

THEORY & METHOD

ON THE CONTEXTUAL VALUATION METHOD AND THE ECONOMIC ARCHAEOLOGY OF GRAVE GOODS

Pascual Izquierdo-Egea

Independent Researcher, Graus, Spain

ABSTRACT. *This article is based on the second chapter of my book Economic Archaeology of Grave Goods (Izquierdo-Egea 2012a). Its purpose is to make the latest revision of an advanced methodology through which mortuary record can be analyzed with scientific objectivity. Thanks to this, economic fluctuations, social changes, and more social phenomena can be inferred.*

KEYWORDS: Contextual valuation method, economic archaeology, grave goods.

TÍTULO. Sobre el método de valoración contextual y la arqueología económica de los ajuares funerarios.

RESUMEN. *Este artículo se basa en un capítulo de título similar publicado en mi libro Economic Archaeology of Grave Goods (Izquierdo-Egea 2012a). Incorpora modificaciones y algunas innovaciones. Su propósito es hacer accesible a cualquiera la última actualización de una avanzada metodología, a través de la cual el registro funerario puede analizarse con objetividad científica. Gracias a ello, es posible inferir fluctuaciones económicas, cambios sociales y otros fenómenos sociales.*

PALABRAS CLAVE: método de valoración contextual, arqueología económica, ajuares funerarios.

INTRODUCTION

From the first step taken in 1989, I began to lay the groundwork for what would become a new *archaeological theory of economic fluctuations*. The main objective of this was to make substantial progress in the scientific understanding of past

societies by deciphering the hidden codes within the grave goods—a key part of the mortuary record. One of the fundamental postulates of this theory argues that *economic fluctuations and social changes associated with them were recorded in grave goods*. Therefore, in order to make possible the measurement of these variables, a specific statistical strategy was designed: the *contextual valuation method*.

This method allows us to understand how grave goods encode economic events produced by society. In other words, grave goods contain information about the economic fluctuations and social changes experienced by the past societies responsible for their deposition. Now, an *archaeological theory of economic fluctuations*—a middle-range theory where contextual value measures the average funerary expenditure invested in grave goods accompanying the deceased—can be developed.

The contextual valuation method is a way of contrasting this theory, and a mortuary analysis based on it allows the implementation of macroeconomic econometrics and sociometry, inferring economic fluctuations and social changes by observing the burial record with statistical techniques. But it is time to consider the framework of axioms and postulates underlying the theory. The *funerary expenditure analysis* through the *contextual valuation method* rests on two pillars: the *diachronic approach* provided by chronology and the *comparative analysis* of cemeteries.

A BRIEF HISTORY OF RESEARCH

The history of my research can be divided into three stages: 1989–93, 1994–2000, 2008–to the present. All began with the certainty that grave goods con-

Received: 1 March 2013. Accepted: 11 March 2013. Published: 21 March 2013.

tained a *secret code* that could be deciphered, and the key to this seemed to be in the context of these archaeological artifacts. The first steps of research were directed to seek and quantify social differences from the variability observed in Iberian grave goods. Later, I found that I was measuring economic differences and that their distribution had shaped the landscape of social differentiation. In short, it was shown that economic activity and social dynamics have been recorded in grave goods. Then systemic functionalism was diluted and a clear economic materialism surfaced from which it was possible to quantify inequalities among individuals in the studied community.

Thus began this great adventure. An initial intensive phase was developed between 1989 and 1993, followed by another very irregular phase between 1994 and 2000. Undoubtedly, the most important event took place in January 1993. It was then that grave goods, following the strategy of not forcing their reading, began to speak for themselves. The first results obtained from different chronological series in numerous cemeteries were crossed. Thanks to this, clear material evidence of an ancient Iberian crisis appeared—well known throughout the archaeological record—and other equally important historical moments that will be discussed in the last chapter of my recent book (Izquierdo-Egea 2012a). This major discovery showed that economic fluctuations were encoded in the burial record. In brief, when seeking social differences, economic differences were also measured. This turning point marked a revolution capable of sustaining a strong theoretical basis underpinning the used method. Furthermore, the fundamental key of the latter was uncovered: the *correlation of chronological series*.

Because of that progress, the first ripe fruits of the tree planted in 1990 with the seed of 1989 were harvested. They were obtained by measuring variability in two burial mounds from Setefilla in Seville, Spain. This was included in my work *The Orientalizing Period in Western Mediterranean* (Izquierdo-Egea 1989). This significant accomplishment was achieved while writing my doctoral thesis *Mortuary Analysis and Historical Reconstruction of Iberian Social Formations*, defended at the end of 1993.

The second of these stages gave substantial developments including a chronological rigorosity (1994) and incorporating a new technique to measure social differentiation (1997). Later, I proceeded to measure social differences based on the variability expressed by the economic differences of grave goods. It was

the second major breakthrough. As a postscript, a study based on these advances was published in 2000: *Economic Fluctuations and Social Changes in Early Iberian Protohistory* (Izquierdo-Egea 1996–7), which represents a major improvement of my doctoral thesis. This study included numerous revisions of burial samples previously considered, as well as notable technical novelties for more accurate analysis.

The third and final phase starts in 2008 and continues until the present. I have analyzed the Iberian necropolis of Pozo Moro (2008–9), the early imperial Roman society of Ampurias (2009–10), both in Spain, the Grand Bassin II cemetery at Mailhac (2010–1), France, the southeast necropolis from *Baelo Claudia* (Bologna-Tarifa, Cadiz), the Can Fanals cemetery in Pollentia (Alcudia, Majorca), and the Greek Ampurias of the fifth century BC (Izquierdo-Egea 2009, 2010, 2011, 2012b, 2012c).

Finally, in 2010, there was another momentous discovery when I checked equivalence between contextual and real value of Roman and Greek coins from Ampurias. This connects the economic archaeology of grave goods with monetary economics, opening a huge range of possibilities for research—for example, the study of devaluations and inflation. These preliminaries allow us to glimpse a horizon where it is apparent that the evidence from ancient communities shows essential aspects such as fluctuations of economic activity and social changes associated with them as unconscious manifestations. They bequeathed to posterity the material evidence of this behavior through the funerary record encoded in the composition of grave goods. But we can still go much further, because the correlation between related populations, studied as a function of time and with a significant proportion of sampling, provide an invaluable economic and social knowledge to scientifically reconstruct their remote past (see the third chapter of Izquierdo-Egea 2012a).

AXIOM OF MORTUARY VARIABILITY

Variability is the basis of my entire theory. By measuring it through the composition of grave goods, we can access an encrypted record of economic information on the life of societies that left their archaeological remains.

At first glance, the mortuary landscape of many ancient peoples and civilizations, e.g. the Iberians, offers a chaotic scene where a material norm in burial

seems to be absent. Paradoxically, the great variability displayed in all cemeteries is a uniform rule, behind which there are hidden regularities, capable of being indirectly identified if we proceed in detail. In short, remembering that this methodology can be applied only to complex societies who used grave goods, it is evident that ancient peoples buried their dead following the same ritual, but expressing material differences between them. Hence, direct observation of the archaeological record confirms the *axiom of a mortuary variability* measurable by the study of the composition of grave goods. This is a prerequisite to make my methodology viable, which statistical quantification provides a privileged way to measure *funerary expenditure*. Having found a reliable relationship between the data and evolution of the protohistoric economy of the Iberians, the theoretical base was modified to adapt it to the new empirical reality.

BUILDING A THEORY: AXIOMS AND POSTULATES

Economic fluctuations and associated social changes were recorded in the grave goods of ancient societies. That leads to building the *archaeological theory of economic fluctuations* cited above, which will enable an *archaeology of economic fluctuations*, where mortuary archaeology and economic archaeology are connected. But this postulate requires compliance with two others. It was stated under the influence of dialectical materialism that material differentiation in access to burial would be proportional to the asymmetry of relations within the community, a process which involved social division of labor (Izquierdo-Egea 1995: 148).

As I argued above, “when society does not manipulate burial practices [through grave goods] as Christianity has done, it is possible to infer important regularities” (Izquierdo-Egea 2012a: 11–2) because they can store variables of economic life. This can be expressed best as a *universal social law*, not as a *conditio sine qua non: if societies do not ideologically manipulate burial practices, they express the social and economic differences between individuals* which, in turn, indicate macroeconomic fluctuations. In fact, religion is responsible for transmitting the real image of society to the beyond.

Of course, the second postulate must also be complied: *individuals buried in the same cemetery represent the whole society*. That is, if some are buried

in one place and some in another and we do not consider all cases, then burials studied would not be displaying a real image of their society. Similarly, the *postulate of inherited social position* is essential. That is to say, social status is passed from one generation to another. The archaeological evidence that confirms this behavior is conclusive and comes from countless burials of children with rich grave goods typical of adults. This shows that social differences do not disappear with death, but are perpetuated beyond life (Izquierdo-Egea 1996–7: 111; 1993: 49; 1989: 108–10). All of these postulates are derived from a previous core developed in the 1989–90 biennium (Izquierdo-Egea 1991: 134–5; 1995). However, the complex statistical study undertaken for my doctoral thesis provided a large corpus whose interpretation required an extensive review, including a refinement of some previous principles and conceptualizations, in order to make them more consistent with these results. Any social inference coming from the material variability of cemeteries, shall assume all these axioms and postulates that give validity to mortuary analysis as a methodological strategy in the reconstruction of the past.

MEASURING MORTUARY VARIABILITY: THE BIRTH OF THE CONTEXTUAL VALUATION METHOD

Variability began to be measured in two burial mounds from Setefilla, as I mentioned above. The *contextual valuation method*—named originally ME-VACON (Izquierdo-Egea 1994)—was developed from that experience as a strategy to objectively estimate the contextual value of grave goods, regardless of whether burials were inhumations or cremations. The selection of complete samples—which will be discussed later—allows us to address with certain guarantees the measurement of variability emanating from composition of grave goods. However, the realization of this objective is reflected through the estimation of two key variables: the contextual value of a mortuary good and a contextual index of burial, whose instrumental precedents were developed in a previous study (Izquierdo-Egea 1989: 67–8, 73–4) and enhanced later (Izquierdo-Egea 1991: 134–5; 1993: 34–41; 1995: 150–1; 1996–7: 107–9).

The *contextual value of a mortuary good* (VC_i) is an approximate measure of its economic value in the spatial and temporal context studied, both the tomb as its cemetery, and the date or specific period of

time of burial. This is, when it was amortized through its deposition inside the tomb by accompanying the deceased.

At this level of microeconomic analysis, the contextual value of an amortized good can be proportional to its exchange value in real life. In fact, experience shows that there is a fundamental difference between economic goods from burials: some clearly express their exchange value against others that demonstrate the use value. Without such an exception to the rule, this observation could be raised to the status of a postulate. Therefore this will not only be limited by geography and chronology, but it will rely directly on the corresponding historical context. Its determination is given by the association with other goods in all contexts where it appears, taking into account basic criteria as their rarity. In fact, in the words of V. M. Fernández-Martínez (1991: 23) on its most important notion, “the fact is that the contextual value of a particular type of artifact seems quite appropriate and rich in content for a valid quantitative approach to the problem: is proportional to rarity, spatial concentration, and social esteem of type.”

This variable depends on the absolute frequencies of five factors: components of grave goods (N), tombs (T), the grave good considered (N_i), associated goods (N_{ia}) and the graves where appears the component under consideration (T_i). Furthermore, we assume that the value of a mortuary good (VC_i) is a function of its rarity or uniqueness, that is to say, the inverse of its relative frequency (N/N_i), the average of goods

$$\frac{N_i + N_{ia}}{T_i} \quad (1)$$

and the relative frequency (T_i/T) of graves where it appears. Multiplying the above statistical expressions, we obtain that the

$$VC_i = \frac{N(N_i + N_{ia})}{T \cdot N_i} \quad (2)$$

Simplifying, the mathematical formulation is clearer:

$$VC_i = \frac{N}{T} \left(1 + \frac{N_{ia}}{N_i}\right) \quad (3)$$

where N and T are constants, while N_{ia} and N_i are discrete variables.

Therefore, the contextual value of a mortuary good will depend directly of the total number of associated components in all the tombs where it appears and, inversely, of its absolute frequency in the sample of the studied population. Another formula expresses best relationship between this variable and rarity:

$$VC_i = \frac{N}{N_i} \cdot \frac{N_i + N_{ia}}{T} \quad (4)$$

For its part, the *contextual index of a grave* (IC_t), obtained from the sum of the contextual values of its components, is an important and approximate measure of the mortuary expenditure invested in the deceased. It is an estimate of the amortized economic value, in the form of material goods, deducted from the family heritage and, consequently, eliminated from the normal economic cycle. It represents an approach to the mean economic cost of burial. Obviously, as in the case of the previous variable, it will depend directly on the economic and social dynamics experienced by the reference population, i.e., it will result from a specific historical context.

The formulation of the contextual index of a grave is as follows—note that it is the sum of the contextual values of grave goods multiplied by their respective frequencies:

$$IC_t = \sum_{i=1}^n VC_i \cdot f_i \quad (5)$$

We can also express mathematically the average of all contextual indexes corresponding to the selected graves in each sample:

$$\overline{IC} = \frac{1}{n} \sum_{i=1}^n IC_{t_i} \quad (6)$$

Finally, relationship between the VC_i and IC_t variables is articulated by the expression

$$\overline{VC} \cdot N = \overline{IC} \cdot T \quad (7)$$

That is, the average of contextual values of all grave goods components of a cemetery is directly proportional to the average of contextual indices of tombs containing them. The mean of all contextual values corresponding to the grave goods in each sample is represented as:

$$\overline{VC} = \frac{1}{n} \sum_{i=1}^n VC_i \quad (8)$$

CONTEXTUAL VALUE OF GRAVE GOODS AS FUNERARY EXPENDITURE

This new concept was a qualitative leap in the scientific study of ancient cemeteries, assuming a clear advance in the *axiomatics* of my methodology. In my early studies, I suggested that the contextual index of a grave objectively measured the level of material ownership of each individual in access to the burial ritual, arguing that such concepts should replace the traditional terms of mortuary wealth or poverty (Izquierdo-Egea 1991: 135; 1995: 151). Later it was found that the level of material ownership was no different than *funerary expenditure* (Izquierdo-Egea 1996–7: 108–9).

Based on the definition of funerary expenditure as economic cost of the funeral, the measurement of contextual value of goods amortized in graves, and of the resulting index thereof, provides a quantitative approach to its magnitude. However, this estimate could not be done without the acceptance of a fundamental postulate that links to another previously stated: *there is a direct proportionality between the economic value of goods consumed in mortuary furnishings and the total funerary expenditure*. The latter includes aspects difficult to quantify such as, in the context of incineration, the banquet (wine, imported cups or native glasses, food, and beverages) or the cost of the funeral pyre (quantity and quality of wood used as fuel for burning). This cumulative economic value is one aspect of the cost of the funeral, surely the most important and the only objectively measurable at present. Consequently, the valuation of amortized goods, removed from normal economic circulation, lets us measure an important part of funerary expenditure, approaching its real value; and although the amount is less, both variables bear a direct proportion.

Continuing with the *axiomatics* discussed above, I propose a new postulate: *the existence of a relationship between funerary expenditure and the family estate*. The economic cost of goods deposited with the deceased is assumed by his relatives. Therefore, funerary expenditure is directly proportional to the estate of a deceased individual, which is none other than of his own family. Accordingly, the deceased's social position is defined in economic terms of goods possession. If mortuary variability shows conspicuous material differences, the new postulate provides consistency to its translation in terms of unequal heritage among families in the community represented

in the studied cemetery. However, although not all community members were buried in the same place, measurement of mortuary expenditure between sectors represented would give significant and consistent results with fluctuations of economy and the associated social changes. This would mean that economic accumulation exhibited is closely linked to community structuring emanated from social system.

We can derive a fundamental corollary: *material differences in burial are the result of an unequal distribution of wealth*. In order to explain how ideology can control the burial without altering the real image of society, I advanced an explanation a few years ago. The mission of ideology is to keep arbitrariness in social order. So I postulated *the existence of ideological control over funerary expenditure* through its regulation (Izquierdo-Egea 1996–7: 109).

Linking with another postulate discussed above, although only a small proportion of family estate was intended to cover the cost of burial, that amount will always be proportional to it, despite the limitations imposed by ideological control of funerary expenditure. Then the observable economic differences between individuals buried in a cemetery in such conditions will always be statistically reliable.

FUNERARY EXPENDITURE AND ECONOMIC ARCHAEOLOGY

The chronological analysis of funerary expenditure, both locally and regionally, is the backbone of the *economic archaeology of grave goods*. The merger of chronology and comparative analysis led to a key tool of analysis: the *correlation of chronological series*, cited above. This makes possible a diachronic study of a social formation through its mortuary behavior and its subsequent comparison with other formations, and constitutes the *chronological postulate*.

When I started the discussion on *axiomatics*, I began taking the first steps in building a new *theory of contextual economic value* as a basis of an *archaeological theory of economic fluctuations*. This is a decisive leap. In fact, the average funerary expenditure invested in a grave or in its cemetery, measured by the contextual index, reports on the state of the economy at any given time and shows its evolution over time. This opens the door to a new way to investigate the macroeconomics and microeconomics of many peoples of antiquity, following the path traced by the economic archaeology of grave goods.

I can propose another corollary: *funerary expenditure is directly proportional to the level reached by economy at a given time*. This magnitude will not only depend on the state of the economy at time of death, but also of the social position occupied by the deceased. In more detail, for a member of the same social status, funerary expenditure in times of economic prosperity would be greater than in times of crisis. The tombs reflect different social and economic realities over time. Internal or external political conflicts had a direct impact on ancient economies, acting over trade and productive activity, and their impact will be reflected in mortuary record. On the other hand, we can undertake microeconomic studies by measuring funerary expenditure through the grave goods. For example, using the methodology proposed here it is possible to determine exchange value of coins in Roman times from contextual equivalences. When they are contrasted with data for monetary circulation, devaluations or depreciations can be detected (Izquierdo-Egea 2010).

It also helps to shed light on another interesting issue. Thanks to the chronological and geographical analysis of funerary expenditure of the Iberians, we can estimate the fluctuation of economic value of Greek goods (Izquierdo-Egea 1993). This allows us to appreciate how the value of Attic pottery is more expensive depending on the distance. That is, its price is increased from coast to the inland. In short, funerary expenditure is a superb econometric indicator, since it is directly proportional to the level reached by economy at a given time.

MEASUREMENT OF SOCIAL DIFFERENTIATION

Having developed an appropriate methodology, it was time to harvest and process data, pursuing the detection and isolating of regularities or trends and economic fluctuations—in some cases cyclic—allowing to unravel social changes from the material remains of the mortuary record. The key tool was the *contextual index of a grave*, which measures not only economic differences but also social differences among the dead, as was argued in the axiomatics discussed above. This allow us to conform a new landscape of social geometry drawn by social distance. We should admit the direct intervention of ideological control exercised by the political and religious power, responsible for the transmission of the real image of society to beyond. But in many cases this limitation does not

prevent material differences from being translated into social differences, although always in an indirect and relative way. In any case, the reading of mortuary record, limited and fragmented, will allow an approach to social reality of the studied formation, insufficient by itself. It will, of course, also be necessary to compare it with results provided by the analysis of other related contexts and with other sources where possible.

If until 1993 only economic differences had been calculated, it was not until 2000 when results were published incorporating social differences estimated from the economic ones. However, this advance was proposed in early 1994, when the advantages of using the coefficient of variation (CV) were detected to measure dispersion rather than the standard deviation. It was noted that while *a contextual index of funerary expenditure* measured the level or state of economy at a given time, the CV was in charge of doing the same with economic differentiation among the dead, i.e. calculating the degree of social differentiation in complex societies—ranked or stratified—(Izquierdo Egea 1996–7: 111). Recently, this technique has been improved with the Lorenz curve and Gini coefficient (Izquierdo-Egea 2010: 6), a measure of inequality of a statistical distribution whose calculation is based on the Lorenz curve (Van Poppel 2011; Bowles *et al.* 2010; Borgerhoff-Mulder *et al.* 2010; Gurven *et al.* 2010; Shenk *et al.* 2010; Smith *et al.* 2010).

ANALYTICAL PROCEDURE AND PARADOXES OF SAMPLING

One of the keys to my method lies in obtaining statistically significant clusters for different times of the life of a cemetery, in order to detect economic fluctuations and social changes recorded in grave goods. Before addressing the issue of sampling, we should remember the limitations of the mortuary archaeological record. Between them, we find the age of numerous excavations with a total absence of methodology, making useless their memories, the spoliation, natural destruction, omission of stratigraphy when it is present, the randomness of findings, incomplete fieldwork, distorting assessment of samples obtained, and many other issues (Izquierdo-Egea 1993: 48). The procedure is defined by applying the sampling on published inventories of excavated cemeteries (Izquierdo-Egea 1996–7: 110; 2010: 6, 12). Only intact tombs—not plundered or destroyed—are selected,

with complete grave goods and reliable datation. Then they are grouped according to their relative chronology, giving rise to several chronological series.

It is possible to find paradoxes within sampling when sample size is small or includes incomplete grave goods due to natural factors—but not pillaged. In fact, if destruction of grave goods is due to natural causes, it is possible to include these cases and obtain meaningful results that follow the general trend indicated by larger samples. La Albufereta in Alicante, Spain is a paradigmatic example (Izquierdo-Egea 1996–7: 110, note 14). The paradox is attributable to a favorable randomness ensuring the representativeness of the statistical sample to the population studied. In any case, there is only one condition to be met by a small funerary sample, with no apparent statistical significance, to support its validity. This consists of a full coincidence of trends in its correlation with larger samples and reliable from other cemeteries in the same period.

Obviously, there is an optimal way to increase the size of selected samples. Both stratigraphy and relative chronology could be combined—overlays are not admissible—with absolute dating of burial remains (ashes, bones, wood, pottery). If we had those three sources, confrontation of these would result in more reliable datings and larger samples. At this point, it is also necessary to clarify other possible distortion. It arises when many of the poorest burials without datable elements are discarded from the selection. In other words, under such conditions, samples have the richest tombs and, therefore, the cumulative mean value is proportionally higher. Anyway, it was found in all known cases that this disadvantage does not break, in any way, the direct relationship between evidence provided by mortuary record and the real state of economy at the time of burial.

CATEGORIZATION

Categories should be defined to encode grave goods following a rule: when particular categories are established, some of them will be unified as intermediate or generic categories when the number of cases is reduced. After this step, you enter data from selected graves into the database of the first version of *Necro* program, written in Turbo Pascal (Izquierdo-Egea 1991).

A decisive technical breakthrough in the calculation of contextual values and indexes was the result of a strong interaction between theoretical archaeol-

ogy and computer programming. That is, the economic value of grave goods, burials, and chronological samples selected in each cemetery. This program was also used in combination with other statistical packages for graphics and make some calculations as the Gini coefficient, such as *Systat*, *Wessa*, *Gretl* (Wilkinson 1990; Wessa 2012; Cottrell & Lucchetti 2012a, 2012b).

These techniques could be incorporated into the new version of *Necro* to develop in the future—in 1996 a prototype was written in QuickBasic language. However, as we have to be extremely rigorous with the criteria required in the selection of graves—intact burials from the point of view of the conservation status with reliable dates—we need to be demanding in establishing categories. It is always preferable to let the artifacts speak for themselves without forcing anything. The context must have the last word, without any manipulation of data obtained from an explicit objective observation.

Recently, in 2010, some issues of categorization have been resolved after surveying numerous Phoenician, Tartessian, Iberian, Celtiberian, Gaul, Greek, and Roman cemeteries. This has allowed us to significantly expand the current understanding of economic fluctuations and social changes of antiquity. Specifically, a statistical anomaly was solved that was caused by the indiscriminate use of particular categories in small samples. Its correction was possible by adjusting the number of specific classes grouped according to their nature and statistical behavior. Finally, intermediate categories are established by reducing to a minimum the particular categories.

When the number of grave goods does not coincide proportionally with its contextual value, an anomaly arises. This is a technical problem that may alter the final reading of some results and is also difficult to detect. It should be remedied by the strict review of specific categories used initially, adjusting them according to their frequency. That is, individual cases must be removed, grouping them into generic classes, with the exception of cases such as the presence of a gold earring, a silver ring or a coin in order to study the noble metals pattern or changes in monetary economy. This seems to be the end of a long debate on the categorization of grave goods, solved by proposing an innovate step.

The mere count of objects or average of grave goods per burial is a simple and reviled technique that all rightly criticize. However, it should be permitted for use as a preliminary indicator if then followed by an application of the contextual valuation

method proposed here. In fact, there is a direct proportionality between this variable and the economic value measured by funerary expenditure. That evidence was observed and confirmed in October 2010, and is useful in samples of small size to avoid making blunders. This will provide a more accurate review of tests performed in the past. However, if one only follows this track, the contextual value of grave goods cannot be estimated, that is, microeconomics will be completely ignored. Also, the average of objects hides the true extent of economic changes recorded in mortuary record, which can only be seen when the categories of goods come into play. It is important to make selections carefully, allowing them to group themselves according to the nature of their composition, the similarity of their value or other combined factors. Furthermore, this technique is, obviously, inappropriate for measuring the social differentiation for the same reason cited above.

Finally, we reach the last and most important step: the temporal and spatial—local and regional—correlation of time series from cemeteries. At this crucial point we can observe regularities across time and space by detecting similar trends. Therefore, the fundamental key lies in a chronological postulate and a comparative method. In other words, chronology and correlation are essential, as well as working with shorter periods to isolate more precise temporal changes. An ideal situation would be a maximum of 50 years and a minimum of 25. This approach will facilitate obtaining significant results in the reconstruction of past societies. It will allow us to isolate trends and regularities of their economic and social behavior.

CONCLUSION

It is possible to decipher the economic and social keys registered in the mortuary record through an objective procedure. In fact, a new methodology—the *contextual valuation method*—has been proposed, from which we can statistically analyze funerary expenditure and measure its direct relation with economic fluctuations in complex societies—ranked and stratified peoples and civilizations of antiquity. This was shown elsewhere—see the book of Izquierdo-Egea (2012a). For instance, its application to Iberian cemeteries has illuminated outstanding aspects of Spanish protohistory.

Thanks to this scientific approach, economic fluctuations and cycles have been discovered and iso-

lated—with stages and phases, social changes, social contradictions pointing out conflicting processes, currency devaluations, and inflationary situations. In short, they are parts of a whole universe called *economic archaeology of grave goods* that make it possible to reconstruct economic and social dynamics of past societies through a solid framework.

The observation and measurement of mortuary variability make this possible, by proving that these phenomena were recorded in coded form in grave goods. This helps build the *archaeological theory of economic fluctuations*, which will enable an *archaeology of economic fluctuations* where mortuary and economic archaeology are connected. The chronological analysis of funerary expenditure through time, both locally and regionally, is the backbone of the *economic archaeology of grave goods*. Together with a correlation of these samples, a statistical comparison between the behavior of one social formation with others is possible. The basis of this building rests on a core concept: the *contextual value of a mortuary good*, an approximate measure of its economic value in the spatial and temporal context where it was deposited—the tomb, its cemetery, and date of burial. The *contextual index of a grave*, derived from the previous notion, measures the expenditure invested in the deceased.

In any case, this study has only glimpsed the top of a huge mountain that awaits to be investigated to offer a rich vein of knowledge of incalculable value. It promises to be exciting and will contribute decisively to the development of economic archaeology, working closely with the economic history of antiquity whose complexity is recognized by I. Morris (2005). Because the mortuary record is a source on the economy of ancient Rome as valid as Mount Testaccio (Remesal 2005, 2008a, 2008b). This will allow us to know too, with a global perspective, social changes linked to economic activity throughout the vast Roman Empire. Also, among the many tasks to be undertaken, a review and extension of the statistical corpus should be conducted with additional data obtained from broader and reliable samplings. In this way, a more precise reading of results is made possible, consistent with a more precise chronological approach. To advance this knowledge, fluctuations and cycles of short and long duration would have to be observed. In fact, economic fluctuations seem to evolve through cycles longer or shorter depending on whether the normal development of the economy is or is not interrupted by traumatic events. This evidence comes from the numerous cemeteries

of the Iberian civilization so far analyzed. Moreover, social or human sciences will awaken from their long slumber by remaining firmly on the path of logical quantification, followed by S. Shennan (1990) and others recently (Bowman & Wilson 2009). The economic archaeology of grave goods strongly relies on a methodology founded on this perspective. It has a promising future not only for the results achieved, but for the flexibility that allows improve it by refining its techniques. For instance, through the review of its mathematical aspects and the development of new versions of the software used to analyze data.

Recently, there has been progress in the development of a new statistical technique to measure the level of internal conflict in a past society through its mortuary record (2012). This achievement represents a major technical advance of the *contextual valuation method*. In addition, another technique to estimate the distribution of wealth, similar to the Lorenz curve, has been developed (2011–2). Both results are surprising and they will be published as soon as possible. Currently, my research is focused in testing the effectiveness of these techniques and, on other hand, more evidence on currency devaluations in Roman burials has been achieved.

Acknowledgements

I would like to express my gratitude to Prof. Juan A. Barceló for reviewing my manuscript, and to Dr. Daryn Reyman-Lock for proofreading.

About the author

PASCUAL IZQUIERDO-EGEA, editor and publisher of *Advanced Archaeology*, has a doctorate in *Philosophy and Letters* (1993). He is a specialist in *Economic Archaeology of Grave Goods* and has studied the *Economic Fluctuations and Social Changes in Antiquity*, making great discoveries like pre-Roman economic cycles in Spain and France or currency devaluations in Roman times. He has also edited and published several international journals such as *Arqueología Iberoamericana* (2009–13).

REFERENCES CITED

- BORGERHOFF-MULDER, M., I. FAZZIO, W. IRONS, R. L. MCELREATH, S. BOWLES, A. BELL, T. HERTZ & L. HAZZAH. 2010. Pastoralism and wealth inequality: revisiting an old question. *Current Anthropology* 51/1: 35–48.
- BOWLES, S., E. A. SMITH & M. BORGERHOFF-MULDER. 2010. The emergence and persistence of inequality in pre-modern societies: introduction to the special section. *Current Anthropology* 51/1: 7–17.
- BOWMAN, A. & A. WILSON, EDs. 2009. *Quantifying the Roman Economy. Methods and Problems*. Oxford: Oxford University Press.
- COTTRELL, A. & R. LUCCHETTI.
- 2012a. *Gretl User's Guide. Gnu Regression, Econometrics and Time-series Library*. < <http://gretl.sourceforge.net/> >
- 2012b. *Gretl Command Reference. Gnu Regression, Econometrics and Time-series Library*.
- FERNÁNDEZ-MARTÍNEZ, V. M. 1991. Las aplicaciones informáticas en la arqueología española: un panorama del primer congreso. In *I Reunión de Aplicaciones Informáticas en Arqueología (Madrid, 1990) = Complutum* 1: 19–30. < <http://revistas.ucm.es/index.php/CMPL/article/view/CMPL9191120019A> >
- GURVEN, M., M. BORGERHOFF-MULDER, P. L. HOOPER, H. KAPLAN, R. QUINLAN, R. SEAR, E. SCHNITER, C. VON RUEDEN, S. BOWLES, T. HERTZ & A. BELL. 2010. Domestication alone does not lead to inequality: intergenerational wealth transmission among horticulturalists. *Current Anthropology* 51/1: 49–64.
- IZQUIERDO-EGEA, P.
- 1989. *El horizonte orientalizante en el Mediterráneo occidental*. Unpublished doctoral work. Bellaterra: Universidad Autónoma de Barcelona. [The Orientalizing Period in Western Mediterranean.]
- 1991. Un programa informático para el análisis funerario en Arqueología. In *I Reunión de Aplicaciones Informáticas en Arqueología (Madrid, 1990) = Complutum* 1: 133–142. [A Computer Program for Mortuary Analysis in Archaeology.] < <http://revistas.ucm.es/index.php/CMPL/article/view/CMPL9191120133A> >
- 1993 [1994]. *Análisis funerario y reconstrucción histórica de las formaciones sociales íberas*. Ph.D. thesis. Bellaterra: Universidad Autónoma de Barcelona. [There is a microfiche edition published in 1994 by this institution.]
- 1994. Aplicación del método de valoración contextual (MEVACON) al análisis socioeconómico de la necrópolis de Baza. In *Homenaje al Profesor Presedo*, pp. 513–25. Sevilla: Universidad de Sevilla.
- 1995. Materialismo histórico y análisis funerario en Arqueología. In *Actas del I Congreso de Jóvenes Geógrafos e Historiadores (Sevilla, 1990)*, pp. 147–

55. Sevilla: Escuela Libre de Historiadores.
- 1996–7 [2000]. Fluctuaciones económicas y cambios sociales en la protohistoria ibérica. *Arx* 2–3: 107–38. [Economic Fluctuations and Social Changes in Iberian Protohistory.] < <http://www.laiesken.net/arxjournal/pdf/izquierdo.pdf> >
- 2009. Pozo Moro y los cambios socio-económicos de la protohistoria ibérica durante los siglos V y IV antes de nuestra era. *Arqueología Iberoamericana* 2: 5–23. [Pozo Moro and the Socio-economic Changes of Iberian Protohistory During the 5th and 4th Centuries BC.] < <http://www.laiesken.net/arqueologia/pdf/2009/AI0201.pdf> >
- 2010. Fluctuaciones económicas en la Ampurias romana de época alto-imperial. *Arqueología Iberoamericana* 7: 3–38. [Economic Fluctuations in Roman Ampurias During Early Imperial Times.] < <http://www.laiesken.net/arqueologia/pdf/2010/AI0701.pdf> >
- 2011. Mailhac y las fluctuaciones económicas de la protohistoria ibérica arcaica (550–450 a. C.). *Arqueología Iberoamericana* 11: 3–25. [Mailhac and the Economic Fluctuations of Early Iberian Protohistory, 550–450 BC.] < <http://www.laiesken.net/arqueologia/pdf/2011/AI1101.pdf> >
- 2012a. *Economic Archaeology of Grave Goods*. Advances in Archaeology 1. Graus.
- 2012b. *Baelo Claudia y Pollentia*: nuevas evidencias sobre las fluctuaciones económicas en la Hispania romana de los siglos I–II d. C. *Arqueología Iberoamericana* 14: 3–16. [*Baelo Claudia and Pollentia*: New Evidence on the Economic Fluctuations in Roman Spain During the First and Second Centuries AD.] < <http://www.laiesken.net/arqueologia/pdf/2012/AI1401.pdf> >
- 2012c. Fluctuaciones económicas en la Ampurias del siglo V antes de nuestra era. *Arqueología Iberoamericana* 16: 3–10. [Economic Fluctuations in Ampurias During the Fifth Century BC.] < <http://www.laiesken.net/arqueologia/pdf/2012/AI1601.pdf> >
- MORRIS, I. 2005. Archaeology, standards of living and Greek economic history. In *The Ancient Economy. Evidence and Methods*, edited by J. G. Manning & I. Morris, pp. 91–126. Stanford: Stanford University Press.
- REMESAL RODRÍGUEZ, J.
- 2005. Escrito en barro: el monte Testaccio y la “Historia Augusta”. In *Historiae Augustae. Colloquium Barcinonense (Ampurias, 1993)*, edited by G. Bonamente & M. Mayer, pp. 249–56. Bari: Edipuglia.
- 2008a. “Olearii”. In *Epigrafia 2006. Atti della XIVe Rencontre sur l’Épigraphie in Onore di Silvio Panciera con Altri Contributi di Colleghi, Allievi e Collaboratori*, pp. 349–73. *Tituli* 9. Roma: Quasar.
- 2008b. Provincial interdependence in the Roman Empire: an explanatory model of Roman economy. In *New Perspectives on the Ancient World. Modern Perceptions, Ancient representations*, edited by P. P. A. Funari, R. S. Garraffoni & B. Letalien, pp. 155–9. British Archaeological Reports International Series 1782. Oxford: Archaeopress.
- SHENK, M. K., M. BORGERHOFF-MULDER, J. BEISE, G. CLARK, W. IRONS, D. LEONETTI, B. S. LOW, S. BOWLES, T. HERTZ, A. BELL & P. PIRAINO. 2010. Intergenerational wealth transmission among agriculturalists: foundations of agrarian inequality. *Current Anthropology* 51/1: 65–83.
- SHENNAN, S. 1990. *Quantifying Archaeology*. Edinburgh: Edinburgh University Press.
- SMITH, E. A., M. BORGERHOFF-MULDER, S. BOWLES, M. GURVEN, T. HERTZ & M. K. SHENK. 2010. Production systems, inheritance, and inequality in premodern societies: conclusions. *Current Anthropology* 51/1: 85–94.
- VAN POPPEL, F. 2011. Trends in mortality and the evolution of the cause-of-death in the Netherlands: 1850–2000. In *Death at the Opposite of the Eurasian Continent. Mortality Trends in Taiwan and the Netherlands 1850–1945*, edited by T. Engelen, J. R. Sepherd & Y. Wen-shan, pp. 17–43. Amsterdam: Aksant Academic Publishers-Amsterdam University Press.
- WESSA, P. 2012. *Free Statistics Software*, Office for Research Development and Education, version 1.1.23-r7. < <http://www.wessa.net/> >
- WILKINSON, L. 1990. *SYSTAT: The System for Statistics*. Evanston, IL: Systat, Inc.