

## From production traces to social organisation: Towards an epistemology of functional analysis

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**Summary.** *This paper discusses the importance of functional analysis for archaeology from a theoretical and epistemological perspective. It is argued that functional analysis offers a way to place our ideas about the economic development of societies within the study of their material remains. This requires the development of an economic theory in archaeology, which proposes a way to link the "traces" of human labour with the social organisation of production and reproduction.*

*Starting from the principles proposed by Classical economic thought, we approach the structure underlying social production and reproduction. Such a definition of economy obliges us to consider the forms of appropriation or allocation of the generated products and, ultimately, to ask for the objective causes of social inequality. A crucial aspect in this discussion is the social division of labour as a decisive factor in the economic development of societies and of the production of surpluses.*

*Finally, the discussion of economic theory in archaeology concludes that functional analysis can be understood as the study of the material changes subjects and objects experience through their participation in social production. At an empirical level, rather than use wear traces, what should be identified are production traces, understood as the physical attributes resulting from the social life of objects as well as subjects. At an analytical level, the proposed economic scheme allows us to distinguish different types of traces which are linked to the production and consumption processes in society.*

**Résumé** *Le présent article discute de l'importance de l'analyse fonctionnelle pour l'archéologie, d'un point de vue théorique et épistémologique. Il plaide que l'analyse fonctionnelle offre le moyen d'introduire, dans l'étude de leurs vestiges matériels, nos réflexions sur le développement économique des sociétés. Ceci requière le développement d'une théorie économique en archéologie qui propose une façon de lier les « traces » du travail humain à l'organisation sociale de la production et de la reproduction.*

*A partir des principes proposés par la pensée économique classique, nous approchons les structures sous-tendant la production et la reproduction sociales. Une telle définition de l'économie nous oblige à considérer les formes d'appropriation ou de distribution des produits générés et, ultimement, à nous interroger sur les causes objectives de l'inégalité sociale. Un aspect crucial dans cette discussion est la division sociale du travail en tant que facteur décisif dans le développement des sociétés et la production de surplus.*

*Finalement, la discussion de la théorie économique en archéologie conclue que l'analyse fonctionnelle peut être comprise comme l'étude des changements auxquels sont soumis les sujets et les objets au travers de leur participation à la production sociale. A un niveau empirique, plutôt que des traces d'usage, ce sont des traces de productions qui devraient être identifiées, comprises comme les attributs physiques résultant de la vie sociale des objets aussi bien que des sujets. A un niveau analytique, le schème économique proposé nous permet de distinguer différents types de traces qui sont liés aux processus de production et de consommation en société.*

**Key words:** Economic theory, social division of labour, functional analysis.

Since the publication of Semenov's *Prehistoric Technology* more than 40 years ago, functional analysis has come to occupy an increasingly important place in archaeology. While in Western Europe its use was mainly restricted to the study of flint tools from hunter-gatherer societies, recently, it has been applied to a growing variety of archaeological materials and to practically any type of social organisation.<sup>1</sup> Specific research methodologies have been developed in order to extend the use of functional analysis to artefact categories such as pottery, metals or wooden objects; an approach which had not been initially considered by Semenov. At an empirical level, conventional microscopic observation of the artefacts' surfaces is now increasingly complemented with experimental work, ethnographic information, contextual studies and residue analyses. The main result of this field of research has been the identification of a variety of work processes, activities and implements, which has allowed the recognition of the often unexpected complexity and diversity of technological devices developed by human societies.

In view of the increasing technical sophistication of functional analysis and the growing body of generally very detailed – metaphorically one could use the term "microscopic" – empirical information on artefacts, it has become necessary to raise questions about the position and relevance of this research within the framework of archaeology, as well as its relevance to our understanding of the history of society in general. While Semenov himself developed use wear analysis as an archaeological methodology within the theoretical framework of historical materialism, and considered technology to be a crucial aspect of the forces of production which determine the different modes of social production, recent trends have been, generally speaking, more empirically orientated, focussing mainly on the way tools were used in the past. A critical examination often reveals the mainly anecdotal character of the information obtained, as the relationship between the particular action carried out with an artefact and the context of social and economic organisation in which such an event would make sense remains unresolved. Such an approach limits functional analysis to becoming just another auxiliary technique, but justifies the common, although academically not uninteresting, claim to being considered a new field of highly specialised research with its own

<sup>1</sup> The diversity of archaeological issues which are starting to be addressed by functional analysis became clear during a recent conference held in Barcelona (Clemente *et al.* 2002).

need for staff, budgets, university courses, conferences, etc. It must be concluded that either the original expectations were unrealistic and methodologically weak, or that too little effort has been made to explore the heuristic value of this methodology for archaeology. In the following pages we will try to address this problem through a discussion of the theoretical implications of functional analysis.

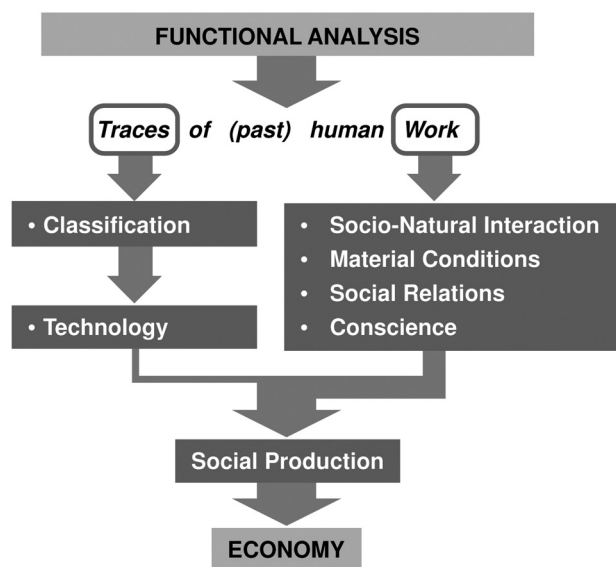


Fig. 1: The theoretical implications of functional analysis.

Archaeological research presupposes a capacity to define the object of study (the social and historical question), on the one hand, and on the other hand the physical objects (the empirical base), which help us to address the first. Furthermore, any statement about the material realm requires a methodology that allows us to observe, define and order the reality perceived. That is to say, a methodology that establishes the inferential relations and the logical structure that link phenomenological observation and abstract conceptualisation, and vice versa. Of course, such concepts only make sense and have any heuristic value when they are set in a theoretical (ontological) framework that recognises a structure of causal relations (Fig. 1). With regard to Semenov’s approach, we can suggest that the object of study of functional analysis is human work, while its empirical references are the traces visible on all objects that have been manipulated by people. Consequently if the emphasis is placed on the physical traces of human activity, research will centre on their classification and relation to specific operations. Such a positivist approach is capable of recognising repeated actions and sequences of operations, which in archaeology are commonly defined as *technology*. On the other hand, if the importance of human work is stressed, then the emphasis falls on processes, which are always located in an invisible past, rather than in a given object/product. From this necessarily theoretical perspective, a completely different set of issues becomes relevant, such as the social

context in which the activity took place, the relationship between that society and its natural resources, or the resulting process of self-consciousness. Rather than discussing the epistemological strengths and weaknesses of each of these approaches, it would seem to be more promising to attempt a dialectical discussion between them by establishing the links between the abstract concepts we are using and the traits we observe. In my view, this exercise shows that functional analysis is not just another archaeological technique, but that it plays a crucial role in any attempt to understand the material conditions of human life, which can be called *social production* (Castro *et al.* 1998).

If functional analysis is defined as the study of labour processes by means of social matter (subjects and objects), it should enable archaeology to tackle three basic economic issues: 1. What is being produced? 2. How is it being produced? and, 3. Who produces it? These questions describe the process of production, but the acknowledgment of their historical implications in a given social organisation requires a solid body of economic theory. From this holistic perspective, functional analysis represents a basically archaeological methodology which allows the application of the postulates of economic theory to the study of social materiality. Unfortunately, most of modern economic theory focuses on market behaviour rather than on production processes. Its metaphysical orientation, based on the subjective notion of “scarcity”<sup>2</sup>, hinders a historical explanation of pre-capitalist economic organisations, and this is partly the reason why archaeology has generally only adopted apparently value-free functionalist approaches to economic issues.

### The question of economic explanation

The search for an economic theory capable of addressing the question of the material and energetic requirements for social development implies going beyond the paradigm of scarcity and the law of supply and demand introduced by the Marginalist approach at the end of the 19<sup>th</sup> century. This paradigm is used not only in the analysis of capitalist market economies, but more or less explicitly underlies most modern social sciences. When individual competition and maximisation is established as the universal law ruling human relations, the reduction of economies to the realm of prices and individual choice, rather than more tangible parameters such as natural resources, technology or social necessities, means that the modern economic school avoids facing any contradictions with the material conditions of human life.<sup>3</sup> Archaeology, still a materially bound discipline, is

<sup>2</sup> Menger, one of the “fathers” of the Marginalist school, defined economic goods exclusively as those goods for which individual necessity is greater than their available quantity (Menger 1871/1985: 84-94).

<sup>3</sup> While writing these pages, the American stock market is going up at the same pace as the magnitude of the destruction and casualties caused by hurricane Katrina become known.

therefore obliged to search for an alternative economic paradigm which allows the establishment of links between the conceptualisation of the notion of socially usable energy and socio-economic development.

One possible starting point is obviously Aristotle, considered to be the inventor of the concept of the economy. The well known definition he proposes in *Politica* emphasises that *oikonomia*, or house-holding, and not *hirmatismos*, or moneymaking, provides the necessary resources for social life. The basis of real and morally acceptable wealth can only rely on the cultivation of land. This paradigm maintained its validity in the Mediterranean through the ancient and medieval periods. In the 18<sup>th</sup> century, the first modern school of economic analysis, known as Physiocracy, was still presenting a model in which the total income of a country depended ultimately on the exploitation of the land. Manufacturing, trade or the national budget were only considered to be the consequences of a certain distribution of the initial wealth generated by primary production. Many peasant societies still operate with such a model in order to explain the material and energetic cycles underlying their subsistence economies (e.g., Gudeman and Rivera 1990).

The first radical paradigm shift occurred at the end of the 18<sup>th</sup> century, when Adam Smith intended to demonstrate in *The Wealth of Nations* that the key element in economic development was not natural force, but human labour and its “productive capacity”. For more than a century, Political Economy made labour the abstract principle ruling economic theory. In *Das Kapital* Marx not only challenged the established academic position by questioning the value theory sustaining Political Economy, but also presented a thorough analysis of the importance of technology in any productive process. This paradigmatic breakthrough allowed Marx to formulate the first systematic account of the interrelation between productive forces and social organisation from hunter-gatherer societies to capitalism. The concept of “modes of production” was introduced in order to synthesise this dialectic interaction between the economic means and property rights that characterise each historical moment.

Each of these “classical” positions offers a different definition of the energy sources necessary for human existence in a given physical environment. Independently of how these sources or economic factors have been valued throughout history – before being excluded from liberal economic thought – they actually express the physical principles of any economic organisation and can thus be articulated in what we have called the *basic economic schema* (Fig. 2). Its variables are the labour objects (LO), first of all land, given its importance as an accumulator of energy, but also all other socially transformable materials, including their energetic values; the labour force (LF), understood as human labour; the labour means (LM), i.e. all the technical elements used in the economic activity; and the product (P) or final aim and result of the activity. Most work processes also

generate by-products, but their consideration as residues or as materials which can be recycled and used in other production processes depends more on social decisions than on the technology available.

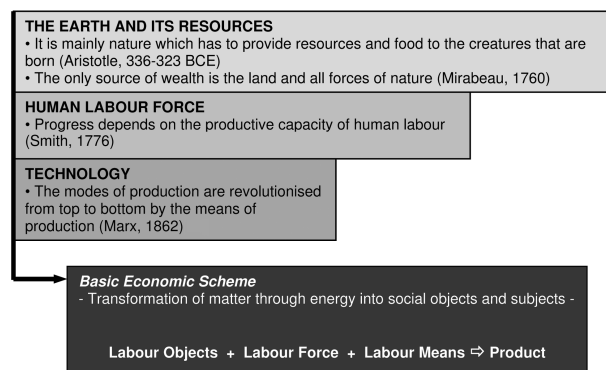


Fig. 2: Economic theory and the basic economic schema.

*The basic economic schema represents an abstract formulation of the economic factors underlying the production of material goods.* Yet, it has been one of the main contributions of feminism to show that many other vital activities have been excluded from modern economic analysis, such as the everyday care of people, storage of goods or the biological reproduction of society (e.g., Vogel 1983; Carrasco 1991). In order to overcome such a partial and unequal evaluation of the activities which warrant the material conditions of human existence, it is considered that all societies reproduce themselves through three types of production process (Castro *et al.* 1998):

- Basic Production* guarantees the biological reproduction of society. It is socially necessary work and can be carried out exclusively by women.
- Object Production* provides all the utilities a society requires and has been overvalued by classical economic schools.
- Maintenance Production* maintains or improves the physical, chemical, aesthetic or affective characteristics of social subjects and objects. It implies an increase in the social value of things without a modification of their original use value. As its aim is to avoid the exhaustion of subjects and objects, it represents an important part of the gross product of society, which historically has been provided to a large extent by women.

All three production processes function according to the basic economic schema and they reveal that men, women and objects must participate in the production of social life in very different ways. Moreover, *the final aim of all production is consumption, while the production process itself implies a consumption process.* Raw materials or tools, for example, are the material result of given labour processes, and at the same time labour objects and labour means are consumed in new economic processes. Equally, the labour force needs to be first generated and

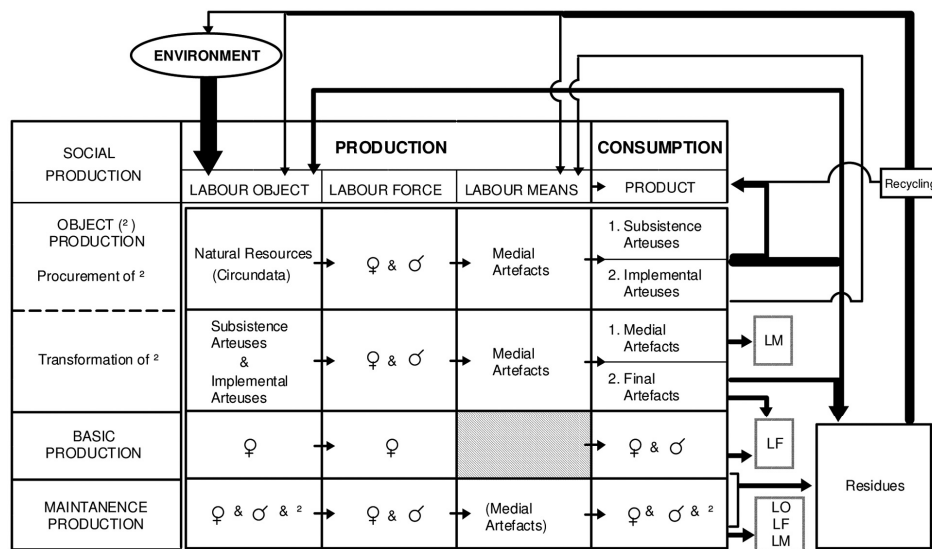


Fig. 3: The cycle of reproduction of social objects and subjects.

then maintained before entering the basic economic schema. This dialectical relationship between production and consumption, known as the paradigm of *social reproduction* (Marx 1857-8/1973; Sraffa 1960), implies, among other things, that every social object (and subject) is the result of a production process and is the condition for a different consumption process. As such, from an archaeological perspective we have to recognise that *all archaeological remains should be analysed from two different perspectives: firstly as matter that has been worked into an object; and secondly, as an object that has been used and consumed*. Moreover, the cycles of social reproduction imply a constant transformation of the social matter formed by men, women and objects, in successive production/consumption processes, until the complete exhaustion of the object has occurred, together with the replacement of its social value. The analysis of the economic organisation of society from this ontological standpoint requires the comprehension of the structure of the three forms of social production in terms of the basic economic schema (Fig. 3). Archaeologically, at least, this means examining the material implications of the reproductive cycle, and confirms that archaeological objects are not units of meaning, but rather represent a network of levels on which the dialectical relations between nature and society, and between at least two sectors of society – male and female – are expressed. Lull (1988), in his *theory of archaeological objects*, already proposed that the materiality of the archaeological object informs us about the environment it originally comes from (*circumdata* or natural material); its dimension as a socially appropriated part of that environment (*arteuse* or used material); and about its dimension as an artificially transformed material (*artefact*). Depending on the function of an object in the economic cycle, one can further distinguish between subsistence, implemental, medial, final and residual used materials and artefacts (Risch 2002, pp.19-24).

The next step is to ask if this or similar sets of categories can actually be related to the archaeological record. One way of approaching this problem is by developing better definitions of the material properties of the objects through petrographic, botanical, faunal or other interdisciplinary methods. These “identifying” or denotative procedures can inform us about the source and the potential or probable utility of the archaeological remains, but they are inadequate for tracing their

participation in a given production and consumption process. A common feature of the material transformation occurring throughout the reproductive cycle is the development of particular “traces”, i.e. attributes resulting from the working, consumption, handling, use, aging or simple exposure to a given environment of social matter. It is less the inner essence of things than the multiple aspects of their appearance that express not only the creation, but also the lifecycle of things. From this perspective, “traces” are defined as *all physical attributes resulting from the social life of subjects as well as objects*. The study of traces involves the totality of the archaeological record understood as *arteuses, artefacts, anthropological remains*, and those *circumdata* associated with them. Given its concern with the observation of “traces” on materials, it is the responsibility of functional analysis to use the archaeological record to define how women, men and objects succeed (or not) in organising social reproduction. The main technical challenge of functional analysis lies in the identification of the archaeological materials as factors in the basic economic schema proposed or in any other economic model.

### The economy in society

Having defined what we mean by economy, it becomes crucial to reconstruct what we previously deconstructed, and to link it to social organisation in general. Not only are we interested in describing the nature of the productive processes, and what material value they have generated, but we also have to understand their implications for social, political and ideological structures. The aim is to move from forms of production to relations of production and ownership.

The difficulty of organising a society’s economy resides in the fundamental differences between the stages it has to go through in order finally to satisfy individual necessities (Marx 1857-8/1973). *Production, as an*

*abstract category, is always a social action, given the social nature of the human species.* Independently of the type of activity and how it is carried out, production goes beyond the satisfaction of the needs of the individual worker and attends to the demands of the community to which he or she belongs. Production not only generates the objects and subjects of consumption, but also generates the need for them. *At the opposite extreme, consumption, whatever its social or private context, is an act of individual appropriation, an existential necessity of each member of society.* Through consumption, new needs are created, which immediately produce the motivation for production. The responsibility for overcoming the opposition between social production and individual consumption falls to distribution. Gifts, tributes, theft or commodity exchanges are particular historical forms of organising individuals' share in production. Yet the social laws that enforce a given system of distribution are only the consequence of a previous organisation of production, and in particular of the distribution of labour objects and labour means in society. The power of Marx's introductory chapter to the *Grundrisse* still lies, in our view, in its emphasis on the relation between general production, particular distribution and singular consumption as dynamic elements of a socio-economic totality. History is not reduced to technology or production processes, but rather appears as the result of the changing relation between these elements of social production. Ultimately, this means searching for the economic as well as political and ideological structures responsible for the generation of material *wealth* and *surplus*, two of the motives underlying the development of our species.

Every society has to engage in a series of activities in order to satisfy its material needs, but there is no predetermined form in which these tasks must be carried out. Throughout history, different societies have developed or adopted countless technical and social variants in order to organise their economies, so responding to changing needs and material conditions. The product obtained constitutes the material wealth of the society.

From a long-term historical perspective, social wealth has maintained an upward trend, although at very unequal rhythms depending on the geographical region and time period, and interrupted by periods of clear reversal. Such increases in production have been achieved by modifying, quantitatively or qualitatively, some of the factors of the basic economic schema, either by increasing the force of labour, or by improving, in material or technical terms, the means and objects of labour. While the former approach only permits an increase in production, the latter approach also achieves an improvement in productivity, understood as the quantity of value obtained per unit of labour.

The historical development of societies' material wealth and the means used in their production undoubtedly

constitute one of the main economic issues in archaeology. Nevertheless, as we have seen previously, this analysis is partial, as it considers wealth as merely a natural result of production and not as an indispensable value for social, and as such, for individual reproduction. From the perspective of consumption, the other question which must be tackled is the access of all the members of a community to this material wealth; in other words, the distribution of social production.

If we approach this issue once again from a historical perspective, it can be seen that the degree of inequality in the distribution of production has fluctuated considerably over time, and does not follow a rising trend. In principle, the earliest state-like societies in Mesopotamia and Egypt do not seem to have followed more equitable redistribution systems than, say, the Greek city states, the Roman Empire or the Caliphate of Cordoba. Even within contemporary capitalism, there are important differences between some countries and others in terms of redistribution of production, although the tendency over the last few years has been one of an increasingly evident concentration of global wealth<sup>4</sup>. What seems clear is that increases in production and productivity are not inevitably associated with greater social inequality in terms of consumption, which is a source of hope for the majority of humanity.

When we take on the question of the unequal distribution of social production, we need to be able to establish when an object, produced according to the factors of the basic economic schema, becomes a surplus. *Surplus is defined as the share of production which does not revert in any form to the group or individual that has generated it.* As such, it always implies an unequal individual appropriation of social production. Surpluses appear when the appropriation of the material result of labour is socially restricted and becomes private property of an individual, group or class. To be sure, this is not just the result of an increase in production, as is usually suggested by functionalist archaeology, but is mainly the result of an unequal distribution of the material and energetic costs and benefits within society. To deny the social character of surplus production, and to confuse it with wealth, is an attempt by modern economic thought to obviate the economic causes of social exploitation, and to present technical and economic progress as neutral, value free processes. Yet, if we conceive surplus as profit or rent, as Smith or Ricardo still did, this negation becomes unsustainable. *To determine how surpluses are produced is a problem for economic analysis, but discovering the forms of appropriation and consumption used in its production relates directly to the study of a group's social organisation* (Risch 2002, pp.24-28).

<sup>4</sup> So, for example, the 200 richest people in the world have more than the combined income of 41% of the world's population (Informe 1999, p.38).

The level of economic exploitation and social inequality of a community depends on the degree of asymmetry between social production and individual consumption. Surplus, property and social exploitation are interrelated concepts. Furthermore the institutionalisation of surplus as property is the consequence of a previous appropriation of one or several of the factors of production (LO, LF, LM and P) in any of the three spheres of social production. As such, *surplus is not the mechanical result of all economic development, but rather depends on certain social conditions which require a historical explanation.*

The same strategies that can increase social wealth can also be used to obtain surpluses: an increase in producers' labour time brings about *absolute surplus value*, while an improvement in the means of production and, as such, in productivity, generates *relative surplus value*. Whereas increased wealth always requires an increase in production, the generation of a surplus, in principle, only implies that the appropriation of the product is no longer kept in proportion to the labour investment of all the members of the society. Its first physical expression is the appearance of people who, though capable, do not work, or who work less, and the direct archaeological implication of this would be an unequal distribution of the means of production. A relative surplus is characterised, furthermore, by technical improvements in the means of production which, as such, should be possible to analyse archaeologically. Insofar as it has repercussions on consumption conditions, a surplus-generating economy also affects the material properties and energy values of the labour means and resources used in production, and of the social benefits obtained through their use. In any form of production, it can be suspected that, if the material and energetic characteristics of its factors of production produce negative consequences for the population's health, nutrition or habitat, then there are private interests underlying this situation, which somehow benefit from the worsening of society's living conditions. As such, the factors of production acquire qualitatively different forms and characteristics depending on whether a surplus is produced or not, and depending on how it is produced.

The economic conditions of surplus production involve variables which should be analysed archaeologically, such as the division of labour, the improvement of the technical means of labour and the volume of production. Functional analysis, understood as the recognition of all work traces left on all socially used material, as well as on anthropological remains, plays a key role in such a research programme. While the identification of traces presents information about technology and the organisation of production and consumption, the number of traces and the analysis of the degree of wear relates to the volume of wealth generated by a community.

The social character of surplus production is expressed physically through the relations between spaces of

production and spaces of consumption and, clearly, in agents involved, their injuries, illnesses and nutritional conditions. The location of the types of traces and, as such, of the activities undertaken in space and time allows a better understanding of the distance between the places and the agents of production and consumption. In short, these are the main archaeological issues to be addressed by the study of the economic development of societies and their drift towards surplus production.

### **Division of labour and surplus**

The *division of labour* has played an extremely important role in the economic analysis of societies, being understood as one of the fundamental mechanisms in the production and increase in wealth and/or surplus (examples in archaeology are provided by Childe 1951; Friedman and Rowlands 1977; Renfrew 1982; Lull 1983; Vidale 1992). Often, a direct relation has been established between specialisation on the one hand and the production of surpluses and increases in productivity on the other. Nevertheless, both approaches are problematic, since the existence of a surplus is linked to social exploitation, and productivity depends much more on the labour means than on the labour force.

By contrast, the generation of more products, or of new types of objects, that is to say, an intensification of production in a society, always implies an increase in the labour force or of productivity, which can imply the division of labour, but not necessarily the generation of a surplus. In this sense it is convenient to distinguish between strictly technical divisions of tasks, intended to increase production, and the social division of labour, which generates social differentiation and asymmetry and whose goal is to obtain a surplus (Castro *et al.* 1998). The complexity of the notion of the division of labour makes a precise definition of its strictly economic implications necessary, while its social nature refers once again to the problem of the distribution of material and energetic costs and benefits in the community.

The merit of having recognised the role of the division of labour in the improvement of productivity goes to Adam Smith. The mechanisms implied in this economic phenomenon are: 1) the specialisation of labour, understood as a means to allow the simplification of manufacturing processes; 2) the improvement of the spatial organisation of production; and 3) mechanisation (Smith 1776/1994). As such, productivity only increases if the labour specialisation includes a technical and spatial division of the labour processes and/or if the instruments and raw materials used are made more efficient. *The first physical consequence of this type of division of labour is a reduction in the variability of all or some of the factors of the basic economic schema* (homogenisation of labour movements, spaces of production, the instruments and material and energetic resources used). Given that the degrees of specialisation in each of these factors are variable and are not

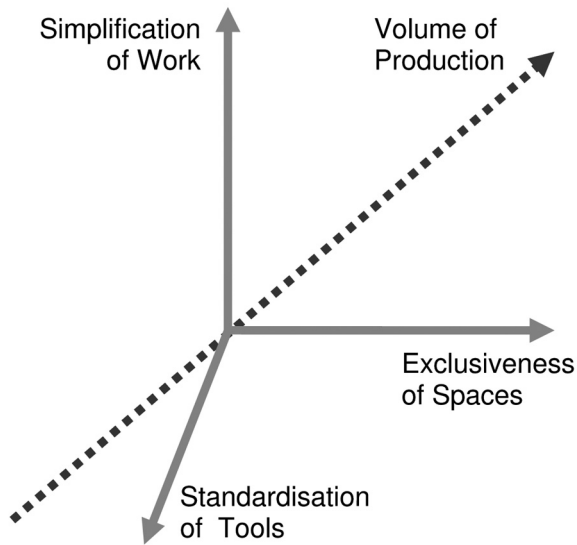


Fig. 4: The four economic parameters of the division of labour.

technically correlated, the division of labour can be organised in many ways. *Secondly, the volume of production is the variable required for quantifying the division of labour and its productivity* (Risch 2002, pp.31-33).

In short, the division of labour should be defined in terms of (fig. 4):

1. *Simplification of work;*
2. *Exclusiveness of the spaces of production;*
3. *Standardisation of the means of production (raw materials and means of labour).*
4. *Volume of production.*

It is important to underline that *labour specialisation* is not equivalent to an increase in the technical sophistication of the activities involved, as has frequently been argued in archaeological studies. Rather, it relates to *an exclusive activity in a particular space and time, which is expressed in a multiplication of exclusive production spaces, and results in a higher volume of production than is required by the consumption needs of the individual or domestic group.* As a consequence of the greater division or individualisation of the production processes, there is also an increase in the productive exclusivity of the spaces of labour. The degree of specialisation of these spaces varies to an inversely proportional extent to the number of different activities carried out in them, and is expressed materially in the diversification and/or dominance of the technical conditions of those spaces.

Another recurrent postulate in archaeology has been the existence of a positive relationship between labour specialisation and the standardisation of the products obtained. It is implicitly assumed that the formal and physical characteristics of the products are determined

exclusively by the technical processes, and that they lack any other social significance. This is clearly not a valid premise, as consumption objects (“final” artefacts), frequently act as political and ideological mediators in numerous social practices. Nor in the case of tools (“medial” artefacts) is there any evident direct relationship between specialisation and standardisation, given that there is generally not a single technological approach available to obtain the majority of products (e.g., Lemonnier 1993). Instead, if a *specialised labour instrument is defined as a tool which is always used to perform the same task*, there seem to be three levels at which specialisation and standardisation can be interrelated:

1. *Functional standardisation of the artefact;* as the result of the use of the object, is expressed in the standardisation of the working or active surfaces in terms of size, shape and types of wear traces.
2. *Material standardisation of the artefact;* as the result of the appropriation of the raw material, is expressed in the physico-chemical characteristics of the object.
3. *Morphometric standardisation of the artefact;* as the result of the selection of the raw material and the production process, is expressed in the reduction of the metric and formal variability.

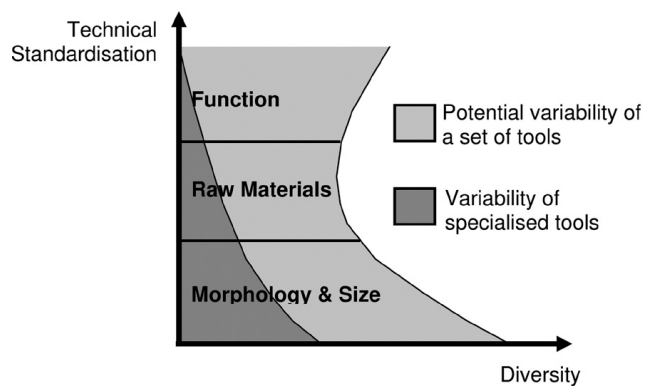


Fig. 5: The relation between standardisation and technical specialisation.

The importance of these three levels of standardisation is proportional to the degree of specialisation of the artefact (Fig. 5). The greater the regularity of the labour action, the greater the standardisation of the work surface. To increase productivity, an attempt would be made to improve and regularise the raw material used. There is often a range of alternative materials available for the satisfaction of the same requirement. Ultimately, the regularity of the work will result in a normalisation of the form, size and weight of the tool. Here, the possibility of extra-economic factors coming into play is even greater. Once again, how this schema can be applied to archaeology depends on the level of development of the functional analysis, not just when determining the use of the objects, but also in order to understand the technical conditioning of their production and consumption processes.

In summary, we feel that these three qualitative parameters (simplification of labour, exclusivity of the spaces of production and standardisation of the means of production) and one quantitative parameter (volume of production) allow the definition of the different historical expressions of the division of labour as a decisive factor in the economic development of societies and of the production of surpluses.

### **Functional analysis and the study of production and consumption processes**

We have seen previously that production and consumption form the continuous cycle through which society reproduces itself. Consequently, *functional analysis can be understood as the study of the material changes subjects and objects experience through their participation in social production*. These changes originate from basic production, maintenance production and object production, as well as from the lifecycle, employment and exhaustion of the subjects and objects generated.

At an empirical level, we can recognise the production/consumption processes by means of different *traces*, understood in a broad sense as *the physical attributes resulting from the social life of objects as well as subjects* (from a microscopic scale – for example a scratch – to a structural scale – for example, an accumulation of charcoal and ashes), using different experimental and analytical techniques (microscopy, residue analysis, chemical analysis, paleoanthropology, etc.). As a starting point, we can relate these traces to the ways material has been used, which enables us to recognise the human remains, artefacts and all other socially used materials as factors in the basic economic schema of the different social production systems.

A second level of functional analysis consists of the location of the production traces in space. The combination and association of traces gives us information about the socio-economic practices carried out in a given space, and, most importantly, allows us to establish the distances existing between production and consumption. Finally, the traces left by individuals' activities to be found among the anthropological remains are an indispensable element for determining if this spatial distance corresponds to a social and/or spatial asymmetry.

From the economic model outlined above, it can be deduced that the traces we observe, even leaving to one side post-depositional processes, have been produced by different types of activities according to the economic structure of the societies. In this sense, it is clearly insufficient to refer to the traces and marks left by social production on an object or subject, as “use wear”. Instead, we should talk about *production traces*, *understood as all physical and chemical transformations*

*that have taken place during the circulation of any subject or object in society*. Epistemologically, the concept of *production traces* goes beyond the identification and description of wear traces (stigmas) and establishes their relationship with particular activities. In agreement with the structure of social reproduction, it is possible to differentiate between the following types of *production traces*:

1. *Manufacturing and gestation traces*: Transformations brought about in objects during the production process and in subjects during basic production, respectively. Except in the case of some raw materials obtained through direct appropriation, these traces tend to be present in all the factors of the basic economic schema (LO, LF, LM and P).
2. *Maintenance traces*: Traces resulting from maintenance production, potentially appearing in all factors, but principally in the agents (men and women) and in the means of labour. The analysis of manufacturing and maintenance traces are the indispensable condition for the archaeological identification of an object as an artefact, as well as allowing us to determine the production value of social matter.
3. *Use traces*: In a strict sense, the term use traces only refers to those traces brought about in the means of labour and the force of labour as a result of transformation, generation or intentional maintenance of objects, women and men. Its presence in objects delimits and characterises that which is normally known as active surfaces, which, in turn, distinguish medial artefacts, or tools. In the case of anthropological remains, it covers both the use of parts of the body as productive instruments (for example, teeth) and indications, in the bones, of occupational stress.
4. *Wear traces*: In general, these are a range of signs of physical wear and/or chemical alteration produced by the use and consumption of any social materiality, separately from the generation of other goods. These traces are produced intentionally or inadvertently during the lifetime of use of all social objects. Materials that only have wear traces and no use traces are final artefacts. Use traces and wear traces provide information about the use value of social objects.

Such differentiation of *production traces* not only allows the identification of a given material as a social object, but it also relates the multiple signs of wear to economic factors in each of the different spheres of social production. These traces appear on artefacts and other socially used materials, as well as on residues generated by production and on the anthropological remains of the social subjects. The abstract classification of traces does not automatically mean that we will be able to identify them technically, but it allows us to become aware of the different social practices that can lead to the features that we are looking at, as well as the relevance of particular observations to a general economic theory.



Production Traces	Economic Factors						
	LO	+	LF	+	LM	⇨	P
Manufacture traces	(+)		+		+		+
Maintenance traces	(+)		+		+		(+)
Use traces	-		+		+		-
Wear traces	+		+		+		+

Fig. 6: Production traces and their economic meaning.

This paper has attempted to discuss some aspects of the general structure of human economies and to draw attention to the historical questions that derive from it. By disarticulating the cycles of social reproduction into economic factors, moments and spheres of social production, it has been possible to reflect on a series of material implications which, in principle, can be approached archaeologically. To this end, functional analysis appears to be the only archaeological methodology which has the heuristic potential to place the different material remains and traces in their social context. The shift of focus from traces to production and its social organisation opens up new perspectives in the research into the historical development of human societies, and, in this sense, recovers the intention of Semenov's original proposal.

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