for multiples of twelve in the sources might be related to religious biases or to economic activity, since dozens and their multiples played a large role in the currency system (the original pound introduced by Charlemagne consisted of 20 shillings [or *schellingen*] and 240 dimes, or *duiten*). The explanation for the overwhelming popularity of heaping on multiples of five is probably biological; the easiest way to count is on the fingers.⁷

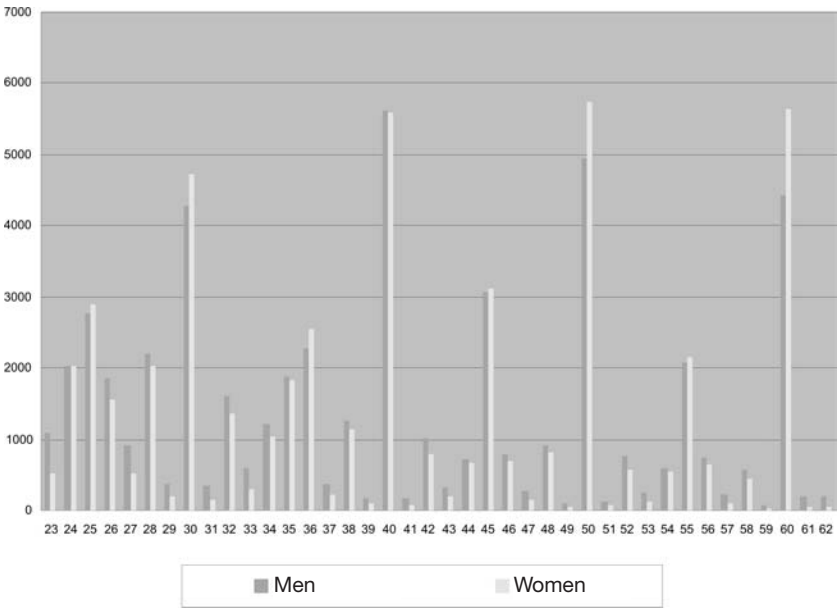
A systematic method for measuring age heaping is indispensable for comparative research. Some of the available techniques are linked expressly to the over-representation of five and zero (such as the Whipple-Index); others measure all of the distortions within the expected age distribution (such as Myer's Blended Index). Age heaping is a complex phenomenon. The degree of over-representation of various numbers may vary from one society to another. For example, in addition to the usual over-representation of five and zero, seventeenth-century Japanese sources show a decided preference for figures ending in eight, probably because eight was considered a lucky number. In China, the desirability of being born in the year of the Drake may have had consequences for age heaping. The recent research by the Baten team, aimed at compiling global maps of age heaping, seems to ignore these culturally embedded forms of age heaping, which come to light only after a careful exploration of the sources.⁸

A scan of the sources demonstrates the potential importance of the age-heaping phenomenon. International research often uses the Whipple-Index to measure the extent to which people aged twenty-three to sixty-two whose ages end on a five or a zero are over-represented in the population distribution. The number of such persons is divided by one-fifth of the total number of people in this age group, because one-fifth is the logical proportion of those who actually have those ages, and the result is multiplied by

7 Marianne Danneel, *Weduwen en wezen in het Laat-Middeleeuwse Gent* (Leuven, 1995), 236. For a general discussion of "number sense," see Stanislas Dehaene, *The Number Sense: How the Mind Creates Mathematics* (New York, 1997).

8 Akira Hayami, *The Historical Demography of Pre-Modern Japan* (Tokyo, 2001), 24–25. A Chinese census of 1990 shows that the Han Chinese (the largest ethnic group in China) show a preference for the ages thirty-eight, fifty, sixty-two, and seventy-four, which correspond exactly with dates of birth that fall in the year of the Drake, the national symbol of China. For further information on the influence of age heaping as a "culturally controlled phenomenon," see J. John Jowett and Yuan-Qing Li, "Age-Heaping: Contrasting Patterns from China," *GeoJournal*, XXVIII (1992), 427–442.

Fig. 1 Ages of Men and Women in Tuscany according to the Catasto of 1427



SOURCE Based on the tables taken from David Herlihy and Christine Klapisch-Zuber, *Tuscans and Their Families: A Study of the Florentine Catasto of 1427* (New Haven, 1985) 656–663.

100. A Whipple-Index of 100 indicates no age heaping; the maximal value is 500—when all respondents report an age ending on a zero or five. This measure is used only for the bracket of twenty-three to sixty-two year olds, since, in demographic terms, it is the most stable population group. For ages older than sixty-two, the greater likelihood of mortality influences the patterns and for those younger than twenty-three, age heaping is less prevalent, or it manifests itself in other ways (for example, by heaping more on even numbers).⁹

9 The United Nations gives a thorough explanation of the Whipple-Index and its application at http://unstats.un.org/unsd/demographic/products/dyb/DYBcensus/VI_Notes1c.pdf. For a more technical explanation of the possibilities of age heaping for historical research, see A’Hearn, Crayen, and Baten, “Quantifying Quantitative Literacy”; Crayen and Baten, *Numeracy, Inequality, Age Heaping, and Economic Growth*. The formula for the Whipple-Index is

$$H_w = \frac{\sum(n_{25} + n_{30} + n_{35} + \dots + n_{60}) / 5 \sum_{i=23}^{62} n_i}{1 / 5 \sum_{i=23}^{62} n_i}$$

To deal with other forms of age heaping requires indexes that measure the possible over-representation of other age groups. For the sources used herein, only the “Dozen Index,” which measures the tendency to heap at multiples of twelve, gave consistently interesting results. The data for Tuscany, and especially the comparable data for Reims in 1422 (presented in Figure 2), show that these effects occurred simultaneously. Since the Reims data reveal no distinct pattern for the age group younger than twelve (which is clearly under-represented, anyway, but for other reasons), parents would seem to have known the ages of their young children. At older ages, however, biases start to creep into the data—for example, the absence of girls aged thirteen. Given that, according to the source, girls often married just after reaching twelve, this gap is strange. Was nobody willing to marry girls of thirteen? Beyond age thirteen, a pattern also common to other sources emerges—the over-representation of even years. Boys and girls of seventeen, nineteen, and twenty-one are far less in evidence than one would expect. This stress on even ages persists in older age groups, even to the disadvantage of the classic preference for ages ending in a five: The ages of twenty-four and twenty-six overshadow twenty-five, and though thirty-five is popular, thirty-six is even more so. Forty is the most popular age of all, especially among women. The patterns that recur most are the classic preference for five and ten, a preference for even relative to uneven numbers (especially among teenagers and twenty somethings), and a preference for multiples of twelve.¹⁰

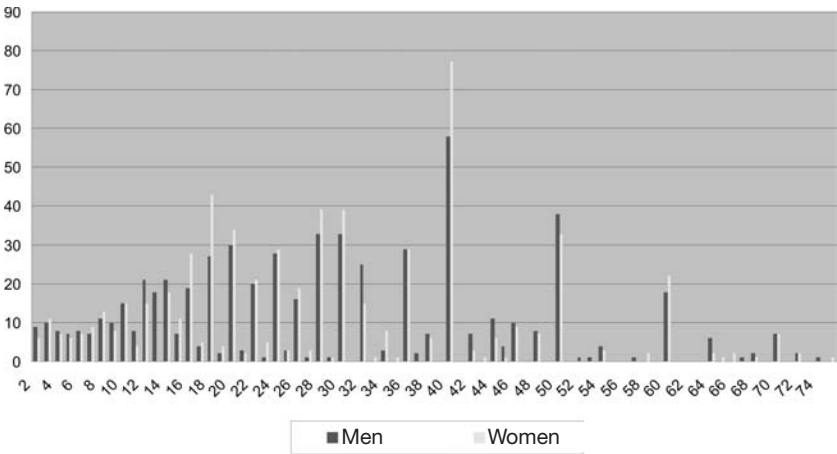
Clearly, the simple Whipple-Index, which deals only with

H_w gives the sum of all ages that are multiples of 5, divided by one-fifth of the total sample (of the age group twenty-three to sixty-two years old).

A slight bias may occur also in the other age groups because of the gradual “thinning out” of older ages, but in the cohort between twenty-three and sixty-two years of age, those aged, say, sixty are implicitly compared with those at the “surrounding” ages of fifty-eight, fifty-nine, sixty-one, and sixty-two; the number of fifty-eight and fifty-nine year olds normally exceeds that of sixty, sixty-one, and sixty-two year olds, but on balance the degree of distortion is small. Myer’s Blended Index and other methods have been developed to check which age categories tend to have the most age heaping. See A’Hearn, Crayen, and Baten, *Quantifying Quantitative Literacy*, 789.

10 Alain Desportes, “La population de Reims au XVe siècle d’après un dénombrement de 1422,” *Le moyen âge*, LXXII (1966), 463–509. Another striking feature of these data, not discussed herein, is the small number of children younger than ten, compared with teenagers and young adults in their (early) twenties, possibly reflecting the popular age of immigration and/or the post-1347/48 plague epidemics, which struck children more than (young) adults.

Fig. 2 Age Distribution of Men and Women in 1422 Reims (Two to Seventy-Five Years)



SOURCE Alain Desportes, “La population de Reims au XV^e siècle d’après un dénombrement de 1422,” *Le moyen âge*, LXXII (1966), 497 (Table IX, “Données brutes du dénombrement de Saint-Pierre”).

multiples of five and ten, does not show the full picture; other “mistakes” cannot be traced with that index. However, other indexes can easily be designed to accommodate the over-representation of even ages (in comparison with uneven ones) and the popularity of twelves (in comparison with all of the other ages). The Even-Index and the Dozen-Index register 100 when no particular preference is evident for even ages or multiples of twelve, respectively, and, just like the Whipple-Index, they increase when the preference for these numbers is larger. These indexes do not overlap with either the Whipple-Index or with each other. To avoid overlap with the Whipple-Index, the multiples of ten are not included in the other indexes; in other words, the Even-Index takes into account only those numbers not included in the Whipple- or Dozen-Indexes. For technical reasons, 320 is the upper limit of the Even-Index and 1,333 of the Dozen-Index (this point follows from the definition given in the note).¹¹

11 To maintain comparability with the Whipple-Index, the age group used for the Even- and Dozen-Index is also between twenty-three and sixty-two (which probably has a more or less balanced age distribution).

The Dozen-Index takes the ages of twenty-four, thirty-six, and forty-eight into account,

How does numeracy in medieval Europe look with these measures? The data about Reims show extreme levels of age heaping for all three indexes, and only small differences between men and women (Table 1). Women do slightly worse than men on the Whipple-Index, but their scores are better on the other indexes. Ages ending in a five are seriously under-represented in Reims. People there heavily favored even numbers and multiples of twelve instead. In fact, the Dozen- and Even-Indexes are higher in Reims than in any other locale analyzed in this article. Reims is actually the only place where the Even-Index gives significant results. Age heaping on even numbers was so rare in the Netherlands that this index is no longer included in the analysis of the Dutch data below.¹²

Adding the other two indexes leads to a strong increase in the estimated share of the population that is unable to give an exact age. The English “postmortem” figures of the thirteenth and fourteenth century (thanks to the pioneering work of Russell) also display high Whipple-Indexes. The Tuscan data included in the table are split between the city of Florence and the rest of Tuscany—mostly countryside, though cities like Pisa and Siena are represented (the age heaping in the “real” countryside must have been even more extreme). Florentine men were fairly adept at counting. The urban women lagged well behind them, but they surpassed both the men and women living in the countryside. The Dozen-Index has no high values, and the Even-Index registers even smaller than 100 for the countryside, due to the popularity of the ages ending in five. The data analysis shows that in Tuscany,

and the Even-Index, only those ages not entered into the Dozen- or the Whipple-Index, in order to avoid overlap in the results. The formula for the Dozen-Index is

$$H_D = \frac{\sum (n_{24} + n_{36} + 48)}{3/40 \sum_{i=23}^{62} n_i}$$

H_D gives the total of the ages ending on twenty-four, thirty-six and forty-eight (multiples of twelve without sixty) divided by $3/40$ of the total sample. The formula for the Even-Index is

$$H_E = \frac{\sum (n_{26} + n_{28} + n_{32} + n_{34} + n_{38} + n_{42} + n_{44} + n_{46} + n_{52} + n_{54} + n_{56} + n_{58} + n_{62})}{13/40 \sum_{i=23}^{62} n_i}$$

H_D gives the total number of even ages not already included in the Whipple- and Dozen-Indexes divided by $13/40$ of the total sample.

12 A score of 500 on the Whipple-Index, meaning that all ages are multiples of five, renders the score on the other indexes, per definition, as zero.

unlike in Reims, ages ending in multiples of five contributed considerably to the age heaping. Jones suggested that the Roman preference for these numbers was associated with the celebration of lustrums (purification rites), which probably was significant in Tuscany as well. In comparison with Reims and England, Tuscany’s Dozen-Index is remarkably low. All in all, in the late Middle Ages, age heaping was still common practice; an estimated 35 to 45 percent of the population reported an inaccurate age. Only the men in Florence upset the trend. Women usually had a lower level of numeracy than men.¹³

How important are these different levels of age heaping? The ability to count and reckon is undoubtedly of fundamental importance for the efficient functioning of a market economy. According to Weber, rational calculation of profit is even part of the “essence” of capitalism. He viewed the introduction of modern (Italian) bookkeeping as highly significant to the rise of capitalism. Whether or not his position is convincing, the link between the ability to perform the complex calculations necessary for rational conduct in the marketplace and to provide an accurate rendering of one’s own age is indisputable. In other words, the rounding off of age is probably a sign of unfamiliarity with large numbers, and hence of a severely limited numeracy.¹⁴

HOW NUMERATE WERE THE INHABITANTS OF THE LOW COUNTRIES?

In principle, all of the sources that report ages of respondents can provide information about age heaping, but the origins and limitations of the sources cannot be ignored. What is necessary is proof that the respondents actually reported the ages given in a particular source, not an interviewer or someone else, such as the registered head of a household. In the population census of 1796, a source for this article, the occasional mention of “son frère” (his brother) or “sa mere” (his mother) gives the impression that the data came from a relative. Such expressions are more frequent for women than for men (27 percent of women and 9 percent of men in a to-

13 Josia Cox Russell, *British Medieval Population* (Albuquerque 1948), 108–111; Duncan-Jones, *Structure and Scale*, 90. To put the European estimates into perspective, Cairo in 1848 had a Whipple-Index of 471. See Ghislaine Alleaume and Philippe Fargues, “La naissance d’une statistique d’État: Le recensement de 1848 en Égypte,” *Histoire et mesure*, XIII (1997), 147–194.

14 Max Weber (ed. Walter Garrison Runciman), *Selections in Translation* (New York, 1978), 334–335.

Table 1 Whipple-, Even-, and Dozen-Indexes for England (Thirteenth to Fourteenth Centuries), Reims (1422), and Tuscany/Florence (1427)

	ENGLAND			REIMS			TUSCANY			FLORENCE		
	MEN	TOTAL		MEN	TOTAL		MEN	TOTAL		MEN	TOTAL	
		WOMEN		WOMEN			WOMEN			WOMEN		
N	225	343	362	705	53,327	104,835	7,849	6,509	14,358			
Whipple (H _w)	256	224	243	234	272	289	176	250	209			
Even (H _e)	64	163	149	156	78	74	104	91	98			
Dozen (H _b)	184	253	239	246	130	135	146	157	151			

tal population of 540,845). However, since this type of indirect reference did not result in a higher degree of age heaping, it probably had little effect on the data. In nearly all of the other sources used herein, the people involved definitely informed the civil servants of their ages. With the exception of the census of 1796, most of our sources for the Low Countries are about individuals rather than households. Though they are not abundant, they offer enough material to test the ideas discussed in the introduction to this article.¹⁵

Intentional misreporting is possible when people have a vested interest in their documented age—when, for example, eligibility for military service or for a pension is at stake. Documents in which the given ages did not have a further administrative use are probably more suitable for this kind of research than, say, militia lists. In general, the sources consulted herein do not have these problems.¹⁶

This article concentrates on sources for the pre-1800 period. For the nineteenth century, marriage acts are, in principle, useful—and widely available—for age-heaping analysis, but the introduction of population registers after 1796 makes the precise ages of marriage partners and their parents more easily determinable. The introduction of systematic population registers in the Low Countries must have enhanced awareness of precise age and thus changed the conditions under which these registrations were conducted. Furthermore, marriage acts tended to cluster around the age of twenty-five, leading to over-representation. Hence, the Dozen-Index cannot be calculated from them; the age of twenty-four is too common. Sources that report year or date of birth rather than age pose another problem—strange concentrations of certain ages because of birth dates that are rounded off.¹⁷

15 See De Moor and van Zanden, “Van fouten kan je leren: Een kritische benadering van de mogelijkheden van ‘leeftijdstapelen’ voor sociaal-economisch onderzoek naar gecijferdheid in het pre-industriële Vlaanderen en Nederland,” *Tijdschrift voor Sociale en Economische Geschiedenis*, V (2008), 81–86, for an extensive appendix that describes all of the sources also used in this article. In a private conversation, Kerstin Manzel and Baten reported a similar absence of the “head of household effect” in their research about age heaping in Latin-America (especially Argentina).

16 John W. Budd and Timothy Guinnane, “Intentional Age-Misreporting, Age-Heaping, and the 1908 Old Age Pensions Act in Ireland,” *Population Studies*, XLV (1991), 497–518.

17 For some of the problems associated with documents that report date of birth rather than age, see http://unstats.un.org/unsd/demographic/products/dyb/DYBcensus/VI_Notes1c.pdf: “Where statistics on age have been derived by reference to the year of birth, and tenden-

Probably the most remarkable sources are the registers of *doorgaande waarheid* (passing truths) of the Oost-Proosse neighborhood and the surrounding countryside in Bruges—questionnaires issued by the bailiff and the aldermen with the intent to trace crimes not yet prosecuted—which date from the late fifteenth and sixteenth centuries (1475 to 1575). Each year the inhabitants of Bruges and its environs were required to answer a number of standard questions regarding local crime, providing such personal details as age and (sometimes) occupation. The preserved registers permit a comparison of the countryside with the city—in this case, however, just Bruges’ lowly Oost-Proosse district, which was home, for example, to large numbers of prostitutes. A clear advantage of the dataset is the balance between male and female respondents, at least until 1525. Strangely, women disappear from the records thereafter. The data generally pertains to inhabitants aged twenty to sixty, almost exactly the optimal age group for age-heaping analysis (twenty-three to sixty-two).¹⁸

The evidence, in conjunction with our knowledge about the social background of the respondents, offers a revealing snapshot of numeracy during this period. According to Whipple-Indexes, the average levels of age heaping for both men and women in town and countryside, between 150 and 180, are relatively low, at least in comparison with the values for Reims and Florence (even given these cities’ slightly decreased levels during the intermediate period). The absence of large differences between men and women (the women in Bruges even surpass the men) and town and countryside (though the urban sample may not be fully representative) is noteworthy. The Dozen-Index, however, is extremely high, possibly for the same reason as in Reims, which has a similar Catholic background.¹⁹

cies to round off the birth year would result in an excessive number of ages ending in odd numbers, the frequency of age reporting with terminal digits 5 and 0 is not an adequate measure of their accuracy.”

18 Marc Boone, “Netwerken in de steden,” in Walter Prevenier (ed.), *Prinsen en poorters: Beelden van de laatmiddeleeuwse samenleving in de Bourgondische Nederlanden, 1384–1530* (Antwerp, 1998), 41; Guy Dupont, “Van Copkin over Coppin naar Jacob,” 137; *idem*, *Maagdenverleiders, hoeren en speculanten: Prostitutie in Brugge tijdens de Bourgondische periode (1385–1515)* (Bruges, 1996), 65–70. The data from Oost-Proosse inside the city walls of Bruges and the village of Wenduine outside it concentrate on the period from 1475 to 1524, because of the absence of women thereafter; the level of age heaping of men did not change much after that point.

19 A preference for multiples of twelve could be religiously inspired, twelve being a holy number, referring to the twelve disciples, among other things.

How exceptional was the situation in Bruges and its surroundings? Comparable data for other parts of the Low Countries are hard to find, but a few sources—such as the famous *Informacie* of 1514, which contains names and ages of usually three notables (mayors or aldermen in towns)—issued highly detailed reports to the government about tax revenues and expenditures. The nature of these reports suggests that the respondents already had relatively high levels of numeracy and literacy. Two other sources that registered the ages of a less privileged population are instructive—an ecclesiastical questionnaire of 1505 in Zeeland, containing the names and ages of thirty-seven men and four women, and the *Enquête naar de buitenneringen* of 1540/41 in the outskirts of Leiden, containing another sixty-eight respondents with twenty age records. Although these numbers are small, they help to place the data from Bruges in perspective (Table 2), showing that Holland and Zeeland are similar to Bruges, especially in terms of the Whipple-Indexes. The notables in the *Informacie* had a high Whipple-Index, possibly because they elevated their ages to gain authority. Again, the differences between men and women are limited, but the number of women included in the analysis might be too small for significance (nineteen).²⁰

The Amsterdam pre-marriage registers (equivalent to the English marriage bans), which date from the end of the sixteenth century, are particularly important for research into population and literacy in the Netherlands. Although they do not present the complete age spectrum, and are not suitable for calculating the Dozen-Index, they have the major advantage of dealing with all levels of society. Based on the literacy dataset that Van Nierop and Kuijpers derived from them, as well as on additional research into a more recent sample, this article provides Whipple-Index values for these registers during the period from 1585 to 1800.²¹

The numbers for the first sample are small, but a pattern

20 S.n., *Informacie Up Den Staet Faculteyt Ende Geleghentheyf Van De Steden Ende Dorpen Van Hollant Ende Vrieslant Om Daer nae Te Reguleren De Nyeuwe Schiltale Gedae in Den Jaere MDXIV* (Leiden, 1866). The *Informacie* can also be found online at <http://www.iisg.nl/nationalaccounts/enquete/documents/informacie.pdf>. Nicolaas W. Posthumus, “Een zestiende-eeuwsche enquête naar de buitenneringen rondom de stad Leiden,” *Bijdragen en Mededeelingen van het Historisch Genootschap* 33 (1912).

21 See Leonie van Nierop, “De bruidegoms van Amsterdam van 1578 tot 1601,” *Tijdschrift voor geschiedenis*, XLIX (1934) 136–160, 329–344; Kuijpers, *Migrantenstad: Immigratie en Sociale Verhoudingen in 17e-Eeuws Amsterdam* (Hilversum, 2005). The data in this article are based on Kuijpers’ database.

Table 2 Whipple- and Dozen-Indexes for Bruges (City) and the Surrounding Countryside, 1474 to 1524

	MEN			WOMEN			COUNTRYSIDE			CITY	TOTAL
	COUNTRYSIDE	CITY	TOTAL	COUNTRYSIDE	CITY	TOTAL	TOTAL	TOTAL	TOTAL		
N	1,777	204	1,981	41	188	229		1,818		392	
Whipple (H _w)	158	172	159	171	168	168		158		170	
Dozen (H _z)	183	137	178	163	199	192		183		167	

Table 3 Whipple- and Dozen-Indexes for the *Informacie* (1514) and Zeeland/Holland, 1505/1541

	INFORMACIE 1514			1505/1541 MEN			1505/1541 WOMEN			TOTAL
	COUNTRYSIDE	CITY	TOTAL	COUNTRYSIDE	CITY	TOTAL	COUNTRYSIDE	CITY	TOTAL	
N		1,285			95			19		114
Whipple (H _w)		203			168			158		167
Dozen (H _z)		112			154			70		140

emerges: The Whipple-Index for 1585, with values ranging from 150 to 160, is comparable to that found for Holland and Flanders earlier in the sixteenth century. Thereafter, a strong decrease follows, to values from 110 to 120, which are remarkably low for a pre-industrial society. The small difference between the values for men and women is evident yet again, as is the fact that women sometimes do better than men.

The decrease of the Whipple-Index from a range of 150 to 160 to one of 110 to 120 runs parallel to what is known about the increase in literacy during this period, but in literacy, unlike numeracy, men and women diverged. The percentage of men who signed the marriage acts increased from 55 in 1585 to more than 70 in 1700; the share of literate women grew from 32 percent in 1585 to 51 percent in 1700. Women in the Low Countries appear to have been as numerate as men but not so proficient in reading and writing, although literate women who married illiterate men might not have wanted to write a signature when their new husbands could only make a cross. Do analyses of the pre-marriage registers systematically underestimate the level of women’s education, which now, via the method of age heaping, finally surfaces, or are the accepted ideas about the parallel increase in literacy and numeracy in general now subject to doubt?²²

Two more sources can help to sharpen our image of numeracy in Amsterdam. The pre-marriage acts include a large spectrum of society, probably only with the exclusion of the destitute (who might not have married) and immigrants who were already married. Data from criminal records, the *Confessie-* and *Justitieboeken*, for the period 1651 to 1750 can complement this material, since the accused mentioned therein (with age and sometimes profession) often belonged to the poorer social classes. These data, collected by Spierenburg, contain nearly 1,500 women and men in the age category relevant to this study. Nearly 38 percent of the persons brought to court whose ages are known were women. As might be expected, the degree of age heaping among these women is higher than that among those who were registered in the pre-marriage acts during the same period: The average Whipple-Index for the 928 men is 123 and for the 558 women 152. The very bottom of the social pyramid thus reveals clear sex

22 Kuijpers, “Lezen en schrijven,” 511.

differences in age heaping, although the levels for both men and women are still low. The *Amsterdamse burgerboeken*—the registers of persons who acquired citizenship, available for the period 1730 to 1799—comprise another source that adds information about ages, in this case the (upper) middle class. The extent of age heaping in this group is small; the Whipple-Index for the 2,146 men is 116 and for the 1,912 women 118.²³

The numeracy of Amsterdam’s large immigrant population is also determinable from these sources. None of the sources used herein provides a perfect reflection of pre-industrial society: The pre-marriage acts document the lower classes and migrants insufficiently (though this defect is reparable by adding data from the criminal records), and the burgerboeken represent only the upper class. Combined, however, this material enables a comparison between the age heaping of Amsterdam’s natives and that of different immigrant groups. The Whipple-Indexes of these groups are calculable in two ways—either by placing the individuals of all three sources in one dataset and finding the relevant Whipple-Indexes per source per group, or by taking the unweighted average of the three Whipple-Indexes that are obtainable on the basis of the three sources (marriage acts, criminal records, and burgerboeken). The advantage of the latter procedure is the lack of bias in the Whipple-Index—given that the Dutch are better represented in the burgerboeken.²⁴

Table 5 shows the results, subdivided according to a number of regions. Among the immigrants from the northern and southern Netherlands and France, age heaping is nearly absent. The Whipple-Indexes are around 120, and those of women are usually higher than those of men (an effect that is explicable by women’s

23 The data and additional information about the confessie and justitieboeken are archived by the Data Archive and Networked Services (DANS). See the following persistent identifier for more information: um:nbn:ui:13-8vl-meg. For a more thorough discussion of the criminal sources used herein, see Pieter Spierenburg, *The Spectacle of Suffering: Executions and the Evolution of Repression, from a Preindustrial Metropolis to the European Experience* (New York, 1984), 208–210. Currently, about 17% of the people suspected of criminal behavior in the Netherlands are women, but this share is rising slowly. See Sarah Leers, “Vrouwen en meisjes steeds criminel,” *Nieuw Amsterdams Peil*, 29 Oct. 2003; <http://www.mediaudies.nl/nap/modules.php?name=News&file=article&sid=318>. The evidence derives from a database of the *Amsterdamse burgerboeken* in Bibi Panhuysen, *Maatwerk: kleermakers, naaisters, oudkleerkopers en de gilden (1500–1800)* (Amsterdam, 2000).

24 For a thorough description of migrants in Amsterdam and their representation in the pre-marriage acts, see Kuijpers, *Migrantenstad*, 85–92.

performance in the *Confessie-* and *Justitieboeken*). Slightly higher is the degree of age heaping by German immigrants and the “rest” (especially those from Central Europe and England/Scotland), among whom the sex difference also increases. Scandinavian men and women, who were often unskilled workers directly from the countryside, had the highest Whipple-Index.

The strong decrease of age heaping that, according to A’ Hearn, Baten, and Crayen, occurred in the seventeenth and eighteenth centuries in large parts of Western Europe had already taken place in the Low Countries a few centuries earlier. Whipple-Indexes indicate that around 1500, only 15 to 25 percent of the population reported an incorrect age, which is considerably lower than the usual age-heaping levels of 35 to 45 percent elsewhere in Western Europe. The data for Amsterdam indicates a further decrease to approximately 5 percent in 1600—a level not attained until the nineteenth century in other parts of Europe. Moreover, the differences between cities and the surrounding countryside were surprisingly small, as were those between men and women, in some cases even in women’s favor.

THE LOSS OF BELGIUM An analysis of the numeracy of the Flemish (and Dutch Limburg) population in the Napoleonic year IV, or 1796, based on the first country-wide population census, provides a much more complete image of the population than the marriage acts or civic registers. One possible shortcoming of the census, as explained above, could be the indirect references to “sa femme,” “son fille,” “son fils,” and the like in the occupation columns, which might suggest that a head of household reported each family’s ages. But the differences in age heaping between men and women are so small that the individuals probably reported the information personally.²⁵

The reason for closing this article with a census dating at the end of the eighteenth century, the time when most age heaping studies start, concerns the criteria for source material mentioned

25 The census followed the law of 10 Vendémiaire Year IV (Octobre 2, 1795) enacted by the communal police, though many of the sources date from later years. Each municipality was obliged to compose a list of all the inhabitants older than twelve, with address, name, age, occupation, and year of immigration. In some cases, immigrants’ place of origin and the period of residence in the municipality was reported, and the sex of children was noted. For a more elaborate discussion about the historical value of this source, see *Inleiding tot de lokale geschiedenis van de 19de en 20ste eeuw* (Ghent, 2003), 125–126

Table 5 Unweighted and Weighted Average Whipple-Indexes of Dutch and Immigrants in Amsterdam, Seventeenth and Eighteenth Centuries

	COUNTRY/REGION OF ORIGIN														
	NETHERLANDS		BELGIUM AND FRANCE			GERMANY		SCANDINAVIA			THE REST				
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL			
N	2,055	2,222	4,277	266	109	375	1,274	639	1,913	119	76	195	128	39	167
Unweighted	118	120	119	117	128	120	121	137	127	139	151	144	125	141	129
Weighted	119	124	121	113	128	117	123	144	131	144	152	142	133	158	140

earlier. This population census is the first systematic one to take place in the southern Netherlands but also the last one to escape the influence of the official population registration. In fact, this census was the basis for the later population registrations. To the extent that the original documents have been preserved, the 1796 census also permits a comparison of the southern Netherlands with the later Dutch Limburg, since the census was compiled identically in both regions. Unfortunately, the 1796 census in the northern Netherlands did not request ages (or occupations), thus hampering a comparison with the Low Countries as a whole. To obtain a highly representative sample, more than 50,000 records, most of them from the countryside, were collected. Unfortunately, the large cities of Ghent, Antwerp, Brussels, and Bruges are not included, since no electronic versions of the source are as yet available, but smaller provincial towns like Leuven, Lier, Tienen, and Turnhout are. Table 6 contains the indicators of age heaping according to the current provincial boundaries.²⁶

The first striking fact is the west–east gradient in the degree of age heaping: The province of West Flanders has a low level of age heaping, followed by the province of East Flanders and Antwerp. The two provinces of Limburg (West Belgian and East Dutch) have much higher scores, with Whipple-Indexes close to 200, whereas the Walloon part of Brabant has the highest index. This east–west gradient, in which human capital decreases with distance from the North Sea coast, is all the more remarkable given that the data for the top-scoring provinces of West and East Flanders are mainly from rural locations, which might seem to have been less numerate than the cities. A closer look of the underlying data shows that no general rule can be formulated from this circumstance: The city of Lier does better than the province of Antwerp (the Whipple-Indexes for men, women, and total being 126, 129, and 128, respectively). Similarly, Hasselt (171, 163, 167) does better than the average for Belgian Limburg, but Leuven

26 The southern Netherlands officially started with the “Registers van Burgerlijke Stand” after the French decree of June 17, 1796, but registration did not take place for some time. See *Inleiding tot de lokale geschiedenis van de 19de en 20ste eeuw* (Ghent, 2003), 143–145. Ages were noted systematically in the census. In only 1.4% of the data was no age reported. Of the 51,572 data entries from 55 villages and cities, 49,016 persons (25,872 men and 23,145 women) gave their ages. In the age group from twenty-three to sixty-two, 33,442 persons also indicated their sex. For more information about the data used herein, see De Moor and van Zanden, “Van fouten kan je leren.”

Table 6 Age Heaping in the Southern Netherlands, 1796, per Province

	WEST FLANDERS			EAST FLANDERS			ANTWERP			FLEMISH BRABANT			WALLOON BRABANT		
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
N	731	678	1,409	576	521	1,097	3,643	4,049	7,692	9,130	6,155	15,285	782	798	1,580
Whipple (H_w)	123	117	120	165	156	161	154	141	147	167	151	161	220	193	206
Dozen (H_{12})	131	153	142	79	187	130	106	123	115	98	111	103	114	147	131

	BELGIAN LIMBURG			DUTCH LIMBURG		
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
N	2,651	2,650	5,301	545	533	1,078
Whipple (H_w)	195	176	185	192	200	196
Dozen (H_{12})	98	111	104	110	133	121
TOTAL						33,442

(171, 175, 171) and Tienen (196, 164, 180) do not surpass the rest of Flemish Brabant. Turnhout, which is situated more toward the east in a less commercialized and poorer area than Lier, has much higher Whipple-Indexes (174, 150, 161) than Lier, which is closer to Antwerp. On average, the differences between city and countryside are small.²⁷

That women outperform men in nearly all parts of Belgium on the Whipple-Index (only in Dutch Limburg is the situation reversed) again confounds the data on literacy, in which women always have much lower levels than men. The Dozen-Index suggests that women systematically used more multiples of twelve when reporting their age. Nowhere—except in the well-developed province of West Flanders—do men show a preference for multiples of twelve, whereas women resort to twelves nearly everywhere, in some cases sending the Dozen-Index to “medieval” values. Could this trend be an artifact of the differing religious tendencies of women and men? More research is necessary.²⁸

It is difficult to compare these data with information on age heaping in Bruges and its surroundings during the fifteenth and sixteenth centuries. The 1796 values for West Flanders are clearly much lower than those presented in Table 3. The increase in numeracy found in Holland may also have occurred in Flanders and Brabant; the levels at the end of the eighteenth century are high, although only the province of West Flanders can actually compete with Holland in this respect. This comparison also shows, however, that the data for Bruges and its environs from the late Middle Ages are probably more distinctive than initially assumed, given that this province was also the most advanced within the southern Netherlands in 1796. Finally, the levels of age heaping found for Limburg and the Walloon part of Brabant in 1796 are not much different from those elsewhere in Western Europe. At some point

27 The data for West Flanders also include the city of Kortrijk. For analysis of the data for Hasselt and more information about the broader context, see Dries Lyna, “Van Loonse stad tot Limburgse provinciehoofdplaats: De demografische, sociaal-economische en ruimtelijke ontwikkeling van Hasselt en haar positie in Limburg 1796–1846,” unpub. Ph.D. diss. (Univ. of Antwerp, 2005). Since the data for Waals-Brabant are limited to Waver, an urban–rural comparison is impossible.

28 For more information about literacy in Belgium during the eighteenth and nineteenth centuries, see Joseph Ruwet and Yves Wellemans, *L'analphabétisme en Belgique (XVIIIème–XIXème Siècles)* (Louvain, 1978).

between 1500 and 1800, these parts of the southern Netherlands probably lost their lead on the rest of the continent.²⁹

LITERATE AND/OR NUMERATE? In their recent study of the relationship between literacy and numeracy in present and past societies, A’Hearn, Baten, and Crayen came to the conclusion that these markers of social capital are closely related to each other, thus suggesting that age heaping could serve as a proxy for literacy when necessary. Can the same conclusions be drawn from the research detailed in this article?³⁰

The pre-marriage registers of Amsterdam can help to support certain inferences about the link between numeracy and literacy. Because of the limited amount of data, the different samples have been combined to ensure a sufficient critical mass for the analysis. The degree of literacy that men and women demonstrated—the degree to which men and women were able to produce a genuine signature—varied considerably: In the sample for the period from 1585 to 1800, 71 percent of the men and 50 percent of the women signed the act; from an international perspective, these figures are high. However, the relationship between literacy and age heaping is weak, perhaps understandably in light of the minute differences in age heaping between men and women (Table 7). On average, persons capable of a signature have a slightly lower Whipple-Index than those who can make only a cross, largely because of the positive relationship between literacy and numeracy among women. Strangely enough, the reverse is true for men: Literate men have a higher Whipple-Index than illiterate men.³¹

Another perspective on literacy as human capital can be given through a calculation of the Whipple-Index by occupational group (Table 8). On the basis of the admittedly small sample of men whose occupations were registered in the pre-marriage acts for 1600 (218) and for 1650 (185) (after about 1590, the marriage acts officially ignored women’s occupation and after 1700, men’s), professionals—including surgeons, chemists, and merchants—

29 Van der Woude, “De alfabetisering,” 257–264.

30 A’Hearn, Baten, and Crayen, “Quantifying Quantitative Literacy,” 783–808.

31 Compare the estimates about men and women in Reis, “Economic Growth” with those of Robert C. Allen, “Progress and Poverty in Early Modern Europe,” *Economic History Review*, LVI (2004), 403–443.

Table 7 Whipple-Index for the Total Number of Documented Pre-Marriage Acts (Samples for the Years 1585, 1600, 1650, 1700, 1750, and 1800), by Sex and by Ability to Sign

	LITERATE MEN	ILLITERATE MEN	MEN TOTAL	LITERATE WOMEN	ILLITERATE WOMEN	WOMEN TOTAL	TOTAL
N	847	345	1,192	505	514	1,019	2,211
Whipple	129	122	127	109	134	122	124

Table 8 Whipple-Index for Amsterdam Pre-Marriage Acts in 1600 and 1650 (Men Only), by Occupational Category

	CRAFTSMEN	UNSKILLED LABORERS	PROFESSIONALS	TOTAL
Men in 1600	123	92	3	218
Whipple (H _w)	102	109	N.A.	103
Men in 1650	105	63	17	185
Whipple (H _w)	124	127	59	119

have low Whipple values. Craftsmen and small retailers also show low levels of age heaping; those of unskilled laborers, such as sailors and cloth shearers, are only marginally higher, again confirming the high levels of human capital throughout the social spectrum of Amsterdam, especially compared with the rest of Europe.

A similar analysis can be performed on the southern Netherlands in 1796. The census allows more distinctions between occupational categories, including such categories as farmers and religious that were absent in Amsterdam and thus providing a broader view of numeracy. The results are largely as expected (Table 9): Men from the lowest social classes—paupers, beggars, orphans, or cripples—tended not to know their real age, as indicated by a Whipple-Index of around 300. Those from higher social categories do much better. The fact that unskilled laborers, farmers, and craftsmen have similar scores confirms the small differences found for Amsterdam between the first and the last group. The professionals, including civil servants and teachers, have a high level of age heaping, a Whipple-Index of 151. All of the categories fare substantially worse than the results obtained from the Amsterdam pre-marriage registers of 1600 and 1650. Whereas parts of the Low Countries demonstrated advanced human-capital investment in the fifteenth, sixteenth, and seventeenth centuries, Belgium had lost its initial advantage over the rest of Western Europe by around 1800.³²

Regional differences in literacy and age heaping can also be analyzed for the southern Netherlands at the end of the eighteenth century. The degree of literacy in the south was still, in comparison with the rest of Western Europe, high, although more so in Brabant than in Flanders. The figures in Table 10 indicate that Belgium was no longer part of the advanced literacy guard. Moreover, the regional pattern of literacy is different from that of numeracy, which has a clear west–east gradient. Literacy seems high

32 The category of craftsmen and small retailers includes bakers, sculptors, butchers, decorators, broom makers, inn keepers, brewers, boatsmen, salesmen/retailers, shoemakers, ropemakers, etc.; the category of wage laborers: servants/maids, day laborers, helpers of craftsmen; the category of professionals and civil servants: physicians, notaries, lawyers, surgeons, directors, clerks, officers, mayors, teachers; the category of religious: pastors, priests, canons, curates, and beguines; the category of paupers: beggars, cripples, mental defectives, and orphans; agricultural occupations: forestry and livestock; farming occupations: farmers, ox farmers, foresters, cow-, sheep-, and pig-tenders. Vandenbroeke, *Sociale geschiedenis van het Vlaamse volk* (Beveren-Nijmegen, 1981).

Table 9 Age Heaping among Men in the Southern Netherlands in 1796, by Occupational Category

	CRAFTSMEN	PAUPERS	FARMERS	UNSKILLED LABORERS	RELIGIOUS	PROFESSIONALS	TOTAL
N	5,002	53	3,060	5,382	193	529	15,327
Whipple (H_w)	171	302	172	175	163	151	170
Dozen (H_{12})	98	50	94	100	83	111	32

Table 10 Estimates of the Degree of Age Heaping and Literacy in the Southern Netherlands, 1796 and 1778 to 1792

PROVINCES	AGE HEAPING (WHIPPLE-INDEX)			LITERACY (PERCENTAGE OF POPULATION)		
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
West Flanders	123	117	120	49	24	37
East Flanders	165	156	161	49	23	36
Vlaams Brabant	160	146	154	62	39	50
Waals Brabant	220	193	206	53	40	46
Belgian Limburg	195	176	185	48	28	38
Dutch Limburg	192	200	196	66	42	54

NOTES According to G. Algoet and Vandenbroeke, "Alfabetisme in Vlaanderen en inzonderheid in Zuidelijk Vlaanderen (einde 18de eeuw—ca. 1870)," *Jaarboek van de Geschied- en Heemkundige Kring "De Gaverstreke," V (1977), 142-178*, and Joseph Ruwet and Yves Wellemans, *L'Analphabétisme en Belgique (XVIIIème-XIXème Siècles)* (Louvain, 1978), 24-28, the increase in literacy during the first half of the nineteenth century was modest. The development of literacy in Belgium was similar to that in England, the other early industrializing country, in which literacy also stagnated during industrialization. See W. B. Stephens, "Literacy in England, Scotland and Wales, 1500-1900," *History of Education Quarterly*, XXX (1990), 545-572.

SOURCES The literacy estimates are based on different sources: Data for West Flanders and East Flanders c. 1785 come from Algoet and Vandenbroeke, "Alfabetisme in Vlaanderen," 154-155; for Flemish Brabant, Walloon Brabant, and Belgian Limburg in 1779 from Ruwet and Wellemans, *L'Analphabétisme en Belgique*, graphs 2-7; for Dutch Limburg, 1813 to 1819, from Adrianus Maria van der Woude, "De alfabetisering," in *Algemene Geschiedenis Der Nederlanden* (Bussum 1980), 260.

in (Flemish) Brabant but not in Flanders (particularly not for women). The apparent absence of a close link between literacy and age heaping demonstrates that age heaping and literacy are not interchangeable markers of human capital.³³

Historical research about numeracy on the basis of the age-heaping method is in its infancy, but this article shows that it has promise for the pre-industrial period. Although this method is not an alternative measure for literacy as an indicator of human capital, it is likely that in the long run, the relationship between age heaping and literacy will become clearer. The notion that the Low Countries outstripped the rest of Western Europe in literacy from the Late Middle ages onward still lacks quantitative proof, but other indicators of human-capital formation, such as the skill premium and book consumption, point in the same direction. Moreover, the age-heaping material, even with its flaws, reveals levels of numeracy in (the surroundings of) Bruges and in Holland/Zeeland c. 1500 that are unique for Western Europe at the time. Whereas 35 to 45 percent of the population elsewhere in Western Europe were unable to report their ages accurately, only 15 to 20 percent in the Low Countries were unable to do so. In the sixteenth century, the figure dropped to 5 percent or less. The numeracy revolution that took place between 1600 and 1900 in most of Europe was already completed in (parts of) the Low Countries by 1600. Thus is the hypothesis about the advantage of the Low Countries confirmed.³⁴

This revolution in numeracy took place in both the city and the countryside, for both men and women. The competency of women in this regard is probably the most surprising outcome of the research; Flemish and Dutch women were able to count and reckon just as well as men. Following Weber’s reasoning, they were as much representatives of the capitalist spirit as were their male compatriots.

The late eighteenth-century data also suggest that this revolution took place in a narrow area along the North Sea coast. More

33 Van der Woude, “De alfabetisering,” 262–264. See also Allen, “Progress and Poverty,” for estimates of literacy levels in a number of other European countries.

34 See, among others, Derville, “L’alphabétisation du peuple,” 759–772; Kuijpers, “Lezen en schrijven,” 490–523; van der Woude, “De alfabetisering,” 257–264.

inland, the level of age heaping c. 1800 was not much different from that in the rest of Europe. Since the situation inland c. 1500 has not been studied in depth, it is difficult to conclude whether the inland area was ever equal to the coast in numeracy (as suggested by Algoet and Vandenbroeke about literacy in 1800) or whether these regions always lagged behind the North Sea area in medieval “girl power.”³⁵

35 Algoet and Vandenbroeke, “Alfabetisme in Vlaanderen,” 42–178.