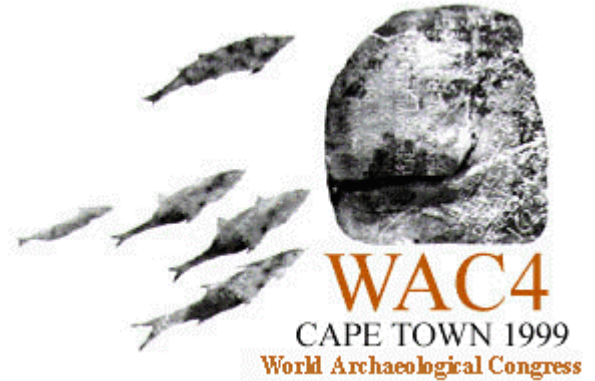


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Symposium: TECHNOLOGICAL CHOICE IN CERAMIC PRODUCTION

Abstract Package

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SCOPE OF SYMPOSIUM

Technological choice in ceramic production involves the choice of clay and temper, forming method, surface treatment and firing procedures. The choices made are determined by the overall context in which the pottery is produced; that is, environmental and technological constraints, the economic and subsistence base, the social and political organisation, and religious and belief systems of the people under consideration. These contextual parameters influence the technological choice either directly, or by determining the uses to which the pottery is put and hence its required performance characteristics.

Technological choice is clearly, in part, an adaptive strategy, either to practical problems arising directly from the environmental, technological and economic context, or to performance characteristics required by the practical uses to which pottery is to be put. For example, technological choice can be determined by the available raw materials or the extent of technological knowledge (eg wheel throwing, kiln firing). Alternatively, it can be determined by the need to achieve the permeability, strength, toughness and thermal shock resistance required in the use of the pottery for transport, storage, cooking, and serving.

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However, there are likely to be several technological solutions to these practical requirements, the choice among these possible solutions being made on the basis of socio-cultural considerations. Alternatively, it is possible that socio-cultural considerations take precedence over practical considerations in determining technological choice; that is, it is not nature but culture that is the main constraint on technology. For example, the concepts of “technological style” and “socio-technical system” have been introduced to provide a direct link between the socio-cultural context and technological choice. Alternatively, the socio-cultural uses to which the pottery is to be put (eg gift exchange, feasting, ritual) can influence technological choice through the need to achieve the required visual and tactile performance characteristics. In addition, technological choice can itself serve a socio-cultural function by conveying information on, for example, social status and group identity.

A fundamental difference between explanations of technological choice based on practical considerations and those arising from the socio-cultural context is that the former links can be investigated by means of experiments and, once established, are generally valid. In contrast, the links between the socio-cultural context and technological choice are less amenable to experimental investigation and tend to be specific to a particular situation. Therefore, they can be applied more generally, only with very great caution.

The aims of the proposed symposium are to assess:

- (1) the extent to which the links between the various practical considerations and technological choice are now understood;
- (2) the value of establishing such links in view of the fact that they are only a part, and not necessarily a major part, of the explanation of technological choice;
- (3) the feasibility of identifying and validating the various links between the socio-cultural context and technological choice, and of establishing whether such links can ever provide more than mere cautionary tales.

1) *Defining cultural traditions through the technology and the morphology of prehistoric pottery*

Laia Colomer (Barcelona)

It is worth to consider the relation between technical features, manufacturing choices and socio-cultural factors if we want to give a further step from mere analytical descriptions in pottery technology. Certainly, I would like to define technology as the technical modes of operation and the sequential choices performed into the clay that come both from the traditional knowledge and from the socio-cultural background. In doing so, artisan technologies become part of cultural traditions, and then we will be in the position of defining cultures not just through the *management* of artefact production in the past in terms of socio-technological articulation.

What I propose, is a methodological analysis based on the relation between the technique itself and the context of this technological performance. That is, first, to define the relation that exists between all the futures that define technically the elaboration of the ceramic artefact, and the morphological patterns of a collection. Secondly, it is worth to evaluate the *chaîne opératoire* according to the archaeological context (similarities and divergences according to time and space) which will define the boundaries of the socio-cultural dynamics in relation to the technological operations.

This proposal will be illustrated with a short example of an Argaric settlement, that is from the Bronze Age of the Southeast of the Iberian Peninsular (Western Mediterranean, Europe), with a complete corpus of ceramics coming both from domestic and funerary contexts along five hundred years of occupation. Through an extensive technological and morphological analysis of the vessels, it has been possible to determinate the homogenic and successful forming patterns, that is a detailed *chaîne opératoire* for the elaboration of the pottery vessels characteristics of this Bronze Age culture. Even this strict pattern, some ceramics showed shape disturbances due to technical mistakes during the manufacturing process. Then, it has been proposed that these shaping disturbances were consequence of social differences in terms of both who elaborated and to whom were elaborated these ceramics.

2) *Why a kiln? - firing technology in the Sierra de los Tuxtles, Veracruz, Mexico*

Christopher Pool (Kentucky)

In ceramic studies, discussion of the influence of performance characteristics on technological choice tends to focus on the ceramic products - pots - rather than the performance characteristics of the tools and facilities used by producers. Under conditions of craft specialization, performance characteristics of tools and facilities are set by two classes of people, producers and consumers, who may weight performance characteristics differently. Producers not only select tools and facilities that meet their own technical, economic, and aesthetic needs, but they also must respond to the demands of their consumers. Thus consumers have an indirect but powerful

influence on choices among different technologies. A case in point is the persistence of two technological options, simple updraft kilns and open firings, in the Sierra de los Tuxtlas of Veracruz State, Mexico since the third century A.D. In this paper I examine the performance characteristics of kilns and open firings with respect to local material constraints and the selection criteria of producers and consumers to understand the origin and diffusion of kilns and the persistence of open firing methods alongside them through 1700 years of changing ceramic traditions.

3) Ceramics in south-eastern Zimbabwe since ca 1400AD, an ethnoarchaeological study

Anders Lindahl (Lund)

Ceramic pots have always played an important role in day-to-day life, and so even to day, and they survive in the archaeological record. Ceramology is the study of ceramic artefacts, raw materials, the technology and organisation of the craft and the use of the products. The final aim, however, is to relate the pottery data to human actions and place it within its social environment.

The project aims to trace the development of traditional technology from the Zimbabwe period, through the post-Zimbabwe phase to the 20th century in the Gutu-Buhera-Bikita area. Pottery will be useful in demonstrating the chronological relationship of the Zimbabwe sites in this area both internally and to Great Zimbabwe itself. Pottery typologies can also be used to establish whether there is continuity from the Zimbabwe period through the "Refuge" period to populations presently living in the area. Focal points of the investigation are: 1) Excavation of sites supposed to contain artefacts informing on technology and use. 2) Oral interviews enlightening the ethno-history of archaeological sites as well as traditional technology and use. 3) Laboratory analyses of archaeological finds, modern pots and raw materials in order to compile a comprehensive inventory of ceramic types.

4) Clay selection and processing in Africa: social and technical requirements

Alexander Livingstone Smith (Brussels)

Raw materials and their preparation have been used for many purposes in archaeology: to characterize "cultural" identity, to assess short or long distance contacts, to trace population movements, to date events, to characterize production contexts or even to assess unavoidable techno-functional or environmental constraints. In recent decades, though, the lack of a proper methodology to explain technical variability as become increasingly obvious. Since Shepard's work, pottery studies suffered from a widening gap between material science, "mainstream" archaeology and anthropology. The development of ever more accurate analytical procedures to characterize pottery fabrics, as well as the use of concepts borrowed from ceramic engineering, lead to functionalist and determinist approaches to pottery materials. Such approaches were oblivious to the social, economic and symbolic aspects of technology, as recently demonstrated by a series of anthropologists.

In this paper, I will examine the relative importance of practical and social factors in the selection and preparation of clay in present-day Sub-saharan Africa. Several seasons of ethno-archaeological fieldwork in Senegal, Burkina Fasso, Togo and Cameroon have led our team to interview over 250 potters. The data collected in the field includes raw materials and clays at different stages of processing, plasticity measurements, thermometric data, as well as fired pots. This reference collection allows not only for an assessment of the relative importance of technical and social factors in the field of raw material selection and processing, but also for an estimation of the factors likely to be reconstructed or interpreted from archaeological assemblages.

5) Choosing a pot for tomorrow: a model of the social motivation for technological change in pottery production in prehistoric central Italy

Helen Loney (Glasgow)

Recent research in both old world and new world archaeological ceramic studies has demonstrated the complex relationship between the rise of complex society and the development of ceramic technology. Recently, American scholars have begun to offer models which explain technological change through differing social/ideological motivations whilst still maintaining a basic link with progressive theories of technological change. European ceramic scholars have emphasized the contextual nature of choices made during technological, but have yet to apply these approaches to long-term cultural development.

This paper proposes a hierarchical model of technological change which will attempt to evaluate the magnitude of the effects of the choices societies make when manipulating ceramic production. The model uses the example of the development of prehistoric pottery in central Italy. By balancing the evidence of change with the choices made in decoration, form, function, as well as in manufacturing technique, we can begin to place such change in perspective. By understanding how society dealt with or changed in response to all grades of change, we can begin to recover how society chooses between elements of technologies, and in essence, directs or reacts to change.

6) Technological choices in Chalcolithic ceramics of southern Levant

Valentine Roux (Paris)

In the southern Levant, during the first half of the 4th millenium BC, a new ceramic technique appears : the wheel shaping technique. This technique is strictly used for the fashioning of a new morphological type found on all Chalcolithic sites : the bowls with a "V" profile. Related fashioning method as well as clay preparation and firing techniques are in continuity with the different local traditions. These data raise questions about the mechanisms of innovation when analyzed in terms of potter's choices. Technological analysis suggests that emergence of the wheel shaping technique indicates a rupture in terms of the skills involved in pot making as well as in the finishing techniques. Such a rupture may be put into relationship with the

emergence of a new religious system. Contrarily to traditional hypotheses, use of the rotative kinetic energy for modifying clay walls appears as not determined by techno-economic factors but cultural ones.

7) *Dung by preference - the choice of fuel as an example of how Andean pottery production is embedded within wider technical, social and economic practices*

Bill Sillar (Lampeter)

The production of every pot requires the potter to make a series of 'choices' selecting from a range of possible raw materials, tools and techniques. Yet the potter is never aware of all the potential techniques s/he could use. In fact each artisan may make relatively few conscious 'choices' because they are unaware of most potential alternatives. Pottery production depends on the wider social practices and technological traditions that the potter is a part of because these affect the potter's awareness of, and access to, raw materials, tools, and techniques. There is a vital dynamic between 'individual choices', the innovative way in which people can alter and extend existing material practices, and 'cultural choices', the underlying technological traditions from which their experience and knowledge is derived. The longer term development of 'technological traditions' emerges out of the active interplay between the conservative force of 'cultural choices' and the innovative nature of 'individual choice'.

In this paper the 'embedded' nature of ceramic technology will be considered through a discussion of how various modern Andean potter's acquire and use their fuel during pottery firings. The most common choice of fuel in the highlands of Peru and Bolivia is animal dung (mainly cow, sheep and llama). This choice has influenced the structure of the pottery firing, the form and decoration of the pots and the longer term development of the region's ceramic technology. This highlights how technological choices are dependent on wider social and economic practices (particularly in relation to animal husbandry) which has further repercussions that affect other technologies (such as agriculture practices). The completed pots (as well as the ash from the firing) are also used in a succession of further technical acts. This succession of inter-related technologies is not unique to pottery, it is fundamental to all technologies. Archaeologists should be ideally placed to utilise this interconnection between different technologies to discuss the basis upon which technical choices were made in the past.

An appreciation of the embedded nature of technologies requires a reconsideration of the way that the concept of the *chaîne opératoire* has been used in archaeology. Because we have tended to limit the definition of the *chaîne opératoire* to the transformation of raw materials into finished artefacts (Cresswell 1976, 6), there is a tendency to isolate the artefacts from the other technical and social fields in which they were involved. By considering the interconnections between many different *chaînes opératoires* we can appreciate how technology is deeply embedded within people's wider cultural practices and knowledge.

8) *The role of strength, toughness and thermal shock resistance in determining the choice of temper in ceramics - an overview*

Michael Tite (Oxford)

The achievement of strength, toughness and thermal shock resistance, appropriate to the uses to which ceramics are put, clearly represents one factor that determines the choice of the temper used in pottery production. Through a combination of theoretical considerations and experimental testing, it has been established that decreasing the temper concentration results in an reduced risk of crack initiation and, hence, an increase in strength. Conversely, increasing the temper concentration reduces the extent of crack propagation and, hence, increases the toughness and thermal shock resistance. Toughness and thermal shock resistance also depend on the morphology of the temper, being greater for platy or fibrous temper than for angular or rounded temper, as a result of greater dissipation of energy during crack propagation in the former case. Concentration and type of temper also influence the thermal expansion properties of a ceramic which, in turn, determine the energy available for fracture when the ceramic is subjected to thermal shock. In addition, temper type can affect the firing conditions necessary in the production of ceramics which, again, can influence their properties in use.

In the present paper, the relative importance of strength, toughness and thermal shock resistance, in the context of the uses to which different ceramics are put, will be assessed. In view of the range of properties influenced by the concentration and type of temper added, any choice of temper represents something of a compromise and, therefore, the concept of an “ideal” temper needs to be questioned. It will be argued, instead, that pottery, with the necessary strength, toughness and thermal shock resistance in use, can be produced using a wide range of temper combinations and that socio-cultural factors are more likely to be of primary importance in the final choice of temper.

9) *In search of technological choice in the production of some ceramic assemblages of the ancient Near East*

A van As (Leiden)

Technological choice in ceramic production is determined by the overall context in which pottery is produced. The activities of extant traditional potters in present-day societies show that environmental, technological, economic, social and cultural factors play a role in the technological choices the potters make to produce their earthenware products. It is difficult, however, to identify the precise role each of these factors have played in ancient ceramic production. The analysis of the composition of the raw materials used and the reconstruction of the shaping, decoration and firing techniques of archaeological ceramics, based on the interpretation of traces left by the ancient potters and followed by simulation experiments with clay comparable with those used in antiquity, may give important clues with respect to the motives the potters might have had for their technological choices. This will be demonstrated by recent archaeo-technological investigations of some ceramic assemblages from the ancient Near East.

10) Forming pottery: choice, continuity and constraint

Pam Vandiver (Smithsonian)

Case studies of prehistoric pottery production in Asia will examine the variation in choice of ceramic forming methods and attempt to evaluate the effects of various factors that influence choice and continuity as well as provide constraining boundary conditions. Differences and similarities in pottery forming at different stages of economic and social integration will be evaluated using systems and/or "*chaîne opératoire*" methodology. The interaction of some environmental, technological and cultural factors will be evaluated.

11) The transformation of tradition; the end of the medieval ceramic tradition in Yorkshire

Chris Cumberpatch (Sheffield)

In this paper I shall examine some of the wider implications of the end of the medieval ceramic tradition in northern England and the emergence of distinctively 'post-medieval' pottery styles. Hitherto, while the emergence of Cistercian wares, Yellow wares, Purple Glazed wares, Brown Glazed Coarsewares and Slipwares have all been recognized and employed as chronological markers, little attention has been given to the wider social implications of the changes in production and consumption which their appearance signifies. Drawing on my recent discussion of the symbolic significance of regularities in medieval ceramics, I shall examine the styles and characteristics of post-medieval and early modern pottery from a similar standpoint, relating the ceramics to wider aspects of 16th and early 17th society. I should examine the case for considering the pottery of the period as part of the material cultural repertoire employed by the emerging yeoman class and 'middling sort' to define themselves as distinct from the labouring and landless classes on the one hand and the aristocracy on the other. This will contribute to a wider critique of the current status of post-medieval ceramic studies in England which have been dominated by simple descriptions of industrial processes apparently conceived of as taking place according to some pre-cultural, evolutionary imperative, divorced from the mundane realities of social conflict and change. I shall illustrate the points made with examples drawn from my current work on the ceramic assemblage from Pontefract Castle in West Yorkshire.

12) Forming a tradition

Ole Stilborg (Lund)

In the Late Mesolithic of southern Scandinavia (ca 5000-4500 BC) pottery was first introduced into the Ertebolle-culture. The idea of making pottery and the knowledge of the basic raw materials reached southern Scandinavia from the south, but the technology of building the pots, and indeed the skills to do it, had to be developed by the Ertebolle people themselves. The study of the pottery from this period therefore

gives a unique opportunity to follow the stages in the trial and - not error but rather improvement process leading up to the traditional craft of the early Neolithic. Of the two vessel types predominant in the EBK - the beaker and the lamp - the former was initially build of coils in the H-technique pressing a new coil onto the preceding with the fingertips, while the later was modeled from a lump. Detailed analysis of the EBK pottery from a settlement at Skateholm on the south coast of Scania, Sweden, however reveals a series of different variations on this rather primitive technology gradually reducing the thickness of the vessel walls. These endeavours led to the invention of the superior N-technique, which was used almost exclusively during the rest of prehistory in Scandinavia. At the same time the dot-ornamentation on EBK-vessels is replaced with new ornaments on the EN-vessels and the large variation in choice of raw materials typical of the EBK is greatly reduced. A craft tradition has been formed.