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Tea for Two: The Dual Modes of Contemporary *Zisha* Teaware Production and their Implications for Archaeological Research

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ABSTRACT

In archaeology, ceramics receive much attention because they are abundant in many archaeological contexts, chronologically sensitive, and provide a good window into past human behaviors, in particular decision-making in ceramic production which reflects past communities of practice and individual actions. While most studies tend to rely heavily on differences in object shape and style to distinguish between different periods and cultural contexts, the present ethnographic study focuses on one object type, namely *zisha* teapots from Yixing, China, to explore the hidden diversity in potting behaviors resulting in products that are visually nearly identical in form and style. The article raises awareness of potential differences in raw materials, techniques, and markets for the production of morphologically similar vessels, which would be categorized as the same “type” within typological ceramic classification, and calls for careful evaluation of the complexities within technological practices and their corresponding social boundaries.

KEYWORDS

Zisha teapot making; ceramic technology; ethnography; slab building; paddling technique; typology; morphology; technological choice

Introduction

Ceramics receive much attention in archaeology because they tend to be abundant in many archaeological contexts, are chronologically sensitive (meaning they change relatively quickly over time), and provide a good window into past human behaviors including food preparation and consumption, stylistic preferences, and technological practices. Potters’ choices in ceramic production in particular have been extensively researched as they provide insights into past communities of practice and individual actions. While most studies tend to highlight obvious diversity in form and style, the present ethnographic study focuses on one specific object type, namely *zisha* teapots from Yixing, China, to explore the hidden diversity in potting behavior resulting in products that are visually near-identical in form and style. The study provides a detailed account of variation in raw material, techniques, labor organization, and

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market, highlighting choices as well as the socio-cultural and economic context in which these choices are made.

This article thus contributes to broader discussions on technological choices in ceramic production and beyond, highlighting the dynamics of decision making by groups and individuals. Previously, researchers have sought to identify correlations between technological practices and the social boundaries of pottery-making communities, which are often assumed to be correlated with linguistic and/or cultural boundaries. However, the surprising internal diversity in ceramic technological practices within what from the outside appears as a fairly homogenous group of potters living in the same region, speaking the same language, and identifying with the same ethnic group discussed in this article calls for careful evaluation of the complexities within technological practices and their corresponding social boundaries. Additionally, the article raises awareness of potential differences in raw materials, techniques, and markets for the production of morphologically similar vessels, which would be categorized as the same “type” within typological ceramic classification.

Zisha Teapots and their Place of Production

Zisha 紫砂 teapots are unglazed tea-brewing and serving wares manufactured in the Yixing area in the Lower Yangtze River Plain in China (Valfre 2000, 11). Based on dates from the recently excavated Shushan archaeological site, the manufacturing of *zisha* teapots can be traced back to the Late Ming Dynasty (1522–1644 CE) (Hang and Ma 2008).



Figure 1. Location of the city of Yixing and surrounding cities.

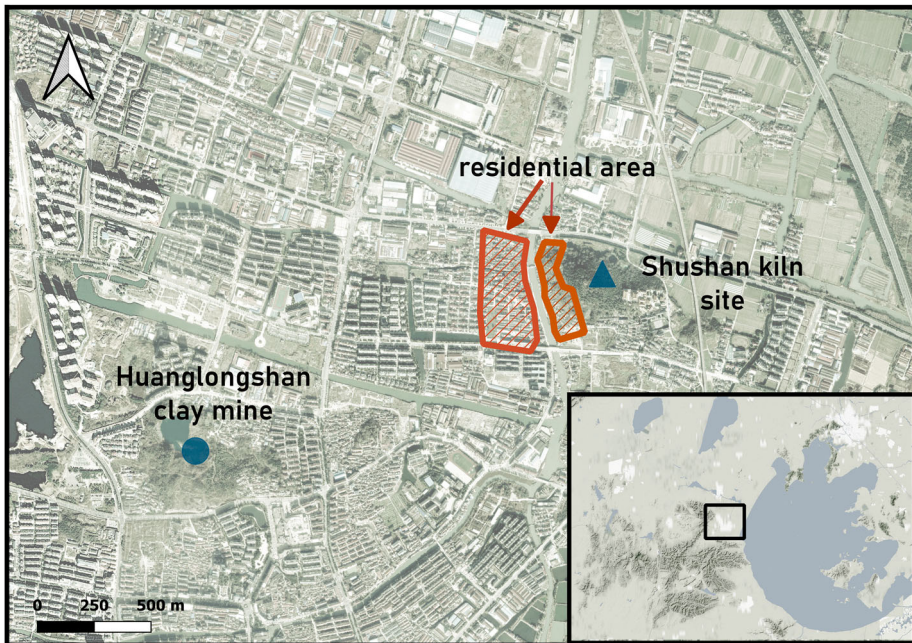


Figure 2. Location of Shushan archaeological kiln site, its associated residential areas, and Huanglongshan clay mines in Yixing.

Prior to the Republican period (1912–1949 CE), *zisha* teapots were predominantly manufactured from *zisha* clay in Yixing using a slab-building technique on a slow wheel, using a paddle and the potter’s hand (Gu, Xiutang, and Changhong 1992, 22–24; Guojiaji 2006). *Zisha* clay (literally “purple clay”) is clay of a specific texture and color range (purple: *zini* 紫泥, red: *hongni* 紅泥, green: *lüni* 綠泥) mined at specific mines, particularly the mountain slopes of Huanglongshan and Zhuangzhuangshan (Xu 2000, 6; for a detailed discussion of the various colors of *zisha* clay, consult Gao 2023). Geologically, the Wutong Formation of the late Devonian, the Gaolinshan Formation of the early Carboniferous, and the Longtan Formation of the late Permian are sources of this clay (Jiangsusheng Yixing 1977).

This material, *zisha* clay, is now predominately used to make pots used in tea brewing. These pots are especially popular in *gongfu*-style tea making from southern China, which has become immensely popular around the globe over the last 15–20 years and involves repeated steeping of tea leaves in fairly small pots and drinking the tea out of small individual cups (Lin 1992). The considerable popularity of this style of tea drinking have made *zisha* teaware extremely sought after, increasing both prices and pressure on producers and resources (Gao and Hein 2023). It has also brought the wares and their production to the attention of anthropologists and cultural heritage specialists.

Previous Research and Open Questions

Over the last few decades, sociologists and anthropologists have come to recognize the active role of material culture in generating social relations and cultural values

(Bourdieu and Nice 1992; Ingold 1990; 2013). Thanks to the pioneering work of scholars like Leroi-Gourhan (1993) and Lechtman and Merrill (1977), much is already known about the complex interplay between technological choices and the societies in which they occur (for extensive discussions on this topic, see Gosselain 1992; 1994; Lemonnier 1993; Schiffer and Skibo 1987; Sillar and Tite 2000). The contributions made by these and other scholars to the literature have greatly advanced our understanding of how material culture is not just a passive reflection of societies but actively shapes the social relations, cultural values, and trajectories of human development. Their work has traced some of the intricate interplay between technology, culture, and society in various societies and context.

Potters constantly make many decisions during their work, including the choice of raw materials, the means and duration of processing, the techniques and equipment used to shape the pots, and the energy sources employed in the process (e.g. water, animals, or human power for clay processing, and different types of fuel for firing pots) (Lemonnier 1993, 1–12; Schiffer and Skibo 1997; Sillar 2000). These choices are shaped by both physical factors, including the availability of necessary tools, raw materials, and energy sources, and by social and cultural factors (Lemonnier 1993, 4).

Substantial efforts have been made to characterize the chemical and physical properties of clay paste, connecting them to shaping, drying, and firing behavior as well as performance of the resultant objects (e.g. Bronitsky and Hamer 1986; Schiffer and Skibo 1987). For instance, Tite, Kilikoglou, and Vekinis (2001) emphasize that the mechanical properties of pottery, as well as their intended use, play an active role in shaping potters' technological choices concerning clay and recipe selection. Archaeomaterials research also has made great advances in understanding clay procurement and processing and the implications of both for the societies and environments in which they take place (e.g. Gosselain and Livingstone Smith 1995).

Furthermore, archaeologists and ethnographers emphasize that technological choices are socially and culturally transmitted behavioral patterns, not simply adaptations to natural environments or raw material characteristics – though these factors certainly play important roles too (Gosselain and Livingstone Smith 1995, 158; Lemonnier 1993, 1–24; Livingstone Smith 2000). Lemonnier outlined five interconnected components that work together in technological systems: matter, energy, objects, gestures, and specific knowledge. Among these, specific knowledge significantly shapes technological actions, both at the individual and societal levels (Lemonnier 1993, 5–6). Ethnoarchaeological ceramic studies have provided valuable insight by identifying multiple factors influencing technological choices among potters and pottery-making communities, including the local environment (Arnold 1985, 35–37; M'Mbogori 2018), gender (Berns 1993; Hirshman 2020), and ceramic-making traditions (Bowser 2000; Livingstone Smith 2016).

Variations in pottery production – be they design, technique, and/or raw materials – are frequently documented and discussed in ethnographic research. However, most of this research focuses on variations between pottery-making communities (Arnold 1971; Wayessa 2011) or variations in the technological practices behind different types of ceramic products within a single pottery-making community. For example, Friedrich (1970) discussed how pot designs are correlated with different pottery-

making groups, while Stark and Longacre (1993) emphasized the recent innovation in Kalinga pottery-making technology and its social context.

Hosler (1996) highlighted how high-status and low-status potters in an Andean community adopted distinct ceramic-making sequences in the creation of ceramic figurines. However, the Andean case is unique as the potters were imitating excavated pieces rather than building on (or deliberately breaking with) existing craft traditions they had been trained in. Yixing provides a more “standard” case in that the pottery making there has a long tradition passed down through generations of local potters. By investigating how and why technological variation occurs among potters in the same region, the present study of Yixing *zisha* teawares provides a case study of alteration on techniques and raw materials within a single pottery-making community who is producing what is technically the same type of ceramics.

Previous ceramic ethnographic studies have examined topics such as production techniques (Sarmah and Hazarika 2018), production organization (Sinopoli 1988), and gender (Stark 1995). Diversity in pottery making within the same community has also been a popular topic (Salanova 2019), but in these studies the focus has been on styles defined based on color, shape, size, and usage – visual features that can be identified macroscopically. The present study on *zisha* pottery making in Yixing investigates more fundamental differences, such as choice of raw materials, techniques, and target market, within a single type of pottery used for the single function of brewing tea.

Zisha ware has been the subject of a number of ethnographic studies recording pottery manufacturing techniques, raw materials, and social organization (e.g. Han and Xia 2001, 392–403; Song, Guangrong, and Jianliang 2011, 94–114; Xu 2017, 50–61). However, none of these studies have approached *zisha* ware production from a materiality-focused archaeological perspective as the present study does. One of the most extensive ethnographic studies on *zisha* ware production was conducted by Gowlland (2017) between 2003 and 2012 among potters in Dingshu. That study provides some information of interest to archaeologists, discussing topics such as transmission of technical knowledge, apprenticeships, and social hierarchies, persistence of traditions versus innovation and individual style, and issues of authenticity in the context of major changes in the Chinese economy (Gowlland 2009a; 2009b). Gowlland’s work focuses on social organization and behavior, while materiality, outer appearance, and human-object interactions are not considered.

Research Methods and Approach

This study investigates contemporary *zisha* manufacturing using an ethnographic approach based on *chaîne opératoire*. In the study of pottery, ethnographic approaches have long relied on detailing operational sequences by observing and interviewing living individuals or communities (Kramer 1985). Interviews help researchers understand selection of raw materials, shaping techniques, and firing processes (Livingstone Smith, Bosquet, and Martineau 2005). In an archaeological context, data gathered using an ethnographic approach is useful for illustrating the relationship between material culture and human behavior (Longacre 1991). Such studies of contemporary behavior can bridge the gap between past and present and contribute new insights to the understanding of past behavior (Sillar and Tite 2000, 6–7).

The chronological segmentation of the acts and thought processes necessary for an artifact's creation and integration into a technological system is known as the *chaîne opératoire* (operational sequence) (Bar-Yosef and Van Peer 2009; Gosselain 2018; Sellet 1993, 106; Torres 2002). This approach allows for the analysis of technological systems across multiple sectors, including raw material, technology, style, and culture (Torres 2002). In the case of pottery-making, this method examines the process from the selection and procurement of raw materials to post-firing consumption (Duistermaat 2016, 121). Based on lithic studies, Bar-Yosef and Van Peer further classified the *chaîne opératoire* into technoeconomic and technopsychological approaches. The former emphasizes spatial and temporal variation (e.g. Favereau and Bellina 2016), while the latter focuses on variation in production systems and sequences (Bar-Yosef and Van Peer 2009, 105). Following the classification by Bar-Yosef and Van Peer (2009), this study follows the technopsychological *chaîne opératoire* approach, examining the production of Yixing *zisha* teapots from raw material selection to distribution of the products. Instead of focusing on the temporal and spatial differences, this study will focus on potters in Yixing, emphasizing the technique sequences and choices made by potters during pottery production.

The ethnographic data for this study was collected during fieldwork conducted in Yixing from July to September 2016 and from April 2019 to December 2021. Two periods of fieldwork were conducted to allow for time to evaluate the observations made during the first fieldwork season and adjust strategies and questions during the second fieldwork season. The study was spread out over this fairly long period due to the COVID-19 pandemic interrupting the work. With approval from the Central University Research Ethics Committee (CUREC) of the University College London and the University of Oxford, the first author interviewed two clay dealers and three teapot dealers and observed the ceramic-making processes of three *zisha* teapot potters. The interviews were semi-structured, starting out with prepared questions approved via CUREC and developing further questions from it, all with the consent of the interviewees. The interviews were recorded in writing rather than recording them so as not to disturb the natural conversational flow. Each interviewee was interviewed only once over a half day or day, depending on how much time they were able to spare. Clay procurement and processing as well as vessel shaping, finishing, and firing were observed spread out over weeks and months as the process demanded and as the potters had time. For each potter, each stage of the process was observed at least three times. No video recordings were made but a limited number of photos were taken when the potters allowed it. None of the potters using molds agreed to be photographed, so we are not able to provide comparison photos between the two techniques as originally planned. The names of all interviewees who consented to participate are anonymized; all interview data are listed in Table 1.

Ethnographic Observations and their Implications

In official documents declaring it Intangible Cultural Heritage (ICH), *zisha* ware is defined as a product made using a specific slab-building technique and a traditional suite of tools to shape clay retrieved from specific mines in Yixing (Guojiaji 2006). The reality, however, is much more complex. The fieldwork conducted for this study

Table 1. Basic information of interviewees and observed potters in 2016, 2021 fieldwork.

Alias	Gender	Age	Position/business
Craftsman 1	Male	Senior	Experienced craftsman who makes <i>zisha</i> ware and sculptures
Craftswoman 1	Female	Senior	Experienced craftswoman who makes <i>zisha</i> teapots
Craftsman 2	Male	Middle-aged	Experienced craftsman who makes <i>zisha</i> teapots
Clay dealer 1	Male	Middle-aged	Previously, mining manager of the Huanglong mine, now private businessman who sells clay
Clay dealer 2	Female	Middle-aged	The wife of clay dealer 1
Teapot dealer 1	Male	Senior	Experienced dealer in high-end teapots. He runs a teapot trading business in Hong Kong
Teapot dealer 2	Male	Middle-aged	Professional dealer in high-end teapots. He runs a teapot trading business in Beijing
Teapot dealer 3	Male	Junior	Non-local tradesman in Yixing. He runs a low-end teapot trading business in Yixing Yinjia Village

noted the existence of two different ways of making *zisha* teapots. The first is conventional hand-built *zisha* teapot-making which ICH-related official documents would call “authentic,” while the second approach involves using molds (for a discussion of authenticity concepts in regard to *zisha* ware consult Gao and Hein 2023). Below, the *chaînes opératoires* for these two approaches are described separately, focusing on raw material selection and processing, forming techniques, and target markets.

The Chaîne Opératoire of Conventional Hand-Built Zisha Teapots

Two of the interviewed *zisha* potters who make pottery by hand-building described the clay sources they used as “authentic” *zisha* clay, procured from the specific mining locations mentioned previously. To prevent overexploitation, one of the Huanglongshan mines has been closed to individual exploitation since 2005 but a state-run company began limited exploitation in 2010 (Zhao 2010). *Zisha* clays from this and other mines in the Yixing region seen as “authentic” (see Gao and Hein 2023) are scarce and thus expensive; according to interviewed clay dealers, authentic *zisha* clay from these sources was priced at over 70,000 RMB per ton in 2016 (ca. \$10,542 at the time).

Processing *zisha* clay is time-consuming and labor-intensive, according to Clay Dealers 1 and 2. The procured clay rocks are weathered naturally in the open air, a process that may take several months or even years. The potters grind up the weathered clay and hydrate it in a large, glazed vessel, stirring it regularly to homogenize the clay, as described by Craftsman 2. Rock fragments are picked out by hand and plant remains are washed away by changing the water. When the clay is soaked, potters also levigate and sieve it. Craftswoman 1 and Craftsman 2 believe that the longer the clay is aged, the better it performs. During vessel shaping, water absorption causes clay minerals to swell, increasing interlayer spacing and enhancing plasticity by lubricating particles, making the paste easier to shape by potters. Additionally, the presence of microorganisms in the water contributes to increased plasticity by bridging clay mineral particles, thereby reducing shrinkage during drying (Gaidzinski, Jamil, and Tavares 2011).

The clay is aged in water, and then dried and subjected to a labor-intensive hammering process. Craftsman 2 hammers the dehydrated clay paste with a wooden hammer for several hours every day over the course of three to five days to wedge it, removing air pockets and homogenizing it further. The hammered clay paste is shaped into a brick and marked with its production date for a second round of aging. Craftswoman 1 stated that some of the clay that was aging at the time the interview took place had been hammered decades ago.

Hand-building *zisha* teapots is an intricate process involving slab-building and paddle-shaping. Craftswoman 1 and Craftsman 2 both created their teapots, from processing the clay to firing them, in their individual pottery studios, which are attached to their households. They usually work on their own but may have

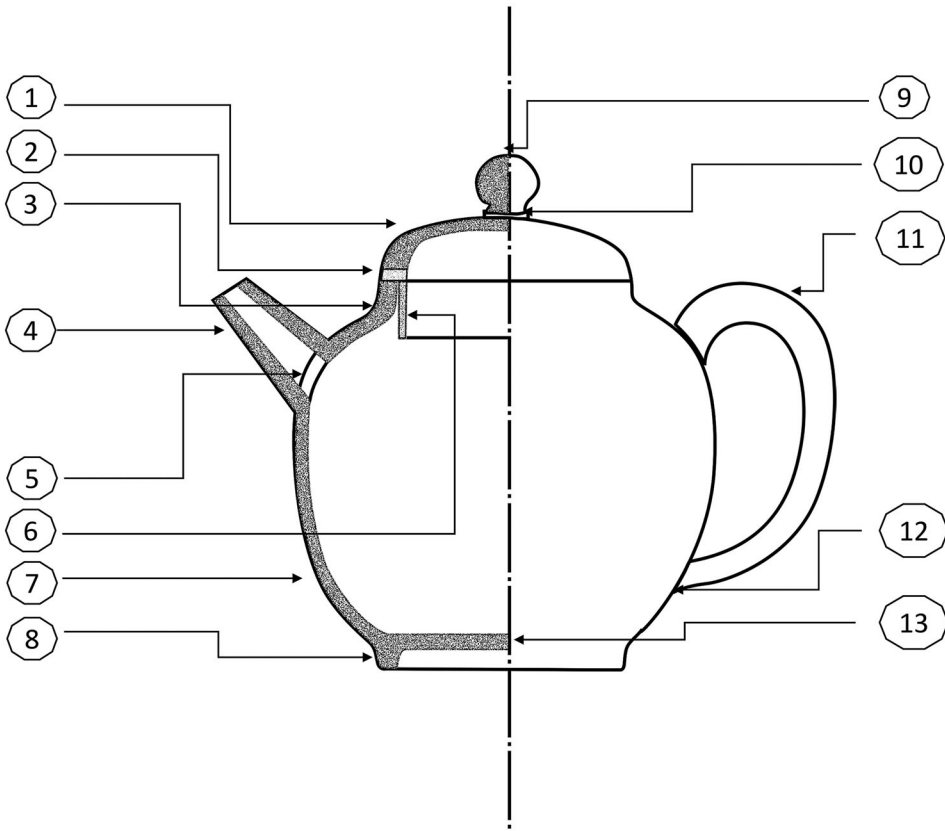


Figure 3. Structure of a hand-built *zisha* teapot and terminology used by potters, based on information from Craftsman 1. 1. *gaiding* 盖顶: top of the lid; 2. *Gaibanpian* 盖板片/ *zuopian* 座片: clay strip used in crafting the teapot's lid, determining its diameter; 3. *jing* 颈: neck of the teapot; 4. *zui* 嘴: spout; 5. *zuidong* 嘴洞: spout opening (for pouring tea); 6. *zikou* 子口: "foot" of the lid, i.e. a narrow clay ring attached to the bottom of the lid for a proper seal; 7. *wei* 围/ *qiang* 墙: vessel wall, made from a long-rectangular sheet of clay; 8. *jiadi* 假底: foot, made from a clay ring cut from a round slab; 9. *diding* 滴顶: knob handle (of the lid); 10. *dizu* 滴足: foot of a knob handle made from a thin clay sheet; 11. *ba* 把: teapot handle; 12. *bashao* 把稍: the bottom end of the handle attached to the vessel body; 13. *dipian* 底片: vessel bottom, made from a round clay slab and connected on the sides with the vessel wall to make the vessel body.

apprentices from time to time. When shaping their pots, they both use several round clay slabs of different thicknesses, as well as a long rectangular slab (Figure 3). The dimensions of the rectangular slab vary depending on the shape of the teapot that is being manufactured. Slabs are made with a wooden hammer. A compass-shaped wooden tool with a knife on one end and an adjustable needle on the other is used to cut a circular hole through the center of a round slab.

The teapot body is made from a long rectangular slab, whose length is determined by the desired teapot diameter, while the width is determined by the desired height. This long slab is placed vertically around the round slab at the bottom. Excess clay is cut away to create a cylinder on a slow wheel made of wood. A flat wooden paddle is used to shape the cylinder. While the paddle hits the exterior surface of the vertical slab cylinder wall, the craftsperson's hand also supports the inside space.

The complexity of making hand-built *zisha* teapots is also evident in the number of tools used in the process. During the 2019–2020 fieldwork, 29 basic *zisha* teapot-making implements made of a range of different materials (wood, metal, ceramic, leather, buffalo horn) were observed in use during pottery-building (12 tools), shaping (14 tools), and finishing (six tools); some of these tools have multiple uses (Table 2).

Once formed, the “green” *zisha* vessels are dried before firing. Drying time varies from weeks to months depending on pot size and weather. The dried teapots are placed into an

Table 2. Tools involved in pottery building, pottery shaping, pottery sculpting and pottery surface treatment processes.

Name of the <i>zisha</i> -making tools	Pottery Building	Pottery Paddling and Shaping	Pottery Surface Treatment
<i>Lulu</i> (轆轤); wooden or metal turntable	√	√	√
<i>Dazi</i> (搭子); wooden hammer	√		
<i>Paizi</i> (拍子); wooden paddle		√	
<i>Juche</i> (矩車); wooden cutting implement for round slab building	√		
<i>Mingzhen</i> (明針); surface treatment tool made from buffalo horn			√
<i>Duge</i> (獨個); wooden sculpting tool			
<i>Mujizi</i> (木雞子); wooden, egg-shaped teapot-shaping tool		√	
<i>Bizi</i> (篋子); teapot shaping tool made from bamboo		√	
<i>Pangpidao</i> (鏘鏘刀); metal teapot sculpting knife	√		
<i>Diju</i> (底矩); bamboo slice used in round slab cutting	√		
<i>Xutuo</i> (虛坨); teapot lid-shaping tool made from fired <i>zisha</i> clay		√	
<i>Nangzi</i> (瓢子); teapot lid-supporting implement made from fired <i>zisha</i> clay	√		
<i>Penshihu</i> (噴水壺); water spray	√	√	
<i>Pimaobu</i> (皮毛布); leather cloth for surface treatment			√
<i>Fuzhi</i> (複只); slice for pottery sculpting made from bamboo or buffalo horn		√	
<i>Niqianchi</i> (泥杆尺); bamboo ruler	√		
<i>Lezi</i> (勒只); pottery-shaping tool made from bamboo or buffalo horn		√	
<i>Wazuidao</i> (挖嘴刀); metal sculpting knife for spout interior			
<i>Tonguan</i> (銅管); metal teapot spout hole driller	√		
<i>Jiandao</i> (尖刀); sculpting needle made from bamboo or metal	√		√
<i>Mupaizi</i> (木拍子); wooden sculpting paddle		√	
<i>Huazi</i> (括子); curved wooden pottery-shaping slice		√	

electric kiln and fired at temperatures ranging from 1050 °C to 1200 °C for 1–2 days, with the maximum temperature maintained for over 1 h. The firing atmosphere (reduction or oxidation) is not deliberately controlled. Before the establishment of the People’s Republic of China, dragon kilns were used for firing *zisha* teapots. Dragon kilns, also referred to as climbing kilns, operating on a cross-draft principle where flames travel horizontally through a long kiln built on a hill slope. These kilns have been common in southern China for millennia and became particularly important in porcelain production from the twelfth century CE onwards, because they allow for firing large numbers of wares at the same time at high temperatures. Today, only one such structure, the Qianshu dragon kiln, is still running in Yixing, while most potters rely on electric kilns they can install in their individual workshops (Yixingshi 2010). Given the high demand for *zisha* teapots since the early 2000s, a single kiln cannot meet the firing needs of the entire region. Furthermore, air pollution caused by dragon kilns also motivated potters to transition from wood firing to electric firing. Nowadays, potters making hand-built *zisha* teapots mostly have their own electric kiln.

Dealers trading hand-built *zisha* teapots usually obtain them in person from the producers. They have close relationships with these craftspeople, somewhere between trusted business partners and friends. Their businesses depend less on quantity but more on the quality of the *zisha* teapots, which can fetch high prices if they are associated with famous potters and deemed to be made with “authentic” *zisha* clay



Figure 4. *Zisha* teapot made by renowned potter Gu Jingzhou 顾景舟 (Hong Kong Museum 1989, 87), whose teapot sold for 27.025 million Chinese yuan in *Kuangshi* 匡时 auction house (An 2016).

and traditional manufacturing techniques. Teapots made by renowned craftspeople can sell for hundreds of thousands of yuan (Figure 4). According to Dealer 1, dealers offer installment services to collectors, who sometimes spend several months of their salaries on a single piece.

The Chaîne Opératoire of Teapots with Plaster Molds

The high demand for small reddish teapots has led to the production of daily-use teapots made from clay from mines outside the Yixing region. According to Clay Dealer 1, raw material from the nearby provinces of Zhejiang and Anhui is commonly used. This clay is often processed using machines rather than human labor to speed up the operation and reduce costs. Ball mills and vacuum de-airing machines are widely used, decreasing the processing time from several years to several days or even hours. Production commonly takes place within factory settings where several potters work within the same workshop, either in a set-up where one potter is in charge of one or several steps or where each potter shapes their own vessels but shares the use of assisting machinery and molds with the other potters. There are usually about 10–15 potters working together in a factory, though there also are some potters working on their own or in smaller groups and employing plaster molds, but these individuals then rarely use work-saving large machines for clay processing which are a worthwhile investment only if used in factories or co-used by a larger number of potters.

The use of plaster molds in *zisha* teapot making (Figure 5) simplifies the shaping process. *Zisha* teapot factories and potters who make daily-use *zisha* rather than collectibles mainly use this technique. The simplification of the process is most evident in the reduction of the number of steps required. The complete teapot is formed in a single step using a plaster mold, as opposed to being manually

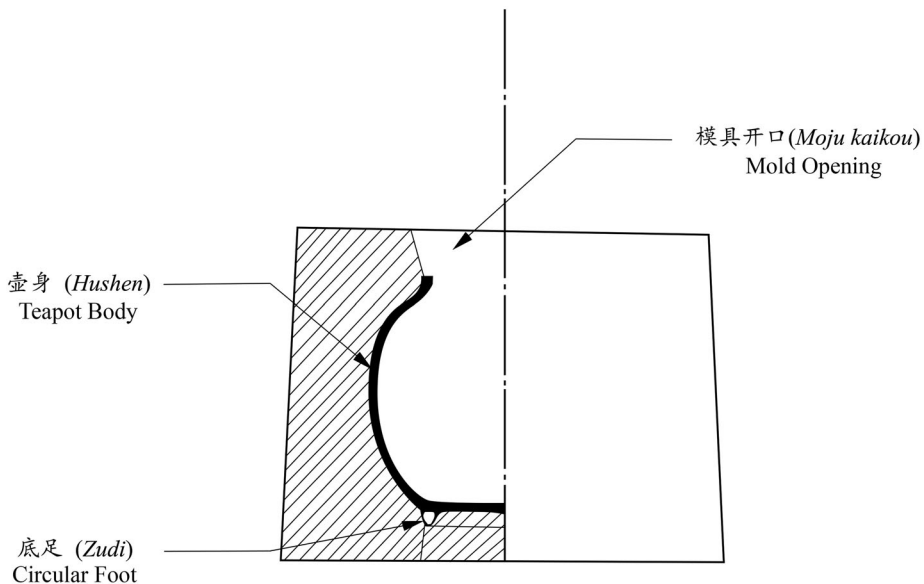


Figure 5. The structure of a *zisha* teapot made with molds, based on an interview with Craftsman 2.

constructed in several steps from multiple separate pieces. Thus, molds make largely identical teapots with less time and less skill on the part of the potter.

The drying process is similar to that of hand-built *zisha* ware and consists simply of placing the vessels on a wooden shelf or other non-stick surface indoors out of the sun and rain where they can dry slowly and safely. Drying time depends on temperature and humidity at the time. The interviewed potters then use electric or gas kilns, firing in larger kilns, which are needed due to the larger output, and the kiln space is furthermore shared between potters. Mold-built *zisha* teapots are sold by a different group of Yixing dealers than bespoke hand-made collectible teapots. Daily ware *zisha* dealers are not interested in maintaining relationships with individual potters but procure wares from a broad range of producers, depending on availability, the price of wares, and what they require at the time. The price of mold-made teapots is considerably lower than that of hand-built teapots; it ranges between 20 and 1,000 yuan per teapot (ca. \$2.76 –138.08 today), depending on size and surface decoration, according to Dealer 3.

Complexities of and Overlap between the Two Modes of *Zisha* Teapot Production

Contemporary *zisha* teapot manufacturing thus appears to fall into two main types in terms of raw material, forming techniques, output, distribution, and market: artisan *zisha* teapots produced in small numbers from a rare variety of local clay using a slab-building technique sold to collectors, and mass-produced *zisha* teapots made with plaster molds from more widely available raw material for daily use (Figure 6). There is a functional difference between hand-built and mold-built *zisha* teapots, the latter being meant for daily use while the former are collectible items acquired for artistic appreciation and investment purposes.

The slab-building technique is more demanding because it requires accessing “authentic” raw materials, which are expensive, and completing elaborate manual processes to prepare the clay and build the teapots, which are time-consuming and require a considerable level of skill and training. Potters making hand-built wares typically do so in household-level production of small numbers of individually designed and shaped pieces (Sinopoli 1988). The two observed potters working this

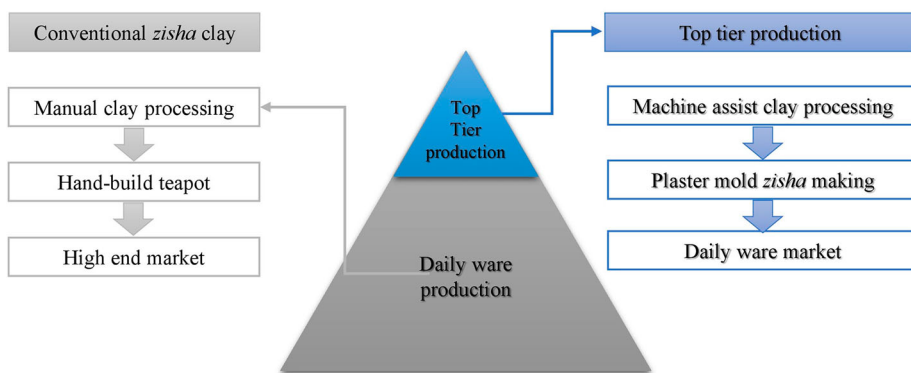


Figure 6. A triangle diagram of the two *zisha* manufacturing systems in Yixing.

way produced one batch of three teapots in three weeks, from prepared clay paste to ready-to-fire teapots, which are fired in small electric kilns. Due to the low output combined with the limited availability and high price of suitable raw material, hand-made *zisha* teapots are relatively rare on the market and expensive. As they look visually similar to mold-made pieces, the trade in high-priced hand-built pieces requires a certain level of trust among all parties involved, as well as expertise among dealers and customers. There is also some level of complexity within the world of hand-made teapots, wares fetching different prices depending on object-specific factors such as size or complexity of design, or external factors such as the fame of the potter or that of the master they trained with.

Mass-produced mold-assisted wares are usually not known by potters' names, but the products also differ slightly in price depending on size and design. Given the high price of clay from the Huanglongshan mine, it is not used for mass-produced teapots created with the plaster-mold technique. Potters engaged in the production of cheaper teapots from other kinds of clay usually do so within factories, using various types of machinery and tools to speed up the process, and having a high output of over 30 teapots a day which are then fired in larger kilns. Given that these potters can be less highly-skilled, their pay is often low, reducing the price of the pots further. The resulting wares are all uniform in shape which makes them desirable for large companies wanting to sell largely identical products across many stores and in some cases internationally.

It is worth noting that these two modes of production – in the sense of two different *chaînes opératoires* involving different producers, materials, and actions – can overlap. For instance, a potter known for making hand-built pots may use plaster molds or clay that has been processed using a machine. If the potter does not publicly acknowledge their use of plaster molds to assist their process, non-expert consumers can hardly tell the difference. Furthermore, hand-made teapots may also be used on a daily basis for tea brewing, either by the collectors themselves or by high-end tea stores who take care of teapots for the owners, using them with care to attain the desired high sheen which increases their value. Furthermore, a young practitioner who begins their career making teapots for daily use in a factory could hone their skills and eventually become an independent producer of high-end hand-built wares. Thus, there exists a degree of cross-over between hand-made and mold-built *zisha* teapots in terms of producers, users, and production and usage settings, and potentially even in raw materials used. Nevertheless, producers, sellers, and consumers all differentiate between these two main groups of products emerging from two different modes of production. This raises the question of how this situation came about and what it meant and what its socioeconomic implications are.

Social and Economic Context of *Zisha* Production in Two Modes

Zisha ceramic making has evolved substantially over time, especially during the major social, political, and economic changes of the twentieth century. Three main phases can be distinguished: individual household production before 1955, state-organized factories within a planned economy until the late 1970s, and then both individual household and factory production within a market economy.

From Household Production to Factory Making

In the nineteenth century, *zisha* teapots were produced in individual households in villages during the agricultural slack season (Yixing 1989, 292). Households that produced *zisha* teapots were in a ceramic making network with pitmen, paste-making households, kiln owners, and clay dealers formed a large social network around the manufacture of *zisha* ceramics (Bao 1985, 152–154; Dingshu 1992, 194). Pitmen sold clay rock to paste-making households, who provided processed clay to individual manufacturers. Potters paid kiln owners to fire their wares. Finished *zisha* teapots were mainly distributed by dealers, but some potters also ran retail businesses.

Under the influence of the Western Affairs Movement of 1861–1895, company business models were introduced, and craft factories were established in Yixing (Ge 1991, 112). Nevertheless, household-level production continued as well. By 1932, Yixing had 1,938 ceramic-making plants and over 2,400 workers (Wu 2007), however, little is known about the details of the production process or work organization. The situation from the late 1930s onwards the situation is much clearer.

The People's Republic of China's Socialist Transformation: Labor Unions, Pottery Associations, and the Yixing Zisha Factory

From 1937 to 1939, Yixing ceramic production was mostly halted, due to the Japanese invasion and the Second World War. By 1949, only approximately 20 potters remained (Dingshu 1992, 197).

The socialist transformation taking place from 1949 involved collectivization of craft workshops and the transition of factories into public – private partnerships. First, 53 crafting households combined to form the Tangdu Pottery Manufacture Cooperative (Wu 2016, 20). By December 1955, five cooperatives had been created, each specializing in a different type of ceramics (Dingshu 1992, 200–201). By 1956, the socialist transformation of individual craftsmen and small-scale households to centralized production was completed. In 1955, in Dingshu a wholesale pottery station was established to arrange ordering and sales for private producers, starting the public – private partnership reforms. A total of 175 privately owned companies were shifted into eight public – private cooperatives, among them the *Zisha* Craft Factory (Dingshu 1992).

In the late 1950s, the *Zisha* Craft Factory started using plaster molds to shape vessels (Xu and Shan 2009, 192). Wood and pottery molds had been used in *zisha* crafting before this time but only for shaping handles and spouts. In 1958, the “Great Leap Forward” movement called for an increase in production, which led to experiments with more time efficient methods. However, these experiments were soon halted due to defects in the finished wares (Xu and Shan 2009, 193–194). Only from the 1980s were casting molds used more widely to produce *zisha* clay cooking and dining wares to meet market demands and boost profits. At this point, potters had found an effective way to mold-shape some parts of the vessels and then join them and smooth out the joints by hand to avoid the defects that earlier entirely mold-made vessels had shown.

Economic Reforms and Modern Zisha Production

After the economic reforms and opening-up policy of the late 1970s, collector and businessman Lo Kwee-seong 羅桂祥 visited Yixing and ordered 565 *zisha* teapots from renowned potters in the Yixing Zisha Craft Factory. He exhibited them as representations of the best *zisha* teapot craftsmanship in Hong Kong. Mr. Lo also published monographs on *zisha* teapots aimed at a general audience (Hong Kong Urban 1989; Lo 1986). As a result of this publicity, four other commercial companies also ordered teapots from the Yixing Zisha Craft Factory (Zhao and Xu 2015, 96).

Between 1980 and 1990, dealers from Japan, Korea, Hong Kong, and Southeast Asia started purchasing *zisha* teapots from Yixing (Wu 2006). The booming domestic and international teaware market triggered an increase in factory production (Jiang 1989, 292). In 1981, Yixing Zisha Craft Factory No. 2 was built, soon followed by factories No. 3, No. 4, and No. 5 (Wu 2006). These factories were also state-owned, and their organization and production arrangements generally followed those of the first Yixing Zisha Craft Factory.

Renowned potters also established independent studios outside the Yixing Zisha Craft Factories. According to Craftsman 2, these potters learned that the commercial value of their teapots was much higher than their factory salaries. At the same time, following the reform and national opening-up policy of 1978, individuals were allowed to establish private enterprises. Several well-known potters formed a group in Yixing and sold hand-made teapots at higher prices than their peers who used mold-assisted techniques. They could therefore afford to use authentic *zisha* clay which allowed them to ask for higher prices.

Archaeological Implications and Discussion

Building on the examination of the historical and socioeconomic reasons behind the emergence of two modes of *zisha* production discussed above, this section delves into the archaeological implications of the resultant insights. This case study enriches ongoing discussions on the ways in which social and economic factors affect potters' choices, calling for a reevaluation of the complex relationship between social boundaries and ceramic-making technology. Moreover, it highlights the importance of being aware of the differences in raw materials, techniques, and markets used in the production of morphologically similar vessels that – if observed archaeologically – would be grouped into the same “type.”

For the case of Yixing, this study has identified the existence of two distinct ceramic-making systems that vary in clay sources, techniques, tools, and distribution markets. This is evident within a single ceramic-making region that produces ceramic products under one name: *zisha* teapots. This dual system is the result of dramatic social changes, including warfare, socialist transformation, and national economic policy, all of which led to major changes to ceramic-making institutions, pottery-production settings (e.g. household, factories), and the equipment used in pottery-making (e.g. milling machines, plaster molds).

The details observed regarding this phenomenon of the dual system highlight that changes to techniques employed by a ceramic-making community for a single type of

ceramic product do not necessarily mean a collective transition from one technique to another. One group of potters may accept new techniques and adopt new materials, while another group may preserve conventional techniques even in the face of dramatic social and/or economic change or even changes in raw material availability. The case of ceramic-making in Yixing thus illustrates the dynamic technological practices within pottery-making – even within the production of a single type of pottery among a single community of potters. As noted at the beginning of this article, previous ethnographic research has mainly focused on the spatial and temporal technological variation between ceramic-making communities or between types of ceramics. Seldom have researchers covered micro-level technological variation among a single group of potters working on a single type of ceramic (cf. Hosler 1996, among others).

Furthermore, this study contributes to the existing anthropological and archaeological literature on pottery production by addressing the dynamic ways in which social and economic factors can effect changes in the technological practices of pottery-making communities. Previous archaeological studies frequently have explored the impact of social and political changes on ceramic designs and production techniques (e.g. Bowser 2000; Jimenez 2004; Knappett 1999; Rautman 1998). For example, Knappett (1999) emphasized the significance of political manipulation by Minoan elites in the adoption of wheel-thrown pottery during the Middle Minoan 1B period. When it comes to *zisha* teaware, social and political issues are interwoven into its history, comprising a mixture of Western intellectual movements, warfare (World War I and World War II), socialist transformation, and national economic policies. Evidently, the social and political factors behind potters' technological choices can be complicated and linked to a long series of historical events.

Extensive archaeological research has centered on the link between technological choices and social boundaries (e.g. Dobres and Hoffman 1994; Hegmon 1998; Killick 2004), with social boundaries commonly recognized as the defining factor underlying pottery-making social units (Stark, Bishop, and Miksa 2000). Stark (1998, 1) explained that interest in technological choices and their parameters is driven by the central question among archaeologists: “How does material culture provide answers about the past.” For instance, Roux (2015) explored the transmission of pottery types across different pottery-making units. Stark, Bishop, and Miksa (2000) assessed how compositional variation in ceramics correspond to social boundaries in Kalinga. Lemonnier (1986) confirmed the presence of various technological differences among Anga groups in New Guinea, linking them to linguistic and ethnic differences. Livingstone Smith (2009) addressed the significance of technical boundaries in the South Katanga region in the “Crossing Borders Project” which investigated the relationship between linguistic groups and technological practices.

However, the case of contemporary *zisha* production serves as an effective reminder of the dynamic nature of technological practices – even among those within a single social unit producing a single ceramic type. While more research in other areas of the world and time periods is necessary, this case of the dual production system behind *zisha* ceramics demonstrates the possibility and importance of rethinking the boundaries of these communities and underscores the inherent complexity of technological choices among pottery-making groups.

Additionally, the results of the present ethnographic study suggest that considerable diversity can exist behind a single morphological ceramic type. A typology is a conceptual framework created by classifying a given set of items into a broad range of categories using a set of standard criteria determined by the typologist's goals (Adams and Adams 1991, 91; Marradi 1990). The classification of archaeological assemblages constitutes an attempt to group the internal coherence of assemblages into categories based on similarities and differences in artifact attributes (Hill and Evans 1972; Rice 2015, 262; Santacreu, Calvo Trias, and García Rosselló 2017, 184). As ceramics are seen as indicators for archaeological chronology and tend to appear in large numbers at many sites, they are commonly used to delineate and distinguish between different historical cultures and aid in the creation of chronological sequences (Binford and Sabloff 1982; Bortolini 2016; Duff 1996; Dunnell 1986; Joukowsky 1980, 332). Most pottery classifications are based on morphological features, such as handle style, rim style, decoration, form, and size (Hruby 2010; Joukowsky 1980, 332; Mateo Corredor and Molina Vidal 2016; Santacreu, Calvo Trias, and García Rosselló 2017, 186; Shepard 1971, 309). In pottery typology, these morphological attributes constitute traits with which to define pottery types (Maschner and Chippindale 2005, 676), which are in turn used to try to understand underlying human behaviors and various kinds of identity.

As this study demonstrates, however, the relationship between human behavior and ceramics is a complex one that cannot be reduced to external appearance. Subtle differences can be detected only by trained potters or connoisseurs for hand-made and mold-made teapots (Gowlland 2017, 52–53). As detailed above, pottery-making procedures can vary in clay sources, means of clay preparation, techniques, and level of skill involved. In the context of Chinese archaeology in particular, typology is based primarily on visual features and, thus, may overlook the hidden complexity of ceramic practices. Many archaeologists have examined ceramic pastes microscopically to establish technologically-defined types, but debates on style preferences, in particular when used to argue typo-chronology or expression of group identities, tend to be separate from research on technological choices and their connection with vessel shapes, which tends to focus more on function and potting communities rather than the identities of the vessel users. Moreover, potters who build their teapots by hand and potters who use plaster molds all live in Dingshu and its surrounding area (Zisha Village is in the Dingshu region), so the mode of production cannot be determined solely based on a potter's location. As mentioned above, in archaeological practice, ceramics dating back to the same time period found in the same region are commonly classified as the same ceramic type if they share visual attributes. As a result, modern-day Yixing *zisha* teaware made using the two production methods likely would be categorized under a single ceramic type if studied by future archaeologists.

A combination of scientific analysis, microscopic examination, morphological traits, and pottery-making impressions can provide a comprehensive understanding of ceramics, going beyond mere shape and decoration distinctions. For instance, neutron activation analysis (NAA) can detect differences between clay sources from Yixing and those from other provinces through the detection of trace elements (Zhu et al. 2019). This suggests that “authentic” *zisha* clay and the iron-rich clay sources from other provinces can be distinguished by their trace elements (which exist in very low abundance [$<0.1\%$]), Sb

and As. Petrographic analysis not only enables the identification of the mineralogical components of ceramic paste but can also help to reconstruct the methods used in the refinement, tempering, and clay-mixing stages (Quinn 2022, 212–237; Reedy 2008, 173–180). Pottery-making impressions and traces can be distinguished based on the orientation of the inclusions through radiographic imaging (Glanzman 1983; Rye 1977).

Conclusion

This study focused on *zisha* teaware in present-day Yixing, revealing two systems of production: hand-built and mold-made teapots. Hand-built teapots use “authentic” *zisha* clay and involve manual processing, slab-building, and paddle-shaping techniques. The process takes three weeks to produce three teapots and commands higher prices due to the clay’s cost, craftsmanship, and lower productivity. In contrast, mold-made teapots use plaster molds and iron-rich clay from other provinces and employ mechanized clay-processing and shaping techniques. This split was not the result of any single historical event; rather, it stemmed from the slow churn of dramatic social and economic changes that took place over decades in China.

This case study serves as a compelling reminder that the true complexity of ceramic production extends far beyond its outward appearance, bringing out the rich tapestry of potters’ technological choices. This study’s examination of the two modes of *zisha* ceramic production not only provided a representative case demonstrating the potential for technological diversity within a single group of potters producing the same morphological type of ceramic, but also shed light on the intricate relationship between ceramic-making technological choices and social boundaries. Overall, this study revealed the truly dynamic nature of the technological practices underlying pottery down to the small-scale level.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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References

- Adams, Y. William, and Ernest W. Adams. 1991. *Archaeological Typology and Practical Reality: A Dialectical Approach to Artifact Classification and Sorting*. Cambridge: Cambridge University Press.
- An, Bei 安蓓. 2016. “Lun Gujingzhou zisha de yishu tese 论顾景舟紫砂的艺术特色.” *Jiangsu taoci 江苏陶瓷* 8: 3–7.
- Arnold, Dean E. 1971. “Ethnominalogy of Ticul, Yucatan potters: Etics and Emics.” *American Antiquity* 36 (1): 20–40.
- Arnold, Dean E. 1985. *Ceramic Theory and Cultural Process*. Cambridge: Cambridge University Press.
- Bao, Dazhi 鲍达芝. 1985. “Yixing taoci gongren gongzi jiegou de bianhua 宜兴陶瓷工人工资结构的变化.” In *Yixing wenshi ziliao di8ji 宜兴文史资料第8辑*, edited by Yixingxian Wenshi Ziliao Yanjiu Weiyuanhui 宜兴县文史资料研究会会员, 156–159. Yixing: Yixingxian Wenshi Ziliao Yanjiu Weiyuanhui 宜兴县文史资料研究会会员.
- Bar-Yosef, Ofer, and Philip Van Peer. 2009. “The Chaîne Opératoire Approach in Middle Paleolithic Archaeology.” *Current Anthropology* 50 (1): 103–131.
- Berns, Marla C. 1993. “Art, History, and Gender: Women and Clay in West Africa.” *African Archaeological Review* 11 (1): 129–148.
- Binford, Lewis R., and Jeremy A. Sabloff. 1982. “Paradigms, Systematics, and Archaeology.” *Journal of Anthropological Research* 38 (2): 137–153.
- Bortolini, Eygenio. 2016. “Typology and Classification.” In *The Oxford Handbook of Archaeological Ceramic Analysis*, edited by Alice M. Hunt, 651–670. Oxford: Oxford University Press.
- Bourdieu, Pierre, and Richard Nice. 1992. *The Logic of Practice*. Redwood City: Stanford University Press.
- Bowser, Brenda J. 2000. “From Pottery to Politics: An Ethnoarchaeological Study of Political Factionalism, Ethnicity, and Domestic Pottery Style in the Ecuadorian Amazon.” *Journal of Archaeological Method and Theory* 7 (3): 219–248.
- Bronitsky, Gordon, and Robert Hamer. 1986. “Experiments in Ceramic Technology: The Effects of Various Tempering Materials on Impact and Thermal-Shock Resistance.” *American Antiquity* 51 (1): 89–101.
- Dingshu Zhenzhi Bianzuan Weiyuanhui 丁蜀鎮鎮志編纂委員會. 1992. *Dingshu Zhenzhi 丁蜀鎮志*. Beijing: Zhongguo Shuji Chubanshe 中國書籍出版社.
- Dobres, Marcia-Anne, and Christopher R Hoffman. 1994. “Social Agency and the Dynamics of Prehistoric Technology.” *Journal of Archaeological Method and Theory* 1: 211–258.
- Duff, Andrew I. 1996. “Ceramic Micro-Seriation: Types or Attributes?” *American Antiquity* 61 (1): 89–101.
- Duistermaat, Kim. 2016. “The Organization of Pottery Production.” In *The Oxford Handbook of Archaeological Ceramic Analysis*, edited by Alice M. Hunt, 114–147. Oxford: Oxford University Press.
- Dunnell, Robert C. 1986. “Methodological Issues in Americanist Artifact Classification.” *Advances in Archaeological Method and Theory* 9: 149–207.
- Favereau, Aude, and Bérénice Bellina. 2016. “Thai-Malay Peninsula and South China Sea Networks (500 BC–AD 200), Based on a Reappraisal of ‘Sa Huynh-Kalanay’-Related Ceramics.” *Quaternary International* 416: 219–227.
- Friedrich, Margaret Hardin. 1970. “Design Structure and Social Interaction: Archaeological Implications of an Ethnographic Analysis.” *American Antiquity* 35 (3): 332–343.
- Gaidzinski, Roberta, Jamil Duailibi Fh, and Luís Marcelo Tavares. 2011. “Influence of Aging on the Technological Properties of Clays in the Ceramic Industry.” *Applied Clay Science* 54 (1): 47–52.
- Gao, Xuyang. 2023. “Unravelling the Complex Meanings and Origins of Zisha Teapots in the Ming and Qing Dynasties.” DPhil Thesis, School of Archaeology, University of Oxford, Oxford.
- Gao, Xuyang, and Anke Hein. 2023. “The Authenticity Problem in Contemporary Techniques of Zisha Teapot-Making.” In *Understanding Authenticity in Chinese Cultural Heritage*, edited by Anke Hein, and Christopher J. Foster, 171–185. London: Routledge.

- Ge, Weiyan 葛維彥. 1991. “Jiushi yixing taoye de jingxiao 旧时宜兴陶业的经销.” In *Yixing wenshi ziliao di19ji* 宜兴文史资料第19辑, edited by Yixingxian Wenshi Ziliao Yanjiu Weiyuanhui 宜兴县委员会文史资料研究委员会, 109–111. Yixing: Yixingxian weiyuanhui wenshi ziliao yanjiu weiyuanhui 宜兴县委员会文史资料研究委员会.
- Glanzman, William. 1983. “Xeroradiographic Examination of Pottery Manufacturing Techniques: A Test Case from the Baqah Valley, Jordan.” *MASCA Journal* 2 (6): 163–169.
- Gosselain, Olivier P. 1992. “Technology and Style: Potters and Pottery among Bafia of Cameroon.” *Man* 27 (3): 559–586.
- Gosselain, Olivier P. 1994. “Skimming through Potters’ Agendas: An Ethnoarchaeological Study of Clay Selection Strategies in Cameroon.” In *Society, Culture, and Technology in Africa*, edited by S. Terry Childs, 99–107. MASCA Research Papers in Science and Technology, Supplement to Vol. 11. Philadelphia: MASCA, University of Pennsylvania Museum of Archaeology and Anthropology.
- Gosselain, Olivier P. 2018. “Pottery Chaines Operatoires as Historical Documents.” In *The Oxford Encyclopedia of African Historiography: Methods and Sources*. Oxford University Press. Retrieved 2 Oct. 2023, from <https://www-oxfordreference-com.ezproxy-prd.bodleian.ox.ac.uk/view/10.1093/acref/9780190698706.001.0001/acref-9780190698706-e-208>.
- Gosselain, Olivier P., and Alexandre Livingstone Smith. 1995. “The Ceramics and Society Project: An Ethnographic and Experimental Approach to Technological Choices.” In *The Aim of Laboratory Analyses of Ceramics in Archaeology*, edited by Anders Lindahl, and Ole Stilborg, 147–160. Stockholm: Kungliga Vitterhets Historie och Antikvitets Akademien.
- Gowlland, Geoffrey. 2009a. “Learning to see Value: Exchange and the Politics of Vision in a Chinese Craft, Ethnos.” *Ethnos* 74 (2): 229–250.
- Gowlland, Geoffrey. 2009b. “Style, Skill and Modernity in the Zisha Pottery of China.” *The Journal of Modern Craft* 2 (2): 129–142.
- Gowlland, Geoffrey. 2017. *Reinventing Craft in China—The Contemporary Politics of Yixing Zisha Ceramics*. Herefordshire: Sean Kingston.
- Gu, Jingzhou 顧景舟, Xu Xiutang 徐秀棠, and Li Changhong 李昌鴻. 1992. *Yixing Zisha Zhenshang* 宜興紫砂珍賞. Hongkong: Xianggang Sanlian Shudian 香港三聯書店.
- Guojiaji Feiwuzhi Wenhua Yichan Daibiaoxing Xingmu Minglu 國家級非物質文化遺產代表性項目名錄. 2006. “Yixing zishatao zhizuo jiyi” 宜興紫砂陶製作技藝. Zhongguo Feiwuzhi Wenhua Yichanwang 中國非物質文化遺產網. <http://www.ihchina.cn/Article/Index/detail?id=14261>. Created 5 February 2006. Accessed 9 March 2021.
- Han, Qilou 韓其樓, and Xia Junwei 夏俊偉. 2001. *Zhongguo Zisha Minghu Xinshang* 中國紫砂茗壺珍賞. Shanghai: Shanghai Kexue Jishu Chubanshe 上海科學技術出版社.
- Hang, Tao 杭濤, and Ma Yongqiang 馬永強. 2008. “Yixing shushan yaozhi de fajue 宜興蜀山窯址的發掘.” *Gugong Wenwu Yuekan* 故宮文物月刊 302: 44–51.
- Hegmon, Michelle. 1998. “Technology, Style, and Social Practices: Archaeological Approaches.” In *The Archaeology of Social Boundaries*, edited by Miriam T. Stark, 264–279. Washington, D.C.: Smithsonian Institute Press.
- Hill, James N., and Robert K. Evans. 1972. “A Model for Classification and Typology.” *Models in Archaeology* 351: 73.
- Hirshman, Amy J. 2020. “‘They Too Can Help’: Hidden Producers and Flexibility in the Organization of Collaborative Labor in Pottery-Making Households in Michoacán, México from the 1940s to 2020.” *Ethnoarchaeology* 12 (1): 1–20.
- Hongkong Urban Council. 1989. *Innovations in Contemporary Yixing Pottery*. Hongkong: Urban Council.
- Hosler, Dorothy. 1996. “Technical Choices, Social Categories and Meaning among the Andean Potters of Las Animas.” *Journal of Material Culture* 1 (1): 63–92.
- Hruby, Julie. 2010. “Mycenaean Pottery from Pylos: An Indigenous Typology.” *American Journal of Archaeology* 114 (2): 195–216.
- Ingold, Tim. 1990. “Society, Nature and the Concept of Technology.” *Archaeological Review from Cambridge* 9 (1): 5–17.

- Ingold, Tim. 2013. *Making: Anthropology, Archaeology, Art and Architecture*. London and New York: Routledge.
- Jiang, Xingzhi 蒋行知. 1989. "Yixing taoci 宜兴陶瓷." In *Jiangsu wenshi ziliao di31ji Jiangsu gongshang jingji shiliao* 江苏文史资料 第31辑 江苏工商经济史料, edited by Jiangsu wenshi ziliao bianjibu 江苏文史资料编辑部, 292–300. Nanjing: Jiangsu Renmin Chubanshe 南京人民出版社.
- Jiangsusheng Yixing Taoci Yanjiusuo 江苏省宜兴陶瓷研究所. 1977. "Jiangsusheng zhuyao taociyuanliao de dizhitezheng yu xingneng jiangding 江苏省主要陶瓷原料的地質特徵與性能鑒定." *Jiangsu taoci* 江蘇陶瓷 7: 17–92.
- Jimenez, Gonzalo Aranda. 2004. "Craft Specialization in Pottery Production during the Bronze Age in South-Eastern Iberia." *Journal of Iberian Archaeology* 6: 157–179.
- Joukowski, Martha. 1980. *A Complete Manual of Field Archaeology: Tools and Techniques of Field Work for Archaeologists*. Englewood Cliffs: Prentice-Hall.
- Killick, David. 2004. "Social Constructionist Approaches to the Study of Technology." *World Archaeology* 36 (4): 571–578.
- Knappett, Carl. 1999. "Assessing a Polity in Protopalatial Crete: The Malia-Lasithi State." *American Journal of Archaeology* 103 (4): 615–639.
- Kramer, Carol. 1985. "Ceramic Ethnoarchaeology." *Annual Review of Anthropology* 14: 77–102.
- Lechtman, Heather, and Robert S. Merrill. 1977. *Material Culture: Styles, Organization, and Dynamics of Technology*. St. Paul: West Publishing Co.
- Lemonnier, Pierre. 1986. "The Study of Material Culture Today: Toward an Anthropology of Technical Systems." *Journal of Anthropological Archaeology* 5 (2): 147–186.
- Lemonnier, Pierre. 1993. *Technological Choices: Transformation in Material Cultures since the Neolithic*. London and New York: Routledge.
- Leroi-Gourhan, André. 1993. *Gesture and Speech*. London: MIT Press.
- Lin, Changhua 林长华. 1992. "Gongfu chaju sijianbao 功夫茶具四件宝." *Nongye kaogu* 农业考古 2: 105–106.
- Livingstone Smith, Alexandre. 2000. "Processing Clay for Pottery in Northern Cameroon: Social and Technical Requirements." *Archaeometry* 42 (1): 21–42.
- Livingstone Smith, Alexandre. 2016. "Pottery and Politics: Making Sense of Pottery Traditions in Central Africa." *Cambridge Archaeological Journal* 26 (3): 471–491.
- Livingstone Smith, Alexandre, Dominique Bosquet, and Rémi Martineau. 2005. *Pottery Manufacturing Processes: Reconstitution and Interpretation*. Oxford: Archaeopress.
- Livingstone Smith, Alexandre, and Anneleen Van der Veken. 2009. "The 'Crossing Borders Project'. Pottery Traditions in Katanga (DRC)." *Afrique: Archéologie & Arts* 5: 141–148.
- Lo, Kwee-seong. 1986. *The Stoneware of Yixing, from the Ming Period to the Present day*. Hongkong: Hong Kong University Press.
- Longacre, William A. 1991. "Ceramic Ethnoarchaeology: An Introduction." In *Ceramic Ethnoarchaeology*, edited by William A Longacre, 1–10. Tucson: University of Arizona press.
- Marradi, Alberto. 1990. "Classification, Typology, Taxonomy." *Quality and Quantity* 24 (2): 129–157.
- Maschner, Herbert D.G., and Christopher Chippindale. 2005. *Handbook of Archaeological Methods*. Oxford: AltaMira Press.
- Mateo Corredor, Daniel, and Jaime Molina Vidal. 2016. "Archaeological Quantification of Pottery: The Rims Count Adjusted Using the Modulus of Rupture (MR)." *Archaeometry* 58 (2): 333–346.
- M'Mbogori, Freda Nkirote. 2018. "Ethnographic Clay Sourcing Practices: Insights for Archaeological Assemblage Interpretations." *African Archaeological Review* 35 (4): 597–608.
- Quinn, Patrick Sean. 2022. *Thin Section Petrography, Geochemistry and Scanning Electron Microscopy of Archaeological Ceramics*. Oxford: Archaeopress.
- Rautman, Marcus. 1998. "Handmade Pottery and Social Change: The Wiew from Late Roman Cyprus." *Journal of Mediterranean Archaeology* 11: 81–104.
- Reedy, Chandra L. 2008. *Thin-Section Petrography of Stone and Ceramic Cultural Materials*. London: Archetype.

- Rice, Prudence M. 2015. *Pottery Analysis: A Source Book*. 2nd ed. London: The University of Chicago Press.
- Roux, Valentine. 2015. "Standardization of Ceramic Assemblages: Transmission Mechanisms and Diffusion of Morpho-Functional Traits across Social Boundaries." *Journal of Anthropological Archaeology* 40: 1–9.
- Rye, Owen S. 1977. "Pottery Manufacturing Techniques: X-ray Studies." *Archaeometry* 19 (2): 205–211.
- Salanova, Laure. 2019. "Pottery Technology and Identity: Some Thoughts from the Balkans." In *Tracing Pottery-Making Recipes in the Prehistoric Balkans Sixth–Fourth Millennia BC*, edited by Silvia Amicone, Patrick Sean Quinn, Miroslav Marić, Neda Mirković-Marić, and Miljana Radivojević, 113–128. Oxford: Archaeopress.
- Santacreu, Daniel Albero, Manuel Calvo Trias, and Jaime García Rosselló. 2017. "Formal Analysis and Typological Classification in the Study of Ancient Pottery." In *The Oxford Handbook of Archaeological Ceramic Analysis*, edited by Alice M. W. Hunt, 181–205. Oxford: Oxford University Press.
- Sarmah, Shreya, and Manjil Hazarika. 2018. "Pottery Making Tradition among the Hira Potters of Morno, Goalpara in Assam." *Heritage* 6: 96–990.
- Schiffer, Michael Brian, and James M. Skibo. 1987. "Theory and Experiment in the Study of Technological Change." *Current Anthropology* 28 (5): 595–622.
- Schiffer, Michael Brian, and James M Skibo. 1997. "The Explanation of Artifact Variability." *American Antiquity* 62 (1): 27–50.
- Sellet, Frederic. 1993. "Chaîne Opératoire; the Concept and its Applications." *Lithic Technology* 18 (1–2): 106–112.
- Shepard, Anna O. 1971. *Ceramics for the Archaeologist*. Washington, D.C.: Carnegie Institution of Washington.
- Sillar, Bill. 2000. *Shaping Culture: Making Pots and Constructing Households. An Ethnoarchaeological Study of Pottery Production, Trade and Use in the Andes*. Oxford: British Archaeological Reports.
- Sillar, Bill, and Michael S. Tite. 2000. "The Challenge of 'Technological Choices' for Materials Science Approaches in Archaeology." *Archaeometry* 42 (1): 2–20.
- Sinopoli, Carla M. 1988. "The Organization of Craft Production at Vijayanagara, South India." *American Anthropologist* 90 (3): 580–597.
- Song, Boyin 宋伯胤, Wu Guangrong 吳光榮, Huang Jianliang 黃健亮. 2011. *Zisha minghu zhenshang 紫砂茗壺珍賞*. Beijing: Yinshua Gongye Chubanshe 印刷工業出版社.
- Stark, Miriam T. 1995. "Economic Intensification and Ceramic Specialization in the Philippines: A View from Kalinga." *Research in Economic Anthropology* 16: 179–226.
- Stark, Miriam T. 1998. "Technical Choices and Social Boundaries in Material Culture Patterning: An Introduction." In *The Archaeology of Social Boundaries*, edited by Maria T. Stark, 1–12. Washington, D.C.: Smithsonian Institution Press.
- Stark, Miriam T, Ronald L. Bishop, and Elizabeth Miksa. 2000. "Ceramic Technology and Social Boundaries: Cultural Practices in Kalinga Clay Selection and Use." *Journal of Archaeological Method and Theory* 7: 295–331.
- Stark, Miriam T., and William A. Longacre. 1993. "Kalinga Ceramics and New Technologies: Social and Cultural Contexts of Ceramic Change." In *The Social and Cultural Contexts of New Ceramic Technologies*, edited by William David Kingery, 1–32. Westerville, OH: American Ceramic Society.
- Tite, Michael S., Vassilis Kilikoglou, and George Vekinis. 2001. "Strength, Toughness and Thermal Shock Resistance of Ancient Ceramics, and their Influence on Technological Choice." *Archaeometry* 43 (3): 301–324.
- Torres, Marcos Martínón. 2002. "Chaîne Opératoire: The Concept and its Applications within the Study of Technology." *Gallaecia: Revista De Arqueología E Antigüidade* 21: 29–44.
- Valfry, Patrice. 2000. *Yixing Teapots for Europe*. Poligny, France: Exotic Line.
- Wayessa, Bula Sirika. 2011. "The Technical Style of Wallaga Pottery Making: An Ethnoarchaeological Study of Oromo Potters in Southwest Highland Ethiopia." *African Archaeological Review* 28: 301–326.

- Wu, Shuying 吴淑英. 2006. "Gaige kaifang yilai yixing zishaye de fazhan jiqi tedian 改革开放以来宜兴紫砂业的发展及其特点." *Jiangsu taoci* 江苏陶瓷 39 (8): 44–46.
- Wu, Shan 吴山. 2007. *Zhongguo zisha cidian* 中国紫砂辞典. Nanjing: Jiangsu Meishu Chubanshe 江苏美术出版社.
- Wu, Junqin 吴俊卿. 2016. "Yixing zisha gongyichang de lishi bianqian diaocha baogao 宜兴紫砂工艺厂的历史变迁调查报告", Master thesis, Nanjing University of the Arts 南京艺术学院, Nanjing.
- Xu, Xiutang 徐秀棠. 2000. *Zhongguo zisha* 中国紫砂. Shanghai: Shanghai Guji Chubanshe 上海古籍出版社.
- Xu, Xiutang 徐秀棠. 2017. *Yixing zisha chuantong gongyi* 宜兴紫砂传统工艺. Shanghai: Shanghai Shuhua Chubanshe 上海书画出版社.
- Xu, Xiutang 徐秀棠, and Shan Gu 山谷. 2009. *Yixing zisha wubainian* 宜兴紫砂五百年. Shanghai: Shanghai Cishu Chubanshe 上海辞书出版社.
- Yixingshi Wenwu Guanli Weiyuanhui 宜兴市文物管理委员会. 2010. *Yixing Wenwu* 宜兴文物. Beijing: Wenwu Chubanshe 文物出版社.
- Yixingxian Weiyuanhui Wenshi Ziliao Yanjiu Weiyuanhui 宜兴县委员会文史资料研究委员会. 1989. "Taoci jingji 陶瓷经济." In *Yixing wenshi ziliao di17ji* 宜兴文史资料第17辑, edited by Yixing Weiyuanhui Wenshi Ziliao Yanjiu Weiyuanhui 宜兴县委员会文史资料研究委员会, 25–29. Yixing: Yixingxian Weiyuanhui Wenshi Ziliao Yanjiu Weiyuanhui 宜兴县委员会文史资料研究委员会.
- Zhao, Hui 赵辉. 2010. "Woshi jiang huifu zishakuang kaocai 我市将恢复紫砂矿开采." *Yixing ribao* 宜兴日报, published 3 June 2010. Accessed 2 October 2023. https://blog.sina.com.cn/s/blog_4d0409970100ke7e.html.
- Zhao, Yue 赵岳, and Xu Zhen 徐贞. 2015. *Ziyin xisheng: Gujingzhou zisha yishu yanjiu* 紫音希声: 顾景舟紫砂艺术研究. Beijing: Shenghuo-Dushu·Xinzhishi Sanlian Shudian 生活读书新知三联书店.
- Zhu, Jian, Brandi L. MacDonald, Tao Hang, Zewei Zhu, and Michael D. Glascock. 2019. "Composition Characterization of Zisha Clay from the Yixing Area (Jiangsu, China) by Neutron Activation Analysis." *Microchemical Journal* 147: 1117–1122.