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MASSIMO VIDALE and HEATHER M.-L. MILLER

On the Development of Indus Technical Virtuosity and Its Relation to Social Structure

ABSTRACT

'Indus technical virtuosity' refers to the distinctive Indus characteristic of inventing and diffusing complex techniques for the production of small, elegant objects, often ornaments. We argue that such virtuosity had important implications for the social patterning of Indus period and later communities. In addition, we examine the relationship between societal patterning and the types of objects valued over time, particularly rare exotic materials *vs.* technologically complex materials, both for the Indus case and as a general cross-cultural model.

Introduction

In recent years, much work has been done on ancient Indus manufacturing techniques. It has been a prolonged effort carried out in a very collaborative fashion by numerous scholars, as can be seen in the pages of *South Asian Archaeology* and other publications. While many papers were and are necessarily devoted to very specific archaeometric questions, other articles have dealt with the anthropological meaning of the evidence (e.g., Jarrige 1995; Kenoyer 1992, 1997; Vidale 1989, 1992; etc.). Such papers have moved from the reconstruction of ancient manufacturing techniques to the study of ancient technologies. This latter term encompasses, besides techniques, a wide range of economic, social and ideological factors. On the basis of this on-going research, we feel that it is possible to trace out a preliminary and partial, yet general picture of technical development in the greater Indus region, extending from the Neolithic period to the end of the Indus period and beyond. Further, we are able to discuss some of the social implications of such a picture of technical change.

The theme of this paper is the discussion of Indus technical virtuosity. With this term we indicate the distinctive Indus characteristic of inventing and diffusing elaborated techniques for the production of small, valuable objects, especially ornaments. This concept does not imply that Indus craftspeople were more sophisticated or more specialized than, for example, their contemporaries in Egypt and Mesopotamia. Rather, it stresses the fact that Indus craft technology, throughout time, is strikingly characterized by experimentation and innovation. In addition, innovations tend to expand the number of steps in production, particularly through the application of pyrotechnology. These techniques allow the production of objects made from a wide variety of materials, many of them 'artificial' – that is, *new* materials created through pyrotechnology, such as metals, terracotta and stoneware, carnelian and etched agate, and the various components of the talc/faience complex described below (Vidale 2000; see also Jarrige 1995).

Indus Technical Virtuosity and Social Structure: The Case of Talc- and Faience-Related Industries

A good example for this discussion is the development of talc-related industries from the Neolithic to the end of the Bronze Age (Fig. 1). This reconstruction of the talc-related industries is largely possible due to the extensive research of the French mission at Mehrgarh and Nausharo (Barthélemy de Saizieu & Bouquillon 1994, 1997; Bouquillon & Barthélemy de Saizieu 1995). The technological and social evolution of these industries serves as an illustration of the type of research needed for each of the craft industries discussed in the second portion of the paper.

During the 7th millennium BC beads made from talcose rocks become progressively smaller in size; this is a trend which continues until the 3rd millennium BC.[1] Pyrotechnological treatment of talcose rocks begins during the 6th millennium BC, then becomes more and more common, culminating at the beginning of the 4th millennium BC when more than 90% of the steatite beads from Mehrgarh are fired white. The amount of talc working debris at the Indus sites becomes massive, and data from the activity area of Mehrgarh 2 (5th millennium BC) is sufficient to suggest the possible presence of apprentices (Vanzetti & Vidale 1994). The application of blue-green glazes to steatite beads also begins in the 4th millennium BC. At the beginning of the 3rd millennium BC, artificial materials such as talc paste, steatite-faience, and siliceous faience are introduced in the Indus bead repertoire. The talc powder resulting from bead cutting is recycled as talc paste beads, and this new technology

[1] Note that in this paper we use the terms 'talc' or 'talcose' and 'steatite' interchangeably.

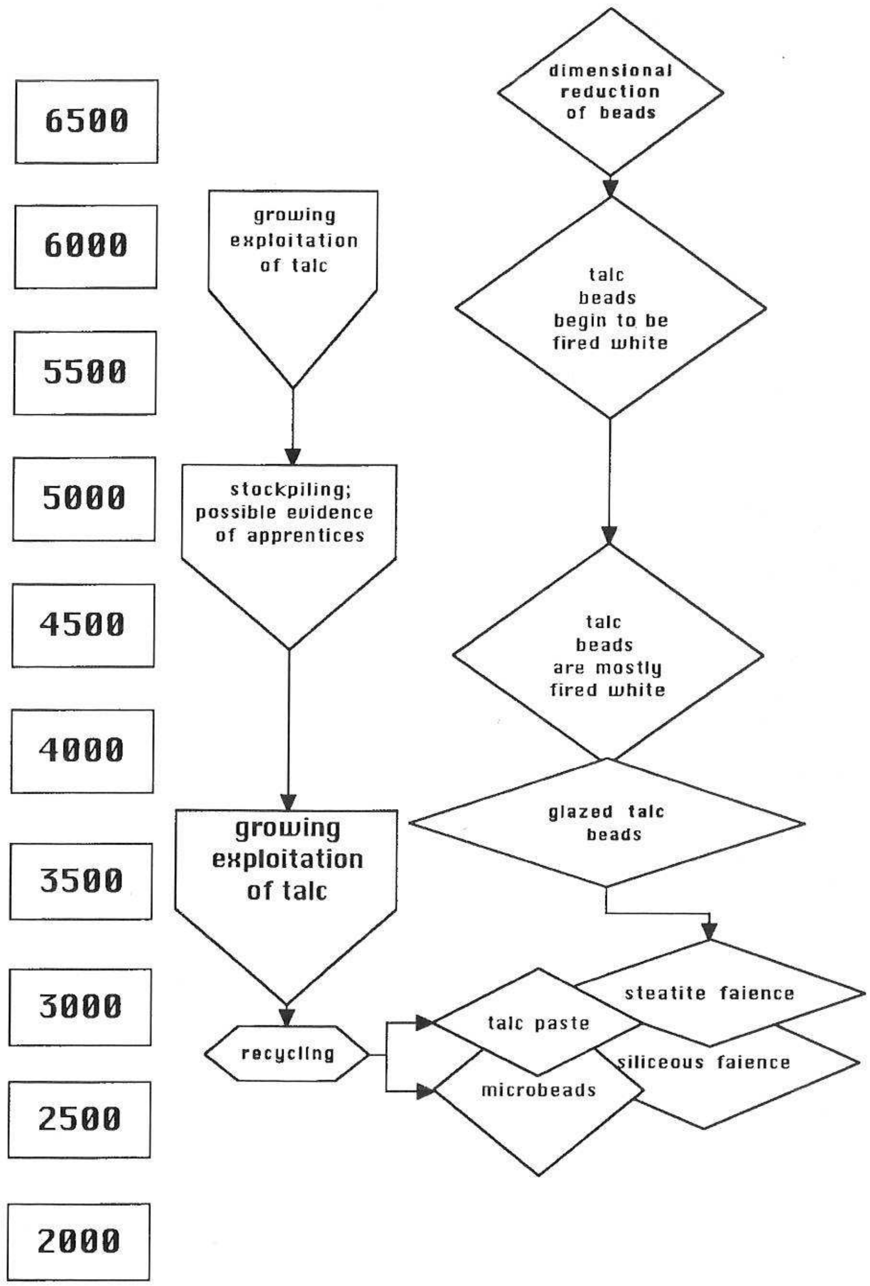

Fig. 1 – Evolution of talc-based craft industries in the Indus region, *c.* 6500-2000 BC.

culminates in the second half of the 3rd millennium BC with the invention of the famous Indus microbeads.

This is a very brief summary of the complex technological evolution of the Indus talc/steatite and faience industries. We will as briefly summarize the many social implications of these technological changes. More extensive discussions can be found in Vidale (2000), and in Miller (1999: chap. 4 & 7). The following discussion is summarized in Fig. 2.

The miniaturization of talcose beads, beginning in the 7th millennium, increased the total worked surface per volume of each bead. This shifted the emphasis from the use of ornaments valuable for their base material to orna-

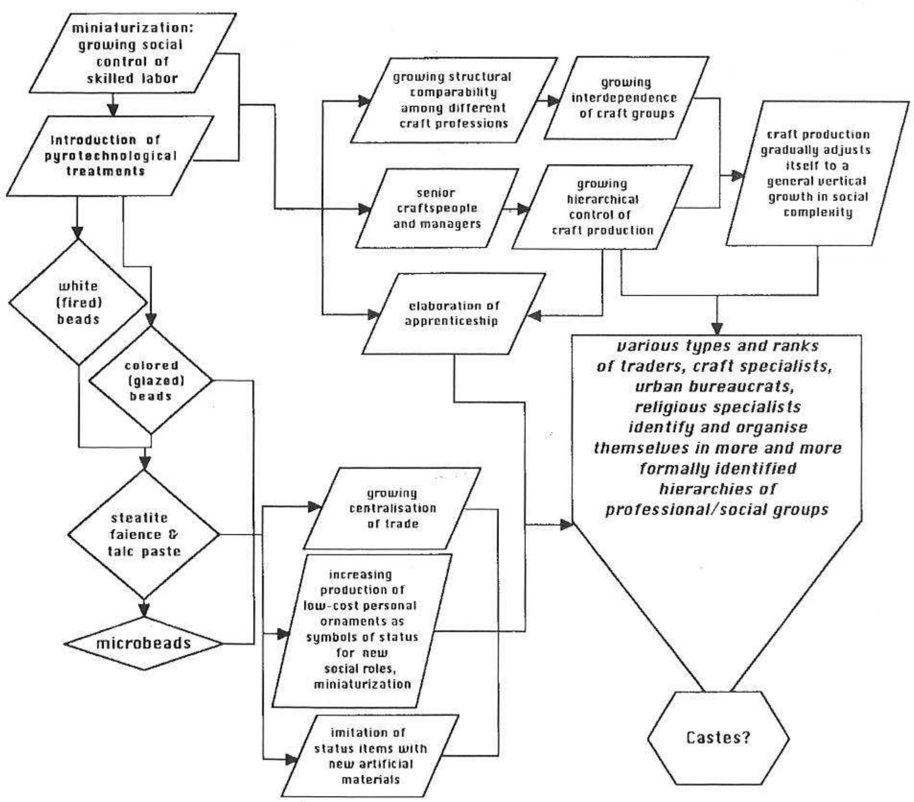

Fig. 2 – Some social consequences of the technological evolution of talc-based craft industries, *c*. 6500-2000 BC.

ments valuable for the amount of work involved in their production. In other words, the major social investment moved from control of procurement to control of manufacturing technology. The application of pyrotechnological treatments to talc increased the number of steps required by bead manufacturing cycles, and also promoted the creation of artificial base materials. This increasing elaboration of manufacturing cycles would have had important social consequences (Fig. 2, upper).

First, when firing was incorporated into talc bead manufacturing cycles, these technical sequences became structurally more similar to pottery making and metal working; this innovation increased the structural comparability among different craft professions. The need to build successful kilns, collect and prepare proper fuel, and plan stages of firing might have promoted collaboration and a growing interdependence among different craft professions. For example, the fact that the Indus Valley clays vitrify at temperatures at or below the firing temperatures needed by all of these industries might have encouraged the sharing of knowledge about suitable refractory materials used to build kilns, crucibles, and other firing tools (Miller 1997, 1999). Interdependence would thus also have encouraged the location of these complex crafts in central places, particularly cities, not only because of the presence of markets and/or controlling elites, but also to facilitate the exchange of information and materials between different crafts (Törnqvist 1969).

At the same time, the increased elaboration of the manufacturing cycle required a growing control of the manufacturing flow within each craft. Senior craftspeople and managers would have been required to deal with this new problem, creating new hierarchies within the craft. Also, a more complex profession would require longer periods of apprenticeship, probably further reinforcing the establishment of sex, age and kin-based hierarchical relationships among the craft groups. In this perspective, pyrotechnology, when applied to talc manufacturing cycles, may have been as a key factor in gradually increasing social complexity within craft production communities.

The creation of artificial talc-related materials also had important effects on the communities involved in the production/distribution interface of the finished products, as well as on the social complexity of Indus society in general (Fig. 2, lower). First, by concentrating on such artificial products, leading craftspeople, merchants and urban managers might have centralized some sectors of the bead trade. Elaboration of the talc and faience industries would mean that they did not depend upon procurement of exotic materials (lapis lazuli, turquoise, shell) from distant mountain and sea areas which were most probably under local, non-Indus control. In contrast, they could impose their own trade, presumably protected by technical secrets, on some foreign markets. In support of this, Indus steatite beads have been found in regions as far away as Karnataka and Sistan.

Second, the new techniques, which became more and more efficient in the second half of the 3rd millennium BC, allowed Indus craftspeople to produce large amounts of expedient, low-cost, and yet valuable personal ornaments. Such increased production of status markers might well have been required by a growing urban population of bureaucrats, managers and/or religious specialists needed by the increasing political centralization of Indus society, especially during the Integration Era ('Mature Harappan period'). When assessing the value of such markers, it is important to remember to account for the increasing 'miniaturization' of beads over time, with the increasing dominance of disc beads and the production of microbeads (Barthélemy de Saizieu & Bouquillon 1994, 1997; Kenoyer 1991). While massive numbers of talc beads were produced, particularly during the Integration Era, the increasingly small size of the beads meant that many more beads were necessary to make up a single ornament, such as a necklace. The value of a talc bead necklace was still therefore quite high, in spite of mass-production, due to both the large number of beads needed, and the high degree of skill needed to produce glazed beads and microbeads. Such ornaments would be ideal markers for an expanding population of statused individuals, as their production would depend less on increased access to precious raw materials than on increased labour, particularly increasingly skilled labour.

Third, and perhaps most important, the imitation of various semi-precious raw materials such as turquoise, lapis lazuli, carnelian, and shell by artificial replicas (mainly terracotta, talc, and faience-related materials) allowed the provision of differently ranked categories of people with different ranks of ornaments (Kenoyer 1991). The addition of new artificially-created materials to the array of semi-precious raw materials allowed an increased number of layers of hierarchy to be represented, and it is clear that technology became an important tool for categorization of people arranging themselves in new orders. A fascinating aspect of this evolution is that while the forms of some important ornament types remained basically simple and stable across time, and particularly during the Integration Era, the materials employed multiplied. If stability of form promoted a (deceptive) image of cultural homogeneity, social integration, and social stability through time, then an extended hierarchy of base materials might have been the most efficient key for categorizing a diversifying social pyramid. The two aspects (stability of form *vs.* hierarchy of materials) are completely integrated and intimately support each other.

These various processes might have concurred in developing, within Indus societies, a complex hierarchy of social personae and functions. This hierarchy might have been the social background on which, in the 2nd millennium BC, were built and formalized the much simpler social categories of the *varṇa* system.

Indus Technical Virtuosity and Social Structure: The General Case through Time

Social aspects of other Indus crafts can be developed along the lines of these implications of the historical evolution of talc-related industries. Indus craft production as a whole can then be examined with Indus society. The grid underlying the remaining figures (Figs. 3 through 9) was developed after a scheme by Kenoyer (1992), refined by Vidale (1992, 2000). The horizontal axis represents the difficulty of access to and procurement of a given raw material, while the vertical axis indicates the relative degree of technological elaboration involved in the production of objects. We should note that both difficulty of access and technological elaboration are highly subjective criteria, very difficult to define analytically and to express quantitatively. In fact, technological elaboration might be seen only as a very indirect function of the absolute number of manufacturing steps of a cycle. Difficulty of access is equally vague, because it does not depend upon pure geographical distance, but on fluctuating, unstable political boundaries which constantly varied in time. Because of this lack of precision, we have simply subdivided both axes into three levels (low, medium, high), generating a grid of 9 cells. This grid has been used to classify a selected series of craft industries and to follow, in time, some aspects of their evolution.[2]

Interestingly, a survey of the available literature suggests that, in a consistent number of cases, poorly stratified, unstable political formations such as chiefdoms will employ status markers based on the procurement of rare, exotic

[2] Note that important industries involving largely perishable goods could not be included, such as fabric production, leather working, wood working, and food production.

raw materials. These are often transformed through relatively simple technologies and massive investments of labour per unit of product. This phenomenon has been widely discussed, and examples include the feather caps of the Hawaiian élites, the *kula* rings of the Trobriand Islands, and the copper shields of the Haida and other cultures of the Northwest Coast of North America. In contrast, and seldom discussed, established political hierarchies such as early states and empires will favour the use of status markers produced by more elaborated technologies, often with complex pyrotechnological treatments, but exploiting local, cheap base materials. The investment of labour *per unit of product* is also usually severely reduced. In some cases, these products imitate more valuable classes of goods, to allow new status levels. A suitable example, in addition to the Indus talc-related industries discussed above, is the flourishing production of Arretine wares in the late republican-early imperial Roman world.

Examination of the production of objects over time, within a single region shifting from chiefdom-like to more bureaucratic political organizations, might thus illuminate this apparent shift in valued objects. Figures 3 through 7 illustrate the case for the greater Indus region (chronology after Shaffer 1992). As noted above, various craft industries are placed on this grid on the basis of a fairly subjective evaluation, due to lack of data. The position of each industry might be somewhat different, once it is satisfactorily reconstructed on archaeometric grounds. For example (Fig. 3), some Neolithic craft industries (such as those based upon hammered native metals, marine shells, and exotic stones) might fall in the space we previously associated with poorly stratified political formations; they exploit difficult to access, rare base materials through relatively simple manufacturing techniques. But the overall trend through time in Figures 3 through 7 is remarkably consistent with the cross-cultural observation (see Note at end of paper).

In the early Regionalization Era, a general improvement of the most important manufacturing techniques, the introduction of pyrotechnological steps in the talc bead-making sequences, the production of complex ceramics, and the use of metals produced from ores move some products towards the upper half of the graph (Fig. 4). The same trend is at work in the later Regionalization Era (Fig. 5). Pyrotechnological treatments extend to the invention of steatite-faience and talc paste (through a systematic recycling of talc powder as a ceramic base material), siliceous faience, and etched agate/carnelian bead making. A series of industries cluster at the upper left corner of the graph.

In the Harappan Phase of the Integration Era, due to a general emphasis on

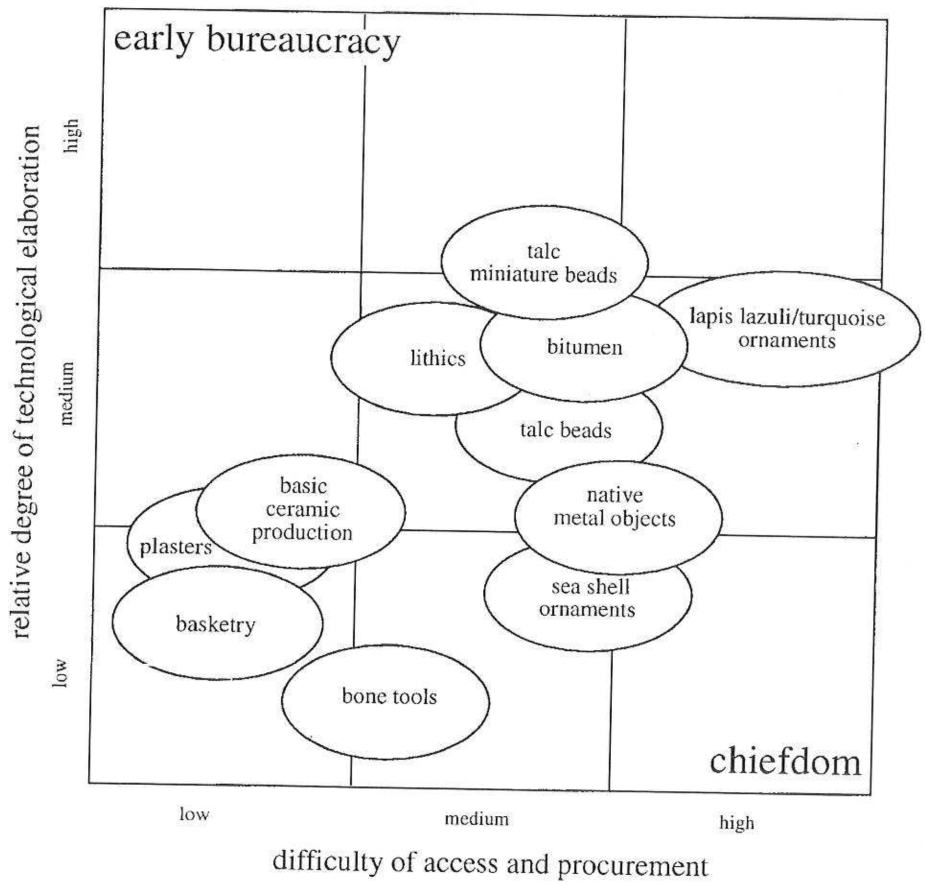

Fig. 3 – Classification of some relevant craft industries of the Indus region during the Neolithic (*c.* 7000-5500 BC) in terms of relative degrees of technological elaboration and difficulty of access and procurement.

the creation of artificial raw materials and to the refinement and extension of pyrotechnological techniques, many industries have been added to the upper part of the graph, and particularly in the upper left corner (Fig. 6). The general picture is consistent with what may be expected for political formations distinguished by a high level of social stratification. Talc paste beads and microbeads, steatite-faience and siliceous faience objects, and stoneware bangles are all characterized by an elaborated technology, primarily local base materials, and an apparently rather low investment of labour per unit product – although this

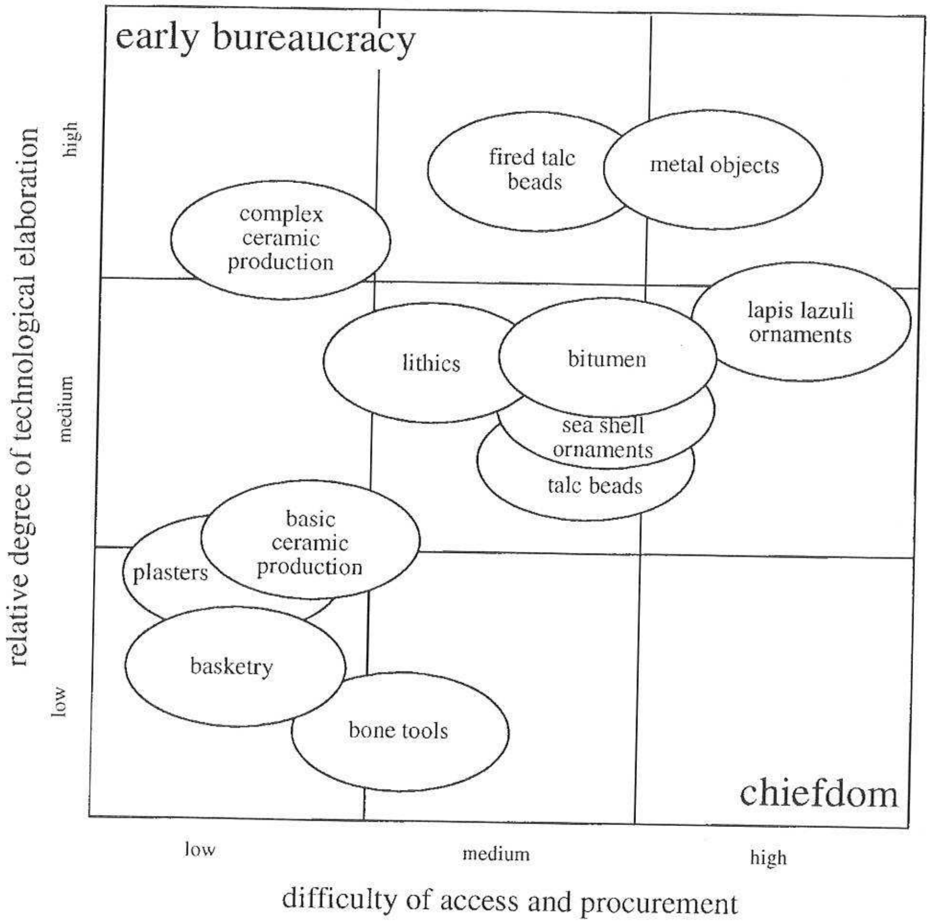

Fig. 4 – Classification of some relevant craft industries of the Indus region during the early Regionalization Era (*c.* 5500-3200 BC) in terms of relative degrees of technological elaboration and difficulty of access and procurement.

is somewhat countered by increasing miniaturization. Artificial ornaments in talc and other materials were material expressions of a subtle, complex reality of social categorization.

An important change occurs during the Localization Era (Fig. 7). With the end of the Indus way of life and the extinction of many typical expressions of Indus material culture, many elaborated crafts formerly occupying the upper left corner are extinguished, together with the basic information technology of

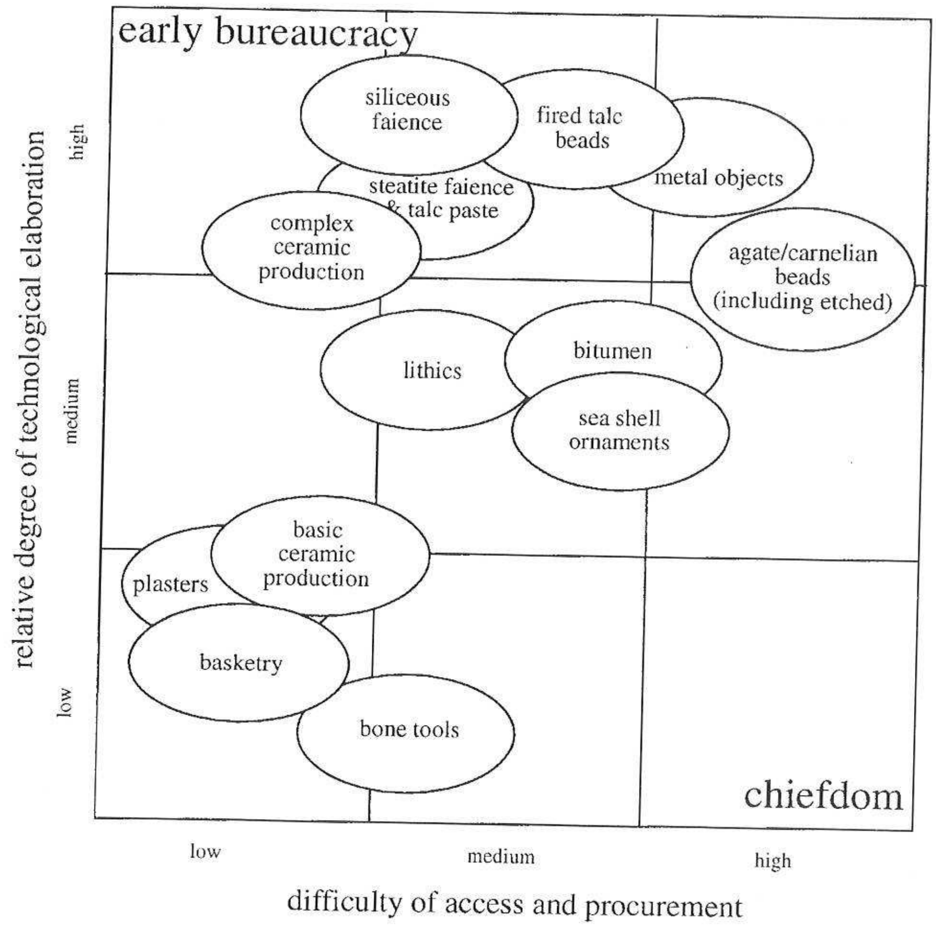

Fig. 5 – Classification of some relevant craft industries of the Indus region during the later Regionalization Era (*c.* 3200-2600 BC) in terms of relative degrees of technological elaboration and difficulty of access and procurement.

the urban rulers, writing. The surviving industries fall primarily into an ideal diagonal – that is, at least in most cases, the more elaborated technologies are those based upon valuable raw materials. The exception is glass, a new but widespread artificial material. Its production seems to have somehow been a simplification of the talc- and faience-related craft industries, and remains closer to the interface with the upper left corner of the graph. Glass, the artificial material *par excellence*, was perhaps the most important gift of the 3rd millen-

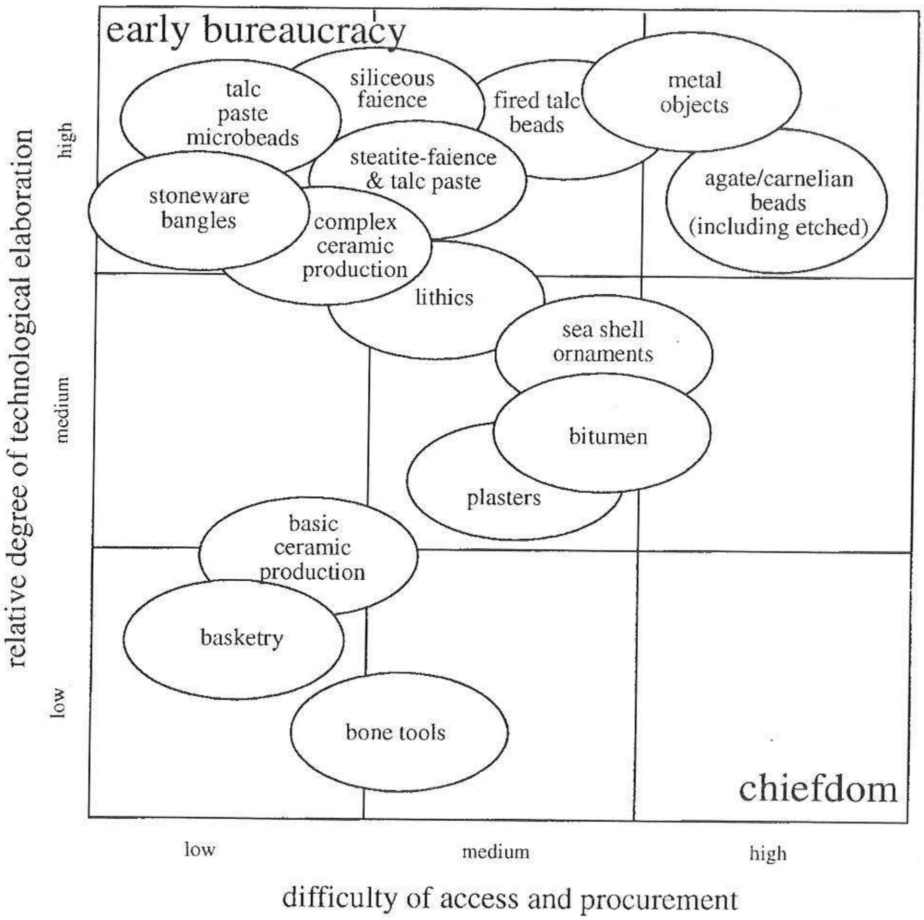

Fig. 6 – Classification of some relevant craft industries of the Indus region during the Indus Integration Era (*c*. 2600-1900 BC) in terms of relative degrees of technological elaboration and difficulty of access and procurement.

nium BC. Glass making, like the production of Indus siliceous faience, did not depend upon costly long-to-medium distance trade networks, but was available to any community capable of sponsoring a family of specialists. Used for creating wonderful, coloured ornaments, rather cheap but relatively elaborated from a technical point of view, glass was very ambiguous.

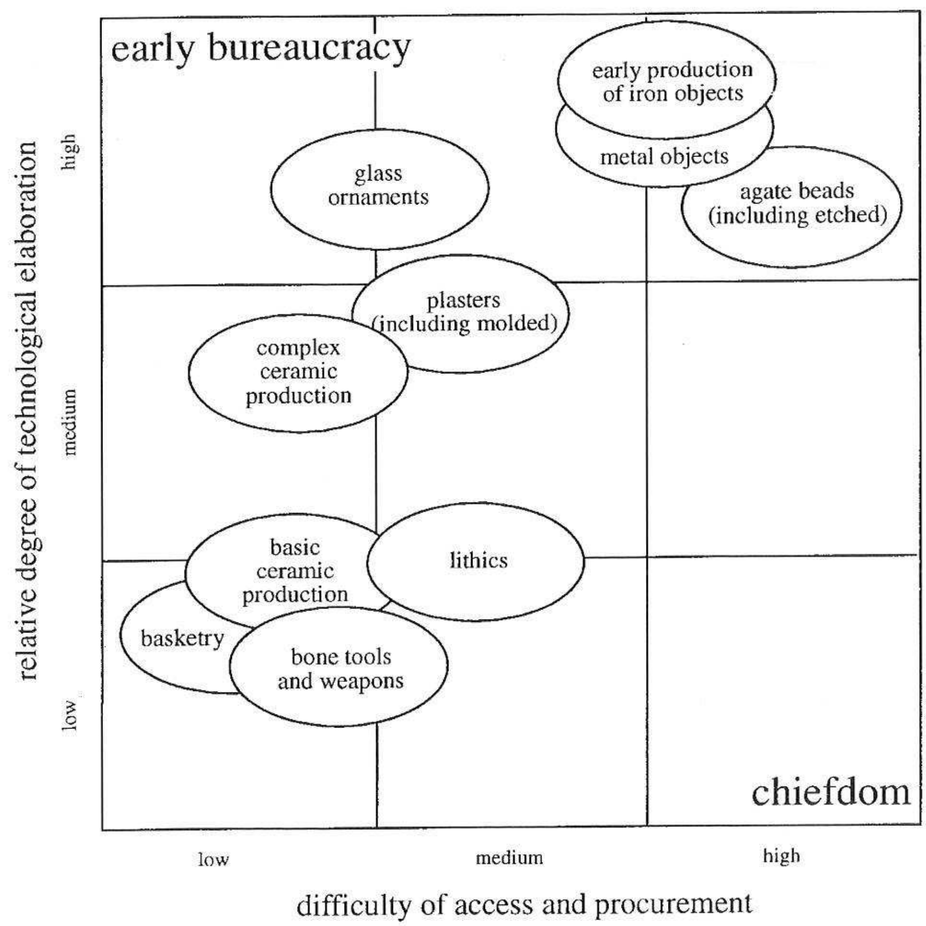

Fig. 7 – Classification of some relevant craft industries of the Indus region during the Localization Era (*c.* 1900-800 BC) in terms of relative degrees of technological elaboration and difficulty of access and procurement.

Indus Technical Virtuosity and Social Structure: Cross-Cultural Implications

Now, let us try to summarize some aspects of the above presentation as a general, cross-cultural model of *technological strategies* (Fig. 8). While it is possible to view this as a multi-step process, for the Indus region we do not conceive of such steps as historical phases, but rather as diachronic trends which

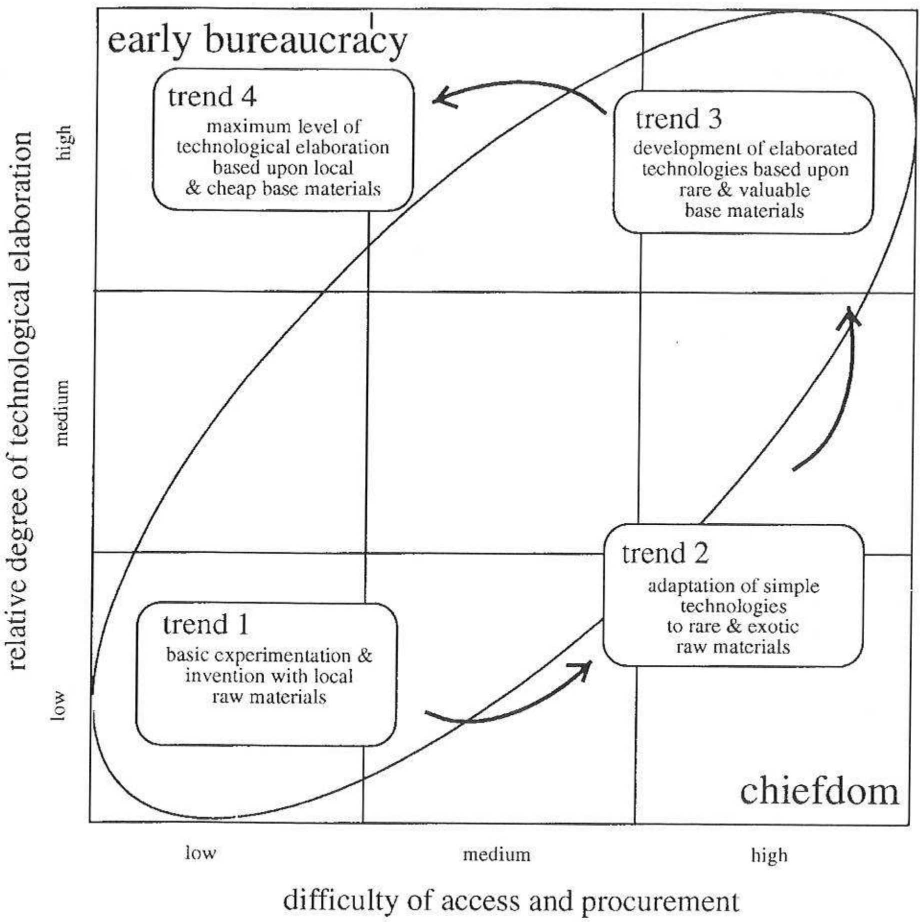

Fig. 8 – Technological strategies adopted over time by craft communities in the Indus region, defined in terms of relative degrees of technological elaboration and difficulty of access and procurement.

superimpose one on the other, with the previous trends remaining more or less active. Nevertheless, there is a clear shift in the emphasis on these trends over time, moving in an anti-clockwise direction on our graph.

Trend 1 represents the basic technological attitude of a stabilized village community to experiment and innovate with their basic, local resources and raw materials. For the Indus, such a trend should have been well defined at the end of the Mesolithic period. Trend 1 is thus responsible for the creation of the basic technological styles and strategies of early settled communities. Trend 2 would be distinguished by the procurement and exploitation of rare and exotic raw materials for the production of status symbols. Manufacturing techniques remain relatively simple. We witness this trend in the Early Neolithic graves of Mehrgarh and their ornaments made from lapis lazuli and sea shells. In Trend 3, manufacturing techniques become more elaborated and are applied to local raw materials as well as rare and valuable materials. Greyware pottery is an example of the former, while examples of the latter include the introduction of copper/bronze working, the systematic firing of carnelian, and the elaborate sea-shell bangles of the early Regionalization Era at Mehrgarh. For the Indus region, Trend 3 appears fully displayed in the second half of the 4th millennium BC. Trend 4, finally, affecting the whole course of the 3rd millennium BC and brought to its extreme consequences in the Harappan Phase of the Integration Era, is distinguished by unusually high levels of technical elaboration in craft industries based on cheap, relatively local raw materials.

So, as a generalized model of *social structure*, each Trend brings about important consequences for the society as a whole (Fig. 9). In Trend 1, adaptation to settled agricultural economies required millennia of experiments and innovations with the local resources and raw materials. This probably allowed a first, basic definition of major production specialization trends in the Indus communities. The resulting differentiation of roles, professions, rights, and ranks in these communities may be seen as a powerful stimulus towards an efficient integration of village/town communities (cf. Durkheim 1893).

In Trend 2, the use of exotic materials as prestige signs perhaps indicated the capability of establishing and maintaining not only trade networks, but also strategically important alliances with other settled communities and tribal groups. At a symbolic level, the use of foreign, exotic materials coming from the outside world might suggest a growing consciousness of the cultural boundaries of an ancient society. This might promote a progressive identification of the community itself (cf. Helms 1993).

Trend 3 is dominated by the consequences of the elaboration of pyrotechnologies, allowing not only the production of new powerful symbols of status, but also the manufacturing of new tools and weapons, and, ultimately, the storing and managing of exchange value through dynamic, perhaps aggressive strategies. Trend 3, therefore, witnesses a growing hierarchical differentiation of communities.

Trend 4, as we have seen, is permeated by the need to articulate new roles and ranks in urban communities, creating new complex hierarchies but mediof Trend 4 were almost completely abandoned and forgotten. This leaves in our graph the two extreme poles of the central diagonal: community integration and community differentiation (Trend 5). These two poles, which we may imagine as complementary trends, summarize the 'impossible' goals of the *varṇa* system and of the later caste-based social organizations: to integrate the most different communities not only through occupational specialization, but also through direct social ranking.

NOTE

As mentioned, the placement of many of the Indus craft industries on the grid was necessarily subjective, due to the current status of research. During the writing of this paper, we thus went to some lengths to avoid unconsciously placing the Indus craft industries so as to deliberately support the pattern suggested by cross-cultural observations for chiefdoms and bureaucracies. Vidale, who made the original observation, independently placed all industries according to his estimate of their accessibility and technological elaboration. Miller, who was rather skeptical of this pattern, and who has experience in different craft industries, then moved the circles around to fit *her* estimates. After extensive discussion, we were somewhat surprised to see that Miller's objections in fact strengthened the case argued in this paper.

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