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The Concept of Copies: An Archaeological View of the Terracotta Ornaments from Sisupalgarh, India

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Starting approximately 5,000 years ago, artisans began to utilize molds to cast flowing media such as metal, clay, glass, and plaster. Molds enabled manufacturers to efficiently increase the number of objects produced and enabled multiple consumers to acquire exact duplicates. The ability to make perfect copies also resulted in new perceptions of style and value, as both producers and consumers could identify distinctions along a scale of originality, from innovative one-of-a-kind items to reliably standardized examples to imperfectly executed knockoffs. This article examines the extent to which the acceptance of copying as a legitimate form of production and consumption for portable objects was linked to the technological processes that enabled exact replications to be made. The article also identifies urban centers as focal points of increased population density and economic activity that played a particular role in the adoption of molding technologies and their finished products. An example is taken from the Indian subcontinent, where the ancient city of Sisupalgarh provides evidence for the widespread use of rapidly made molded terracotta jewelry such as bracelets, pendants, and ear ornaments.

In recent art theory, the concept of copies receives mixed treatment. Particularly in the fine arts, and for archaeological relics that are meant to be wholly authentic, copies are derided as “fakes” made to fool unsuspecting consumers or as “useless derivatives” that are a pale simulacrum of the original.¹ The emphasis on authenticity privileges the producer, whether ancient or modern; today, the designs, forms, and style even of mass-manufactured goods are protected by elaborate international legal prohibitions on unauthorized reproduction. Such piracy is most commonly associated with software, entertainment media, and designer handbags and clothing, although product-safety monitors

note that the array of copied goods includes items ranging from pharmaceuticals to aircraft parts.³ Copying is thus often viewed as problematic, whether in the form of the capture of ideas or the unauthorized physical replication of consumer goods.

More measured responses to the phenomenon of copying, however, can be found in scholarship that takes into account the dynamic relationship between innovation and replication. In some cases replication is viewed as a culturally sound form of independent creation.³ In other cases, replication and repetition are deliberately employed as a powerful visual trope that serves to reinforce ideology. Zainab Bahrani, for example, observes that in ancient times the architectural embellishment in large public buildings resulted from “the sculptor’s understanding of the powerful forms of visual repetition.”⁴ She further notes the way in which political leaders used replication and repetition as a means of emphasizing their authority, a strategy of imposed aesthetics seen in the palaces of ancient Mesopotamia, the cities of the Roman Mediterranean, and among the theater-like public spaces of the Inka realm.⁵ Legitimacy and control expressed through the authenticity of duplication extend to other technologies of the state as well, such as coinage, stamps, seals, and other tokens of authority.

Political authorities’ use of copies built upon the fact that the human capacity to recognize the effects of duplication long predated the emergence of the state. In the history of crafting, the first distinctive artifacts are Acheulian handaxes, which are bifacial leaf-shaped stone tools found in Africa, Europe, the Arabian peninsula, and the Indian subcontinent and date to about 1.65 million years ago.⁶ The same shape was manufactured for more than a million years, with a remarkable fidelity of form. Subsequent stone tool manufacture consisted of a proliferation of smaller objects such as spear points and arrowheads that similarly were made according to recognizable protocols of form and distributed over large areas. Copying also was part of the first development of representational “art” starting approximately 40,000 years ago, as seen in the famous cave paintings of Europe as well as in the earliest rock art of sub-Saharan Africa, Australia, and the Indian subcontinent (fig. 1). In the past 15,000–20,000 years, people living in settlements engaged in an explosion of craft-making of both utilitarian and nonutilitarian objects, resulting in widespread styles with distinctive attributes in both synchronic and diachronic terms. Archaeologists have identified imitative styles in an assortment of everyday items, ranging from pottery vessels and agricultural tools to beads, textiles, and house forms, to funerary arrangements and ritual structures.

A broader perspective on copying that engages with the cognitive effects and aesthetic desirability of sameness enables a critical exploration of the interdependence of duplicative artisanry and end-user adoption. Crafts-makers of all kinds, from basket weavers and hairdressers to chefs and carpenters, make their handiwork recognizable through their reference to a repertoire of known and familiar entities. And even the most “inventive” arts make use of prior designs as the basis for new creations in painting, sculpture, poetry, dance, and music. Copying is a fundamental component of consumption as well, providing the framework for the quotidian use of clothing, accoutrements, and household

Fig. 1
Horses at the Paleolithic site
of Chauvet. Licensed under
CC BY-SA 2.0 via Wikimedia
Commons: http://commons.wikimedia.org/wiki/File:Chauvet%C2%B4s_cave_horses.jpg#/media/File:Chauvet%C2%B4s_cave_horses.jpg.



goods. Individuals take up and utilize items in recognition of prevailing styles through which they communicate to others their age, gender, ethnicity, socio-economic status, and individual identity. For both producers and consumers, new items “play on recognizability” through their approximation to already-existing forms and styles, enabling people to correctly utilize a material object or interpret a symbol.⁷

Social theorists have addressed the world in which we live today as one in which the boundaries between independent invention, copying, and replication are continually being negotiated (for example, through the concept of “sampling” in music and the shifting boundary between “high” and popular art).⁸ Historical treatments of copying in the fashion industry indicate that although attempts to control imitations started as early as the 1930s, such attempts were forestalled by the difficulties of determining what exactly constituted a “copy” and by the argument that “copying was and is an essential component in fashion diffusion.”⁹ Replication is essential in other ways as well. “Revival” styles have their essence in the copying of earlier traditions, such as the Renaissance rekindling of Classical Roman and Greek styles in sculpture, the decorative arts, and furniture; the mass imitation of Chinese ceramics by European producers starting in the sixteenth century; and the development of Victorian majolica in imitation of earlier Italian, French, and Spanish designs.¹⁰ Copying is also an essential mechanism for evoking original experience in intangible products such as theater or digital art.¹¹ In some cases, copies not only are *as good as the*

“real” item, but are considered *better* according to particular performance criteria such as durability, cost, or ease of replacement.¹²

Copying and the Manufacturing Process

Ancient manufacturing processes were of two types: glyptic (subtractive) and plastic (accretionary). Subtractive techniques were used on natural materials such as fur, feathers, wood, antler, and stone, in which human actions were a process of removal. In making a stone tool, an artisan chips or grinds away the parent material until the desired form of a chopping tool, projectile point, or stone axe is achieved. Glyptic manufacturing is a one-way reductive process, as once the parent material has been removed it cannot be reattached without making the mend highly visible. The process of manufacture would generally be undertaken by the same individual from start to finish, often incorporating a lifetime of apprenticeship and trial and error leading to the production of finished products. Although this individualized production trajectory had the capacity for idiosyncratic results, the archaeological record indicates that styles in stone tools were widely reproduced, with an emphasis on copying and replication. The resultant consistency of artifact styles is so pronounced that archaeologists often base their assessments of site chronology and cultural affiliation on the shapes and decorations of artifacts—such as pottery, ornaments, and tools—found through surface survey and excavations.

Plastic media are highly distinct from glyptic media. Plastic media are additive as well as malleable and changeable. Many plastic media are manufactured entities whose forms are not evident in nature but are instead the result of human imagination and technological prowess. Metal, for example, rarely bears any physical resemblance to the parent raw ore from which it was smelted. Clay is transformed from a malleable state to a brittle one only when shaped and heated. Other plastic media, such as plaster, concrete, glass, ink, and polyethylene (“plastic”), are all human-developed products that result from the combination of ingredients in a chemically or thermally transformative process. Metal is smelted to a molten form; shells or limestone are slaked to make lime, to which water is added to make plaster; glass is made from a sintered mass of sand, soda, and lime. Compared to glyptic media, plastic media are a much more recent addition to the human technical repertoire, with the first usage of fired clay ca. 24,000 BC at Dolní Věstonice in the form of a female figurine; the first metal smelting in Eurasia ca. 5000 BC and in the Americas ca. 1000 BC; the first usage of glass in Egypt and Mesopotamia ca. 1500 BC; and the first usage of concrete by ca. 100 BC in the Levant.¹³

The use of plastic media to generate material objects has been greatly facilitated through replication technologies such as molds, woodcuts, movable type, photography, and printing (including the recent development of three-dimensional printing). For some plastic media, such as liquid metal, molds are a necessary component of the manufacturing process; in other cases, molds enhance the design range of the finished product. Molds range in type from

complex multipart forms for molten metals, in which the casting process is fraught with risk and physical danger from hot metal, to molds made for relatively benign and slow-setting fluid media such as clay and plaster. Molds can be used simply as holding containers for a mass of molten material meant to be transported in raw form elsewhere, or can be highly decorated as a template for a finished product that is then removed from the mold and used with little further modification.¹⁴

Molds are an intermediate step between the artisan's acquisition and control of raw material and the creation of a finished product, in which mold making itself constitutes specialized investment and craft-making.¹⁵ The use of molds in the production process ranges from simple forms to lengthy and elaborate preparations, depending on the shape of the mold and the type of material to be molded. The most elaborate preparations might require the bracing of multipart molds and the use of a "releasing agent" to enable the separation of the finished product from the mold (not unlike the practice of greasing and flouring a pan in the traditional cake-baking process). The concept of mold making provides not only the opportunity for repetition as an aesthetic concept but also a savings of labor, because less skilled individuals can be employed to fill and empty molds.

The idea of exact replication through molding was manifested at the same time as the development of fluid materials. In Europe, the first copper smelting appeared at the same time as the first cast copper objects, indicating the way in which the production technology and the aesthetics of finishing techniques emerged simultaneously.¹⁶ In addition, the use of fluid media to cast objects in molds enabled the first mass production. Mold-made bread is evidenced at the workers' village of the Great Pyramid on the Giza plateau by ca. 2500 BC, where the excavator suggests it fulfilled the need to feed the larger numbers of people working on the pyramid complex.¹⁷ Roman mold-made pottery vessels were generated at a rate of up to 29,000 finished vessels in a single firing; Roman glass molding similarly enabled rapid and repetitive production that resulted in the widespread diffusion of designs throughout the Mediterranean.¹⁸ More recently, the development of fluid-metal casting for movable type enabled the rapid production of printed material, while plastic injection molding today enables the production of millions of identical exemplars.¹⁹

Although highly efficient in reducing labor costs through repetition, molds are meant to be a hidden part of the production process. The relative lack of importance given to molds by producers, once the "valuable" finished items have been made, means that molds are often discarded with other waste products. Molds may be obsolete after a single use (as with lost-wax or sand casting), or may be made of a perishable material, such as wood, that disintegrates or is repurposed (including as fuel). When they are made of metal, molds may be recycled and recast when designs fall out of fashion; when molds are made of stone, they may be devolved to some use far away from the production locale, including as grinding stones, construction material, or pavement. In many cases, the best evidence for the use of molds is through the finished products, which are often found widely distributed in archaeological contexts and serve as evidence

for production technologies even when the original manufacturing locale is unknown.

When multiple identical exemplars are present in a marketplace or other venue, potential consumers cannot be fooled into thinking that they are acquiring a uniquely designed or bespoke piece. As a result, the successful adoption of molds for replicative manufacture requires a shift in perception toward an acceptance and appreciation of duplicative items. Historians and anthropologists have long recognized that people's selection of objects is not the blind result of accepting what producers make, but the result of a series of choices that are conditioned by individual perceptions, economic capacities, and identity making. Davide Gualerzi describes this as a process of "social innovation" in which perceptions of individual utility and consumer acceptance of innovations are essential components of manufacturers' adoption of new techniques.²⁰

Discussions of the role of copying in the creation of material culture are situated within a much larger discourse on the value and use of objects. As Marina Bianchi and others have noted, economists have had difficulty understanding the affective nature of consumption and the rationale for the consumption of objects beyond those necessary for daily biological subsistence.²¹ Objects are generally theorized to enable differentiation and hierarchy, as argued long ago by Thorstein Veblen and more recently by Pierre Bourdieu, as well as Mihaly Csikszentmihalyi and Eugene Rochberg-Halton.²² The desire for copies runs counter to the notion of using material culture to achieve social distinction: why do people want to acquire something that is already in the hands of so many others? While the possession of unique objects can enable people to proclaim their individual or household distinction within a group, the possession of copies enables them to express another important form of distinction in showing the self-identified group to which an individual belongs or wishes to belong.²³ The advent of molds in particular seems to require a consumer-producer interface characterized by population growth or some other form of economic acceleration.²⁴ Michael J. Silverstein and Neil Fiske suggest that ubiquitous offerings can be described as "mass prestige" goods through which large numbers of people experience identity formation and group participation through consumption.²⁵

Ancient Cities and the Social Context of Mass Production

The considerable acceleration of technology in the past five hundred years has resulted in the frequent conflation of technological changes with social ones. "Modernity" results from the dialogue between the repetitive availability of abundant goods and the artisanal turn that emphasizes individual craft-making skill and the human touch. However, the impetus of "modernity" can be distilled not to a particular kind of technology but to the interaction between new production processes and their simultaneous effects on social organization. Thomas J. Misa and Junichi Murata have examined the entangled interlocation between technology and modernity as co-constructed phenomena, explaining that "modernity" includes both physical technologies and distinct

ways of thinking.²⁶ They note that Francis Bacon saw the existence of printing, gunpowder, and the compass as threshold objects to modernity; Lewis Mumford identified the clock as the key development; and industrialists such as Henry Ford saw modernity as characterized by distinct thought patterns related to order, regularity, and control.

Taken as a combination of new technologies and new thought processes, one could search for a “modernist” trend in ancient times whenever there were co-constructed changes in both production technologies and social configurations that resulted in new aesthetics and new approaches to the use of material culture.²⁷ Where might the first “modernist” configurations therefore be found? The answer is: in the world’s first cities. People first came into population configurations the size and scale of cities starting around 6,000 years ago. In cities, the increased volume of producers and consumers resulted in an acceleration of manufacturing through copying and replication. But this increased sensitivity to the power of repetition was brought into existence not merely because of the simultaneous emergence of the state; rather, the capacity for the production of duplicative exemplars preceded and outpaced the limited realm of interactions that could be carried out by the first fledgling political authorities. Cities preceded states in almost every instance, in which urban centers were nodes of commerce and interaction before they became knit together into political systems.²⁸

Ancient urban centers provided the opportunity for a “premodern” modernity in the sense of providing both the impetus for new production techniques and the critical mass of consumers to avail themselves of finished products. Not only did people acquire and thereby demand the increased production of new goods, but they also incorporated the aesthetics of uniformity in at least some aspects of their material identity, resulting in a visual urban culture that provided an essential baseline of shared communication necessary for maintaining mutual comprehension in densely concentrated populations.²⁹ The need for this harmony should not be understated; the first urban centers not only had the capacity for a positive sense of well-being and identity; they harbored the inverse through ethnic tensions and outright violence.³⁰

Object Replication in Ancient India

The Indian subcontinent today comprises the diverse topography and climate zones of the modern nations of Afghanistan, Bangladesh, India, Nepal, and Pakistan. Starting in the seventh millennium BC, peoples of the region adopted plant and animal domestication along with settled village life, and engaged in long-distance trade activities.³¹ Artistic expressions in this era include rock art (petroglyphs and pictographs) as well as handmade terracotta figurines at sites such as Mehrgarh.³² These items had similar styles of form and execution that constitute evidence for shared communication on a regional scale.

By the Bronze Age, sophisticated craft traditions were well established in the subcontinent. The Indus urban culture (ca. 2600–1900 BC) sustained a distinct aesthetic that included standardized pottery shapes, engraved stone seals



Fig. 2
Woman and man with
ornamentation, Sanchi
Buddhist site, India, ca.
2nd–1st c. BC. Author photo.

bearing an as-yet undeciphered script, hand-formed terracotta figurines, and distinctive long-barrel carnelian beads. Indus artifacts were distributed throughout a large portion of the western subcontinent (today Pakistan and India), as well as through the Gulf region as far as the Arabian peninsula. Within Indus cities such as Harappa, simple molds were used for copper ingot production, and wooden molds were likely to have been a component of faience manufacture.³³ However, most craft-making was instituted through processes of glyptic copying rather than the manufacture of identical items through molds.

After the decline of the Indus culture, the subcontinent was home to small-scale village societies for a thousand years until the reemergence of cities and widespread trade networks in the mid-first millennium BC, a time known as the Early Historic period.³⁴ The concomitant growth of Buddhism was facilitated through the spread of a shared iconography and architectural styles. Buddhist structures were covered in floral, geometric, human, and animal sculptures that were closely replicated throughout the subcontinent and beyond.³⁵ In addition, the rendering of the Buddha in human form starting in the first century AD resulted in a representation that even today is one of the world's most widely

recognized iconographies. Portable secular material culture such as pottery and other daily-use goods also exhibited widespread similarities of form.

By the Early Historic period, artisans utilized molding as an integral component of the liquefaction/cooling process of metal manufacturing. The process of molding also made the jump from metallurgy, where it was a requisite technology, to the processing of clay, in which the choice of a mold was an elective strategy, a diffusion of technology across platforms described elsewhere by Keith Pavitt as “process innovation.”³⁶ Clay was molded for decorative and ornamental purposes, including the manufacture of both jewelry and religious-themed terracotta plaques. Sculptures from the subcontinent illustrate that personal ornamentation was a normative part of public display and identity for both elites and non-elites in the Early Historic period (fig. 2). Archaeological investigations have revealed ornaments made through glyptic processes, including stone (especially agate and carnelian), marine shell, bone, and ivory. Molding of plastic media was utilized to expand the realm of ornamentation, augmenting the availability and diversity of items that were part of the quotidian material repertoire.

Why did manufacturers expand their repertoire to include molding, particularly in clay? Technological change is not always an obvious process, and the mere availability of a known technology does not automatically result in its adoption.³⁷ Although clay was readily available in most parts of the subcontinent, the adoption of molds by crafts-makers would have required changes in production strategies and reconceptualizations of raw materials in a number of ways. First, the presence of a mold as a negative was a new development compared with the prior use of clay only in positive form when vessels were created by hand shaping or the potter’s wheel. The creation of a negative mold also meant interacting with mold manufacturers who possessed that specific skill set, whether molds were themselves made in clay or through the use of a different material such as wood.

Manufacturers would have had to organize work flows to effectively integrate relatively unskilled workers into the production process. Integrating more workers may have incurred some additional costs of management and monitoring, including attention to theft. While the sizes of finished vessels would have precluded their unsanctioned removal from a pottery yard, baked clay ornaments could easily have been pilfered by workers for their own use or for surreptitious exchange. The broad diffusion of identical finished products would have made it difficult to identify which consumers had acquired their goods through legitimate channels once the goods were in public view.³⁸ Finally, manufacturers potentially would have had to adjust the streams of both raw materials and waste materials to the new technologies of molding, although such technologies enabled them to create relatively high-value items from common materials, given that the amount of clay used for a pot would have represented enough raw material for several dozen ornaments.

The consumer demand for rapidly made and inexpensive ornamentation, prompted by the “fast-fashion” atmosphere of the urban milieu, provided the impetus for changes in production processes and labor organization. Through

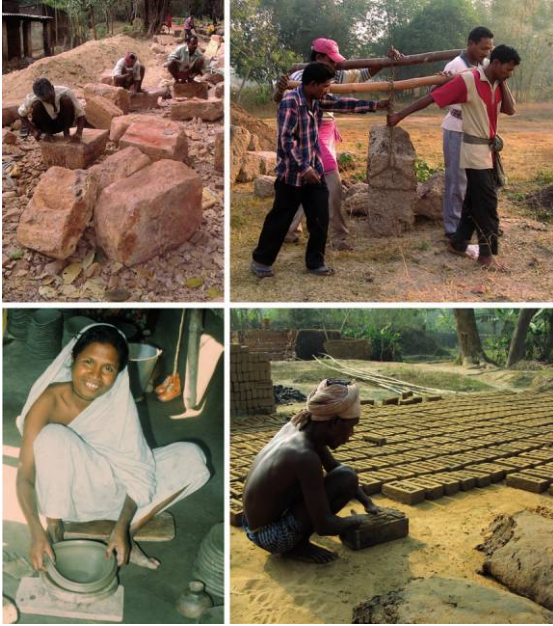


Fig. 3
 Stone as a collective production and distribution process compared with the individualized production of clay items. Clockwise from top left: stonemasons in Konark, India; carrying laterite blocks, Sisupalgarh, India; molding bricks from clay, rural Odisha State; hand-forming pottery vessel, Bangladesh. Author photos.

the use of molds, manufacturers were able to transform clay into entirely new shapes, a change in producer-consumer interactions that was not limited to the sartorial repertoire (fig. 3). Molds were also used to make bricks in rectilinear form, which made reference to the rectilinear stone blocks utilized for construction in the region. However, the manufacture of bricks and tiles provided an entirely new scale of building material in which each individual element could be handled by a single person, unlike stone blocks, which required two or more people to lift. In molded items of all sizes, the capacity for replication was not merely a way of providing a cheap copy; it also provided the opportunity for innovations in both style and form.

Investigations at the Ancient City of Sisupalgarh

Among the most extensively studied ancient cities in the subcontinent is Sisupalgarh in eastern India. The site was first investigated through excavation in 1948, with a renewed program of surface survey, mapping, excavations, and geophysical survey starting in 2000.³⁹ The site has a distinctive rectilinear rampart with eight formal gateways surrounding an urban core that is more than one square kilometer in size; in addition to this rampart the site is graced with monumental architecture in the form of monolithic stone pillars and massive laterite blocks. Geophysical surveys and excavations confirm that the site was fully occupied, as seen in the remains of artifacts and architecture not only within the rampart walls but also in the adjacent exterior.

The majority of artifacts at Sisupalgarh are made of clay, a reflection of the site's location on the Daya River within the Mahanadi River delta. Tons of discarded

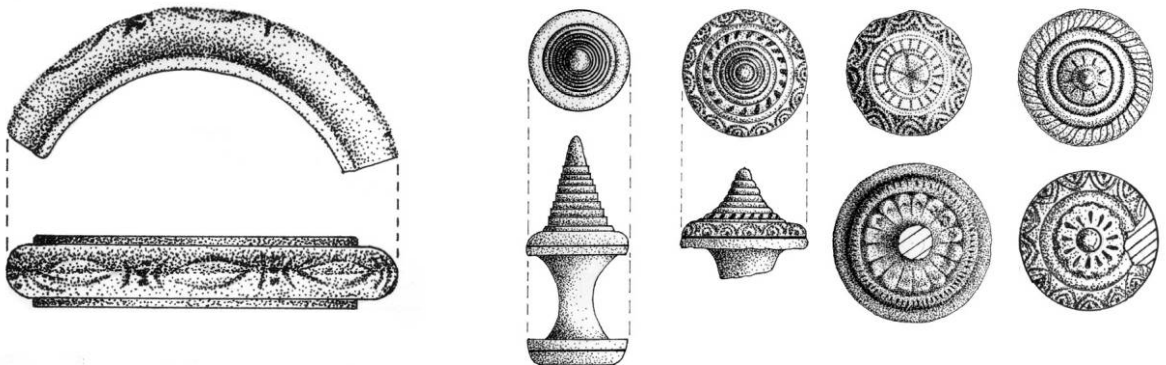
pottery vessel fragments have been recovered in the site's habitation deposits, indicating the ease of replacement and the innovation of what might almost be termed a "disposable" material culture, given that many of the vessels seem to have been discarded with little or no use-wear. The pottery shapes are similar to those found elsewhere in the region, including types found all along the eastern coast of the subcontinent, indicating participation in regional styles of both objects and culinary practices.

Terracotta ornaments are distinctly prevalent at Sisupalgarh compared with other sites in the region, and are found in the form of bangles, earrings, finger rings, and pendants. These items have been found in all of the excavation areas, and in contexts of differential wealth ranging from substantial multi-roomed domestic structures to the smallest do-it-yourself habitations. With the exception of the simplest forms of ear studs, beads, and bangles, all of the terracotta ornaments from Sisupalgarh are made from molds in which decorative patterns were embossed through the molding process. More than 1,000 different whole and fragmentary artifacts were found in the recent excavations at Sisupalgarh, forming a data set that enables us to discuss these objects within the producer-consumer dynamic of the emergent urban tradition of the late first millennium BC.

The different types of terracotta ornaments exhibit a range of molded decorations, indicating that each ornament form was subject to different grammars of novelty. Terracotta bangles measure from 3 to 18 mm wide (measured perpendicular to the wrist), with a curvature of 4–10 cm, suitable for the arms of both children and adults. Twenty-five percent of the bangles are plain and may have been made from either hand forming or molding. The remainder, which are molded, bear a limited range of designs. The most prevalent motif is a lenticular impression, found on 40 percent of the bangle fragments that are well-enough preserved to discern the presence of molded decoration (fig. 4). This design has also been documented in a gold ring found at the site, suggesting a continuity of styles in different media. Additional molded designs include raised dots, incised cross-hatching, rope designs, and florals. No complete bangles were recovered in the excavations, and the fragments tend to be in a relatively worn condition, as

Fig. 4 (left)
Molded terracotta bangle fragment, Sisupalgarh.
Drawing by D. V. Karanjikar.

Fig. 5 (right)
Molded terracotta ear ornaments, Sisupalgarh; complete object on left, with examples of variant designs.
Drawings by D. V. Karanjikar.



though they were utilized for a long time, then tossed away with other types of common refuse and hence subject to trampling and abrasion.

Terracotta ear ornaments come in a greater variety of styles and decorations than do bangles; most were designed to hang within an enlarged ear hole (fig. 5). Over 450 such molded ear ornaments were recovered in the excavations, of which nearly half consist of a peg shape, followed in quantity by crescents ($n = 89$), pulleys ($n = 46$), solid disks ($n = 46$), the asymmetrical shape known as “reel/amphora” ($n = 35$), annular forms with a hole in the middle of the ear spool ($n = 15$), and gamesman shapes ($n = 10$). The molded items often exhibit decorative motifs ranging from embossed concentric circles to floral and geometric designs.

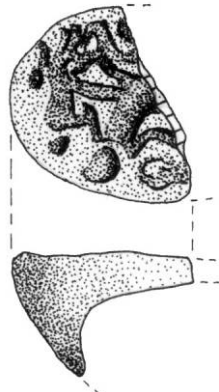


Fig. 6 (left)
Bezel fragment of molded terracotta ring, Sisupalgarh. Author photo.

Fig. 7 (right)
Fragment of molded terracotta ring, Sisupalgarh. Drawing by D. V. Karanjikar.

Finger rings constitute the smallest category of terracotta ornaments ($n = 33$ exemplars). Their molded forms usually include a broad bezel on which anthropomorphic, zoomorphic, or geometric designs are impressed (figs. 6, 7). Often, however, the ring fragments are so abraded that their motifs cannot be discerned. This abrasion is likely the result of the objects' loss trajectories, such as falling off the hand or breaking in the course of daily activities inside or outside the home.

Among the terracotta ornaments from Sisupalgarh, pendants exhibit the greatest diversity of size, shape, and decoration. Terracotta pendants were never hand formed and were made utilizing only the molded technique that produced an embossed design (there were no plain pendants). The 113 pendants recovered in the excavations come in a variety of ovoid, circular, and elongated shapes ranging from 1.8 to 8.4 cm in original size. Of all the categories of terracotta ornaments, pendants appear to represent the greatest range of preservation, with some pendants in good, or even very good, condition. Designs include floral motifs ($n = 34$), zoomorphs ($n = 19$, the majority of which are elephants, bulls, and other quadrupeds), geometrics ($n = 13$), and anthropomorphs ($n = 4$). A significant number ($n = 25$) are circular pendants with a human head in profile, a style of pendant known as a “bulla” that is widely distributed in the Indian subcontinent in this period (fig. 8). When the first such items were found,

Fig. 8
Terracotta
"bulla" pendant,
Sisupalgarh.
Author photo.



Fig. 9
Floral-motif pendants
from different molds,
Sisupalgarh.
Author photos.



Fig. 10 (bottom)
Comparative views of
elaborate terracotta
bull pendant,
Sisupalgarh. Drawing
by D. V. Karanjikar.



investigators cited the similarity to Roman portrait coinage as the basis upon which to interpret bullae as imitations of those coins.⁴⁰ However, the simultaneous existence of Buddhist figural sculpture, numerous portrait coins of contemporary indigenous rulers in the western subcontinent, and the distinctly Indian profile of the exemplars at sites like Sisupalgarh all indicate instead that the source of inspiration was a complex, multifaceted one.

The relatively better condition of pendants and their greater variety of designs suggest that the manufacture and use of pendants may have reflected greater selectivity and investment in curation compared with ear ornaments, bangles, and finger rings (fig. 9).⁴¹ The most elaborate and largest terracotta ornament recovered in the excavations is a bull-motif pendant (fig. 10). Comparison of this exemplar with “ordinary” pendants suggests that some molds were more likely than others to have required greater skill in handling. In addition, the bull pendant tantalizingly suggests that very elaborate pieces devolved into simpler ones over time, as the pendant came from one of the lowest layers of the broad horizontal excavations of the households in the northern portion of the site.

Among the terracotta ornaments recovered in the seven different excavation areas at Sisupalgarh (keeping in mind that the amount of area excavated was well under 0.1 percent of the entire site area), there were rarely two objects that could have come from the same mold.⁴² The scale of production of both molds and finished products, in which there was a great deal of imitation practiced among the different producers, coupled with expectations among consumers that they would be able to access a range of distinct designs in low-cost items of ornamentation, was quite robust. The rapid site-formation processes that characterize this archaeological region, in which monsoons combined with pisé architecture have resulted in compressed, recycled stratigraphic profiles, complicate the determination of a clear sequence of stylistic changes. One might expect, however, that the rapid discard of ornaments supports a model in which zoomorphs, florals, geometrics, and other patterns might have quickly gone in and out of fashion.

At Sisupalgarh, archaeological evidence reveals that the use of molding technology for clay manufacturing simultaneously appears in the form of utilitarian objects (bricks) and ornaments about midway through the site’s life in the mid-fourth century BC. This transition was still under way during the time of the historical event known as the Kalinga War, in which the region was conquered by the Mauryan dynasty of the Ganges plain in the mid-third century BC. Although the archaeological evidence from Sisupalgarh cannot pinpoint any specific events of warfare, and the urban center was already undergoing economic transitions, the subsequent centuries appear to have been a time of economic growth expressed in new forms of architecture (through the use of bricks and tiles), the first use of coinage, and the widespread adoption of terracotta ornaments.

The production location for these ornaments is at present unknown. Within the rampart walls at Sisupalgarh there was no evidence for production such as the presence of durable molds or concentrations of single designs that might have

been the result of stockpiling finished products by manufacturers or merchants. Furthermore, molds might have been made of perishable materials such as wood or from metal that was subsequently recycled into other forms. Although terracotta ornaments could have been made in a small kiln, the fact that clay, fuel, and water would all have had to be carried to the site from the hinterlands suggests that it is equally or more likely that production took place outside the walls and that finished products were transported into the city. The clay often is not finely prepared and has the same coarse inclusions as pottery vessels, indicating that ornament production probably was developed as a specialty within pottery-making workshops.⁴³

The Social Context of Mass Production at Sisupalgarh

In ancient cities, replicability may have enhanced the consumption experience, with the perception of limitless supplies that could increase in tandem with demand.⁴⁴ Local producers made the leap to molds for products ranging from architectural elements (bricks) to coinage to consumer goods in the form of terracotta ornaments. Potters were also able to break the monopoly on ornamentation that had previously been held by metallurgists and carvers working in stone, marine shell, ivory, and other rare materials. At the same time, consumers made a cognitive leap to accepting identical objects and reinforcing their production through mass consumption while demanding a diversity of designs in the finished product. These actions entailed costs and benefits for both parties. Producers had to interact with specialized crafts-makers who made molds and thus were able to engage in ornament making at a new scale and with new materials. Consumers acquired “unoriginal” items, but with the benefit of gaining access to stylish new goods at a fraction of the expense of traditional stone beads or metal pendants.

The demand for comparatively inexpensive mass-produced ornaments is also seen in the phenomenon of glass beads, which began to be manufactured in the Early Historic period, though their presence is scarcely attested at Sisupalgarh.⁴⁵ It is important to note that the advent of mass-produced items such as glass beads and terracotta ornaments did not *replace* older traditions of glyptic craft-making in stone and shell; instead, they augmented the range and repertoire of ornamentation. As Marina Bianchi has observed, “new” goods are always “part of a system of relations which continue to be the same and make the good still understandable and recognizable to its adopters.”⁴⁶ Who were the early adopters of terracotta ornaments? Researchers working on more recent time periods note that trends in the consumer adoption of material goods come from different directions. New styles may be adopted by elites and trickle down to less wealthy social strata, but evidence also exists for initial adoption by low-status or marginalized groups, with subsequent adoption by higher-status groups as well as for the simultaneous adoption of particular goods across all socioeconomic classes.⁴⁷ Ornamentation enjoys a particular status in this regard. It can be a relatively minor acquisition that, by virtue of its function in public display, is both easily changeable and highly visible, resulting in an effect out of proportion to its cost.⁴⁸ At Sisupalgarh, terracotta ornaments

of all types are found throughout the city and are not apparently associated with distinct status or ethnic groups or with particular neighborhoods. Their widespread occurrence suggests that they may have been adopted simultaneously, marking a cross-cutting “urban” identity.⁴⁹ Although urban fashions were adopted in smaller population centers, our research at sites in the region around Sisupalgarh has resulted in a much lower recovery rate of terracotta ornaments at hinterland settlements.⁵⁰

At Sisupalgarh, ornaments were recovered intermixed with ordinary domestic trash such as pottery, or found indiscriminately deposited within and among the melted debris of pisé architecture. Although there was at least one deposit that could be considered a “ceremonial” context within the rampart wall (consisting of several nested complete bowls, a deer antler, and a gold ring), it did not contain any terracotta ornaments. Terracotta ornaments seem to have been discarded in the same way as other unwanted/used items and do not seem to have formed the basis of “collections” or curation behavior among the city’s residents.⁵¹ The only dense concentration of ornaments ($n = 128$ exemplars) was in an otherwise nondescript context outside of the rampart, but they were extremely abraded and hence not likely to have consisted of a merchant’s stockpile or a consumer’s trousseau.

Urbanism at sites such as Sisupalgarh brought with it an increase in group identity (for example, in the psychology of who lived “inside” the distinctive ramparts) and a greater range of potential employment and consumption activities. Ornaments, worn close to the skin and selectively displayed in both private and public realms, constituted a category of highly individualized items that enabled both the projection of identity and a concept of “ownership.”⁵² The development of a sense of property ownership in personal, portable items may have been particularly important in urban areas, where so many other aspects of life could not be wholly controlled by individuals: noise and smoke, crowds, wastewater streams, public spaces, and the behavior of one’s neighbors. The fact that terracotta ornaments were surely the cheapest common denominator of consumer item, and visually as well as economically distinct from metal ornaments (with their connotations of inheritance, family wealth, and social status), resulted in an independence of materiality that could be accessed by all urban dwellers. Both producers and consumers could readily make investments in ornaments with very low switching costs, while entrepreneurship was supported from production (as mold-makers made new molds) through distribution (whether by itinerant merchants or in urban marketplaces).⁵³ The development of mass-produced objects indicates that the concept of “economies of scale” applied not only to the production process but to the consumption process as well, driven by new considerations of aesthetics and value in the diverse social realms of the subcontinent’s emergent cities.

■

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1 The equivalence of copies with fakery is a focus of considerable art-historical and conservation literature, including manuals for detection (e.g., Paul Craddock, *Scientific Investigation of Copies, Fakes and Forgeries* [Amsterdam: Elsevier, 2009]) and philosophical discussions of market demand (Mark Jones, “Why Fakes?,” in *Fake? The Art of Deception*, ed. Mark Jones with Paul Craddock and Nicholas Barker [London: The British Museum, 1990], 11–22). For an explanation of the disparaging view of famous art reproductions on calendars and posters, see Zainab Bahrani, *The Infinite Image: Art, Time and the Aesthetic Dimension in Antiquity* (London: Reaktion Books, 2014), ch. 4. For the concept of the simulacrum, see Jean Baudrillard, *Simulations*, trans. Paul Foss, Paul Patton, and Philip Beitchman (New York: Semiotext(e), 1983).

2 For a comprehensive review of brand piracy, see David S. Wall and Joanna Large, “Jailhouse Frocks: Locating the Public Interest in Policing Counterfeit Luxury Fashion Goods,” *British Journal of Criminology* 50 (2010): 1094–1116.

3 On the culture-specific perceptions of copying, see Barbara Bosker, *Original Copies: Architectural Mimicry in Contemporary China* (Honolulu: University of Hawai‘i Press, 2013); for pejorative views of copying, Sara B. Marcketti and Jean L. Parsons, “Design Piracy and Self-Regulation: The Fashion Originators’ Guild of America, 1932–1941,” *Clothing and Textiles Research Journal* 24 (2006): 214–28; and Thomas G. Schumacher, “‘This Is a Sampling Sport’: Digital Sampling, Rap Music and the Law in Cultural Production,” *Media, Culture and Society* 17 (1995): 253–73.

4 Bahrani. *The Infinite Image*, 123.

5 Bahrani discusses Mesopotamia in her volume; for the Inka, see Lawrence S. Coben in *Archaeology of Performance: Theaters of Power, Community, and Politics*, ed. Takeshi Inomata and Lawrence S. Coben (Lanham, MD: AltaMira, 2006).

6 Kathleen Kuman, “Oldowan Industrial Complex,” in *Encyclopedia of Global Archaeology*, ed. Claire Smith (New York: Springer, 2014), 5560–70.

7 Marina Bianchi, “Introduction,” in *The Active Consumer: Novelty and Surprise in Consumer Choice*, ed. Marina Bianchi (London: Routledge, 1998), 10. A strong comparison can be made between the use of material culture for communication and the dialectic of structure and agency in language use, in which grammar scaffolds intelligible communication at the same time that individual utterances can eventually become widespread through others’ repeated use. For a particularly delightful example of this process, see Todd Jones, “How Many New Yorkers Need to Like Bagels Before You Can Say ‘New Yorkers Like Bagels?’: Understanding Collective Ascription,” *Philosophical Forum* 36, no. 3 (2005): 279–306.

8 Schumacher, “‘This Is a Sampling Sport.’” The critique of photography and its potential for endless replication that results in a devaluation of the depicted subject can be found in Susan Sontag’s essay collection *On Photography* (New York: Farrar, Straus and Giroux, 1977).

9 Marcketti and Parsons, “Design Piracy,” 215.

10 Stacey Pierson, “The Movement of Chinese Ceramics: Appropriation in Global History,” *Journal of World History* 23, no. 1 (2012): 9–39; Marilyn Karmason with Joan B. Stacke, *Majolica: A Complete History and Illustrated Survey* (New York: Harry N. Abrams, 1989).

11 Although technology is often viewed as a mechanism for exact replication, the reproduction of original sounds and digital experiences can be difficult to achieve because the platforms of performance are increasingly more advanced than the computers utilized for the original creation. Hence, archivists must deliberately build in approximations of the initial experience such as jerky motions or low-resolution graphics to replicate creators’ originals; see Dragan Espenschied et al., “Large-Scale Curation and Presentation of CD-ROM Art,” in *Proceedings of the 10th International Conference on Preservation of Digital Objects (iPRES 2013)*, ed. José Borbinha, Michael Nelson, and Steve Knight (Lisbon: Biblioteca Nacional de Portugal, 2013), 45–52, http://purl.pt/24107/1/iPres2013_PDF/iPres2013-Proceedings.pdf.

12 In *Scientific Investigation*, Craddock discusses the phenomenon of “genuine fake Rolex” watches

that owners of real Rolexes wear while traveling and that manufacturers compete to demonstrate are the best ones on the market. He also notes that museums display fakes to conceal losses or forestall theft of genuine items. Charles S. Stanish has proposed that forgeries can serve as a mechanism for site preservation, if good copies can satisfy the demand for ancient objects and thereby forestall looting ("Forging Ahead: Or, How I Learned to Stop Worrying and Love eBay," *Archaeology* 62, no. 3 [2009]: 18, 58–60, 65–66). The article's appearance in a popular magazine has suppressed an effective disciplinary engagement with what might be viewed as a very reasonable approach to the significant problem of antiquities looting. A similar suggestion was made by J. M. Kenoyer for Harappan beads (reported in Craddock, *Scientific Investigation*, 10), with an analogy to the fake "coral" developed by Jacques-Yves Cousteau in an attempt to save coral reefs. These practical approaches have a philosophical counterbalance in the work of Jean Baudrillard (*Simulations*) and Michael Taussig (*Mimesis and Alterity: A Particular History of the Senses* [New York: Routledge, 1993]), both of whom note that real, singular objects can be overwhelmed and made obsolete by their copies.

13 Archaeologists are less inclined these days to pronounce a given artifact type as the "first" of its kind compared with a generation ago, given the discipline's current focus on process rather than on individualized historical trajectories and the perception that "firsts" are likely to be quickly displaced as older and older examples are found. As a result, it is surprisingly difficult to locate the unambiguous "firsts" of particular technologies in the scholarly literature in a way that contributes to comparative interdisciplinary dialogue. The date offered for Dolní Věstonice comes from a textbook: Paul Pettit, "The Rise of Modern Humans," in *The Human Past*, 2nd ed., ed. Chris Scarre (London: Thames and Hudson, 2009), 164–65. For the first metal smelting in Eurasia, see Miljana Radivojević et al., "On the Origins of Extractive Metallurgy: New Evidence from Europe," *Journal of Archaeological Science* 37 (2010): 2775–87; in the Americas, Gray Graffam, "Metallurgy in Pre-Columbian South America," in *Encyclopedia of the History of Science, Technology, and Medicine in Non-Western Cultures*, ed. Helaine Selin (Netherlands: Springer, 2008), 1649–51; for Egypt and Mesopotamia, A. J. Shortland and K. Eremin, "The Analysis of Second Millennium Glass from Egypt and Mesopotamia, part I: New WDS Analyses," *Archaeometry* 48 (2006): 581–603; for the Levant, Khaled Al-Bashaireh and Gregory W. L. Hodgins, "AMS 14C Dating of Organic Inclusions of Plaster and Mortar from Different Structures at Petra-Jordan," *Journal of Archaeological Science* 38 (2011): 485–91.

14 For molds as a simple recipient of fluid media, see Paul T. Nicholson et al., "The Ulu Burun Glass Ingots, Cylindrical Vessels and Egyptian Glass," *Journal of Egyptian Archaeology* 83 (1997): 143–53; for molds as templates, see Joyce C. White and Elizabeth G. Hamilton, "The Transmission of Early Bronze Technology to Thailand: New Perspectives," in *Archaeometallurgy in Global Perspective*, ed. Benjamin W. Roberts and Christopher P. Thornton (New York: Springer, 2014), 834.

15 The concept of "co-crafting" describes the mutual developments and interdependencies of some manufacturing practices; see Izumi Shimada, ed., *Craft Production in Complex Societies: Multicraft and Producer Perspectives* (Salt Lake City: University of Utah Press, 2007). For examples specifically related to metallurgy and molding, see Siran Liu et al., "Microscopic Study of Chinese Bronze Casting Moulds from the Eastern Zhou Period," *Journal of Archaeological Science* 40 (2013): 2402–14.

16 Radivojević et al., "On the Origins of Extractive Metallurgy," 2775.

17 Mark Lehner, *The Complete Pyramids: Solving the Ancient Mysteries* (London: Thames and Hudson, 1997), 237.

18 Michael Fulford, "Gallo-Roman Sigillata: Fresh Approaches, Fresh Challenges, Fresh Questions," in *Seeing Red: New Economic and Social Perspectives on Terra Sigillata*, ed. Michael Fulford and Emma Durham (London: Institute of Classical Studies, University of London, 2013), 1–17; E. Marianne Stern, *Roman Mould-Blown Glass: The First through the Sixth Centuries* (Toledo, OH: Toledo Museum of Art, 1995).

19 Jeremiah E. Dittmar, "Information Technology and Economic Change: The Impact of the Printing Press," *Quarterly Journal of Economics* 126 (2011): 1133–72.

20 Davide Gualerzi, "Economic Change, Choice, and Innovation in Consumption," in *The Active Consumer: Novelty and Surprise in Consumer Choice*, ed. Marina Bianchi (London: Routledge, 1998), 55. Moreover, molding is not an inevitable aspect of production in plastic media. For example, copper and gold working can be achieved through hammering native metals, and some societies such as Native North American groups achieved a high artistic distinction through these techniques in metallurgy without ever developing the technologies of smelting and liquefaction; see Kathleen L. Ehrhardt, "Copper Working Technologies, Contexts of Use, and Social Complexity in the Eastern Woodlands of Native North America," in *Archaeometallurgy in Global Perspective*, ed. Benjamin W. Roberts and Christopher P. Thornton (New York: Springer, 2014), 303–28. When multiple traditions of manufacturing were available, distinctions among types of manufacture were perceived and evaluated by consumers. Mary Helms has identified a hierarchy of value in Panama prior to European contact, noting that poured-gold ornaments were considered more prestigious than hammered native-gold ornaments made by local crafts-makers because the cast gold pieces came from distant Colombia (*Ancient Panama: Chiefs in Search of Power* [Austin: University of Texas Press, 1979], 46, 159).

21 Bianchi, "Introduction," and other papers in *The Active Consumer*. Archaeologists have increasingly engaged with the subject of "value" related to ordinary goods in the premodern past; Monica L.

Smith, "The Role of Ordinary Goods in Premodern Exchange," *Journal of Archaeological Method and Theory* 6, no. 2 (1999): 109–35; Monica L. Smith, *A Prehistory of Ordinary People* (Tucson: University of Arizona Press, 2010); Mary C. Stiner, "Finding a Common Bandwidth: Causes of Convergence and Diversity in Paleolithic Beads," *Biological Theory* 9 (2014): 51–64.

22 Thorstein Veblen, *The Theory of the Leisure Class* (New York: Penguin, 1994 [1899]); Pierre Bourdieu, *La distinction: Critique sociale du jugement* (Paris: Éditions de Minuit, 1979); Mihaly Csikszentmihalyi and Eugene Rochberg-Halton, *The Meaning of Things: Domestic Symbols and the Self* (Cambridge: Cambridge University Press, 1981).

23 Quentin Bell, channeling Veblen heavily, discusses the role of imitation particularly with regard to ornamentation and fashion in *On Human Finery*, 2nd rev. and enlarged ed. (New York: Schocken Books, 1976), 181. A fresh and thoughtful comparative approach that focuses on portable electronics using data from four contemporary middle-class groups in sub-Saharan Africa is provided by Tendai Chikweche and Richard Fletcher, "Rise of the Middle of the Pyramid in Africa: Theoretical and Practical Realities for Understanding Middle Class Consumer Purchase Decision Making," *Journal of Consumer Marketing* 31, no. 1 (2014): 27–38.

24 Sarah B. Graff has recently noted that the development of molded figurines in the ancient Near East came after millennia of hand-molding ("Sexuality, Reproduction and Gender in Terracotta Plaques from the Late Third–Early Second Millennium BCE," in *Critical Approaches to Ancient Near Eastern Art*, ed. Brian A. Brown and Marian H. Feldman [Boston/Berlin: DeGruyter, 2014], 371–90). This development coincided with the rapid growth of cities in what is known as the Ur III period; for a detailed discussion of Mesopotamian craft-making, see P. R. S. Moorey, *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence* (Oxford: Clarendon Press, 1994).

25 Michael J. Silverstein and Neil Fiske with John Butman, *Trading Up: Why Consumers Want New Luxury Goods—And How Companies Create Them*, rev. ed. (New York: Portfolio, 2005). The concept of belonging is an active component of everyday life that is more compelling than the somewhat passive treatments of people's relationships with mundane objects through notions of style or aesthetics. However, the manner in which the critique of "everyday aesthetics" is beginning to permeate archaeological studies indicates the promising future trajectories of commingled art/anthropological theory; see, for example, Richard Lesure, "Figurine Fashions in Formative Mesoamerica," and James I. Porter, "The Value of Aesthetic Value," both in *The Construction of Value in the Ancient World*, ed. John K. Papadopoulos and Gary Urton (Los Angeles: Cotsen Institute of Archaeology Press, 2012).

26 Thomas J. Misa, "The Compelling Tangle of Modernity and Technology," and Junichi Murata, "Creativity of Technology: An Origin of Modernity?," in *Modernity and Technology*, ed. Thomas J. Misa et al. (Cambridge, MA: MIT Press, 2003), 5–6 and 241.

27 Bahrani, for example, makes the case in *The Infinite Image* that ancient art motifs such as those found in Mesopotamian palaces can be productively analyzed through comparisons with decidedly "modern" artists of repetition such as Andy Warhol.

28 The idea of a cities-first model of social complexity has been gaining ground in archaeological theorizing over the past twenty years, given the strong evidence for urban growth that predates the emergence of strong political authorities, and the recognition that early political institutions had effects on only a limited range of domains such as the military and a limited amount of territorial administration. Most aspects of daily life remained unaffected by political configurations. See, for example, Adam T. Smith, *The Political Landscape: Constellations of Authority in Early Complex Societies* (Berkeley: University of California Press, 2003); Monica L. Smith, "Introduction," in *The Social Construction of Ancient Cities*, ed. Monica L. Smith (Washington, DC: Smithsonian Institution Press, 2003); Monica L. Smith, "Networks, Territories and the Cartography of Ancient States," *Annals of the Association of American Geographers* 95 (2005): 832–49.

29 Monica L. Smith, "Seeking Abundance: Consumption as a Motivating Factor in Cities Past and Present," *Research in Economic Anthropology* 32 (2012): 27–51.

30 Augusta McMahon et al. analyze a mortuary context indicative of sustained violence and mass casualties at Tell Brak, one of the first cities in Mesopotamia; "Late Chalcolithic Mass Graves at Tell Brak, Syria, and Violent Conflict during the Growth of Early City-States," *Journal of Field Archaeology* 36, no. 3 (2011): 201–20. Deborah L. Nichols et al. discuss the more subtle effects of ethnic tension at Teotihuacan, one of the largest New World urban settlements, in "Watering the Fields of Teotihuacan: Early Irrigation at the Ancient City," *Ancient Mesoamerica* 2, no. 1 (1991): 119–29.

31 For a thorough introduction to early South Asia, see Upinder Singh, *A History of Ancient and Early Medieval India* (Delhi: Pearson Longman, 2008).

32 The most comprehensive treatment of Mehrgarh is found in Catherine Jarrige et al., eds., *Mehrgarh Field Reports 1974–1985—From Neolithic Times to the Indus Civilization* (Sindh: Government of Sindh, Pakistan, Department of Culture and Tourism, 1995). Mehrgarh's status as one of the most thoroughly excavated early sites also makes it a prominent entry in standard texts, including Singh, *A History of Ancient and Early Medieval India*. A summary of Neolithic and Bronze Age crafting is provided by Jonathan Mark Kenoyer and Heather M.-L. Miller, "Multiple Crafts and Socioeconomic Associations in the Indus Civilization: New Perspectives from Harappa, Pakistan," in Shimada, *Craft Production*, 152–83.

- 33** For copper production, see Heather M.-L. Miller, "Investigating Copper Production at Harappa: Surveys, Excavations and Finds," in *South Asian Archaeology 2001*, ed. Catherine Jarrige and Vincent Lefèvre, vol. 1, *Prehistory* (Paris: Éditions Recherche sur les Civilisations, 2005), 245–52. For faience, see Jonathan Mark Kenoyer, *Ancient Cities of the Indus Valley Civilization* (Karachi: Oxford University Press, 1998), 157.
- 34** Monica L. Smith, "The Archaeology of South Asian Cities," *Journal of Archaeological Research* 14, no. 2 (2006): 97–142; Singh, *A History of Ancient and Early Medieval India*.
- 35** Alex Wayman and Elizabeth Rosen, "The Rise of Mahayana Buddhism and Inscriptional Evidence at Nagarjunakonda," *Indian Journal of Buddhist Studies* 2, no. 1 (1990): 49–65.
- 36** Keith Pavitt, "Patterns of Technical Change: Towards a Taxonomy and a Theory," *Research Policy* 13, no. 6 (1984): 345. Michael Brian Schiffer has also discussed the extent to which newly developed technologies are rapidly diversified to serve production and consumption trajectories simultaneously in *Power Struggles: Scientific Authority and the Creation of Practical Electricity before Edison* (Cambridge, MA: MIT Press, 2008). Electrification not only enabled the development of artificial light but was also quickly adopted for motors used in transportation (automobiles), manufacturing processes (textiles), and the automation of domestic and consumer goods (washing machines, refrigerators) in a process that Schiffer terms an "invention cascade."
- 37** Pavitt, "Patterns of Technical Change"; Schiffer, *Power Struggles*. Even the most objectively "advantageous" technologies can be met with skepticism; for an insightful treatment of the initial rejection of the automobile among rural Americans, see Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37 (1996): 763–95.
- 38** In modern times, identical goods are made distinct through the use of unique serial numbers.
- 39** The initial investigations by B. B. Lal constituted one of the first archaeological research projects of independent India. The research was reported both in immediate publications (B. B. Lal, "Sisupalgarh 1948: An Early Historical Fort in Eastern India," *Ancient India* 5 [1949]: 62–105), and in subsequent synthetic assessments (B. B. Lal, "Planned Cooperation between Archaeologists and Scholars of Ancient Literature—A Crying Need," *Man and Environment* 16, no. 1 [1991]: 5–21). His work (and encouragement!) was the foundation for our own subsequent research at the site; for example, Monica L. Smith, "Archaeological Research at Sisupalgarh, an Early Historic City in Eastern India," in *South Asian Archaeology 2003*, ed. Ute Franke-Vogt and Hans-Joachim Weisshaar (Aachen: Kommission für Archäologie Außereuropäischer Kulturen, 2005), 297–306; Rabindra Kumar Mohanty and Monica L. Smith, *Excavations at Sisupalgarh* (New Delhi: Indian Archaeological Society, 2008); Rabindra Kumar Mohanty, Monica L. Smith, and Tilok Thakuria, "Excavations at Sisupalgarh: The Northern Gateway and Activity Areas outside the Rampart," *Man and Environment* 38, no. 1 (2013): 55–65; Monica L. Smith and Rabindra Kumar Mohanty, "Archaeology at Sisupalgarh: The Chronology of an Early Historic Urban Centre in Eastern India," in *Proceedings of the 19th Meeting of the European Association of South Asian Archaeology, Paris*, ed. Vincent Lefèvre (Paris: Musée du Louvre, in press).
- 40** The search for materials of Roman affinity has been a focus of South Asian studies for the past century. With regard to bullae, the relationship of Roman coins to Indian clay copies is often assumed; see, for example, C. Margabandhu, "Trade Contacts between Western India and the Graeco-Roman World in the Early Centuries of the Christian Era," *Journal of the Economic and Social History of the Orient* 8, no. 3 (1965): 321.
- 41** It is also possible that pendants, being hung around the neck, were less likely to break, or that they were a slightly later innovation compared with other forms of terracotta ornament and hence less "recycled" in the process of site formation and architectural turnover. Because of the high water table at Sisupalgarh, most of the excavations were truncated at a depth of 2–3 meters, with selective deeper trenches excavated further with the assistance of mechanical pumps. These trenches revealed that the cultural sequence at the site was up to 6.7 meters thick; in these deep trenches, the first appearance of molded terracottas consisted of ear ornaments, although the very small amount of area of the site's earliest occupations excavated precludes fine-scaled or statistically robust analyses of whether there was a sequential development of different forms over time.
- 42** Many of the terracotta ornaments that were recovered in the archaeological excavations at Sisupalgarh were sufficiently worn that while the designs could be discerned, it was difficult to ascertain whether the same design came from the same physical mold.
- 43** The clay of ornaments was of variable fineness, as can be seen in a comparison of the terracotta ring in figure 6 with the coarse grains visible in the pendants of figure 9.
- 44** Although there were many shared elements among the urban centers in the Indian subcontinent, individual cities did seem to have their own "style" of manufactured goods. The nearest peer city to Sisupalgarh is the walled site of Chandraketugarh, 400 kilometers to the north. Chandraketugarh also had a highly developed molded clay repertoire, but in the form of small terracotta plaques. Interestingly, the entire West Bengal region lacks terracotta ornaments, while Sisupalgarh is practically devoid of any traces of molded terracotta objects except for ornaments. The subcontinental phenomenon of "urbanism" was both an integrative phenomenon across regions and one that provided opportunities for distinction and specific urban identities, not unlike the ways in which producer/

consumer dynamics result in distinct identities among cities even within the same nations today; see Allen J. Scott, "The Cultural Economy of Cities," *International Journal of Urban and Regional Research* 21, no. 2 (1997): 323–39.

45 For a recent synthesis on glass production, see Laure Dussubieux and Bernard Gratuze, "Glass in South Asia," in *Modern Methods for Analyzing Archaeological and Historical Glass*, ed. Koen Janssens (Chichester, UK: John Wiley and Sons, 2013), 399–413.

46 Bianchi, "Work and the Sirens of Consumption," 67.

47 The directionality of adoption from lower-status to higher-status groups can be seen in contemporary times through the widespread adoption of hip-hop clothing and foods such as fajitas and ribs. When new products are launched, they are sometimes first adopted by the consumers at the "bottom of the pyramid," as noted by C. K. Prahalad, *The Fortune at the Bottom of the Pyramid* (Upper Saddle River, NJ: Wharton School Publishing, 2005), sometimes at the top of the pyramid (Marcketti and Parsons, "Design Piracy"), and sometimes simultaneously throughout the economic spectrum (Bianchi, "Work and the Sirens of Consumption"; Silverstein and Fiske, *Trading Up*).

48 The social effect of very inexpensive ornamentation can be seen in the recent phenomenon of motivational silicone bracelets, of which the most prominent example is the distinctive yellow "Livestrong" band. Prior to the Lance Armstrong doping scandal, these were very popular with all status groups; for those of us living in Los Angeles, an excursion through Beverly Hills would invariably include the sight of at least one person driving an expensive convertible and wearing a Rolex on one wrist and a one-dollar rubber bracelet on the other.

49 As assessed through the archaeological surface survey throughout the rampart interior at Sisupalgarh, a similar effect appears to have been the case for fine-ware pottery. The ubiquitous appearance of very thin ceramic sherds suggests that every household had the equivalent of at least some pieces of "good" serving ware regardless of their socioeconomic status.

50 The recent discovery and investigation of two smaller contemporaneous Early Historic settlements with the same formal rampart plan as Sisupalgarh indicates that the inhabitants of "town"-sized settlements had the same range of artifacts but in much smaller quantities; see Rabindra Kumar Mohanty, Monica L. Smith, and Timothy Matney, "Excavations and Geophysical Survey at the Ancient Early Historic Town of Talapada, Odisha, 2013," *Man and Environment* 39 (2014): 53–63.

51 For insightful assessments of the function and results of collecting behaviors, see Marjorie Akin, "Passionate Possession: The Formation of Private Collections," in *Learning from Things: Method and Theory of Material Culture Studies*, ed. W. David Kingery (Washington, DC: Smithsonian Institution Press, 1996), 102–28; Marina Bianchi, "Collecting as a Paradigm of Consumption," *Journal of Cultural Economics* 21 (1997): 275–89.

52 Anthropological treatments of "ownership" have traditionally focused on highly valuable entities such as land and elite goods, while more recent treatments have begun to consider low-value items and intangibles such as intellectual property; see Veronica Strang and Mark Busse, eds., *Ownership and Appropriation* (Oxford: Berg, 2011); and Monica L. Smith, "Inconspicuous Consumption: Non-Display Goods and Identity Formation," *Journal of Archaeological Method and Theory* 14 (2007): 412–38.

53 For the concept of "switching costs" in low-value items, see Prahalad, *Fortune*.