From standard pots to potters' standards

An integrated approach to ceramic standardization and change in Archaic Satricum (6th–4th century BC)

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Chapter 1
Theoretical Approaches to Ceramic Standardization and Change

This chapter primarily defines the key concepts lying at the core of the research, such as innovation and tradition in technological knowledge systems, ceramic standardization and variability and their complex relationship with the process of tracing production systems and distribution and consumption patterns. Second, it presents the current development of the debate on ceramic variability, especially related to craft specialization, in Latial archaeology.[6]

1.1 Ceramic change and pottery-making systems: Early approaches

Documenting ceramic change among pottery-making communities is one of the staples of archaeological research, the basis of myriad chronologies as well as studies of interaction and social change. Drawing on neighboring disciplines such as ethnography, anthropology, experimental archaeology and social science, archaeologists have begun—theoretically and empirically—to make sense of artifacts' variability and elucidate valuable modal patterns. Yet in 1985, C. Kramer concluded that ceramic ethnoarchaeology had contributed relatively little to an understanding of ceramic change, beyond the insight that potters are often fairly conservative.[7] Fortunately, archaeologists' understanding of ceramic change has advanced significantly since then, thanks to the contribution of several new research directions developed over time and across disciplines.

In 1988, R. Adams explicitly stated that "we can consider ceramic change as a process embedded within the context of a culture's social and cognitive system."[8] Adams's formulation owes much to processual archaeology, which has cultural evolutionism at the heart of its theoretical frame.[9] Processual archaeologists propose that cultural change happens within a predictable framework and seek to understand it through the analysis of its components. Moreover, since the framework is predictable, science is the key to unlocking how these components interact with the cultural whole.[10] Already in

6 In this chapter, part of the discussion concerning tradition and innovation in technological craft systems (section 1.2) has been previously published in Revello Lami, M. 2021, Fluctuation and Stability: Materialising Technological Knowledge among Satricum Potters, in M. Gnade & M. Revello Lami (eds.), *Tracing Technology: Forty Years of Archaeological Research at Satricum*, Louvain, 129–144.

7 Kramer 1985, 97.

8 Adams 1988, 62. The most comprehensive discussion available of ceramic change is still Carol Kramer's work (Kramer 1985) as mentioned above. For an update of Rice's source guides on technological change (Rice 1984, 1987, 449-459), see Loney 2000.

9 A fundamental work is Willey and Phillips's *Method and Theory in American Archeology* (Willey & Phillips 1958). For the further theoretical developments, see Clarke 1968 and Binford & Binford 1968.

10 Trigger 2006, 289.

1972, C. Renfrew elaborated on this theoretical structure, describing the process of cultural change as changes in subsystems. The precise characterization of these subsystems can vary according to the analyst: in his consideration of the emergence of civilization in the Aegean, for example, Renfrew chooses subsistence, metallurgy, craft specialization, social, projective and trade communication as the basic components of society. His model recognizes technology as one of the main aspects in reproducing the whole process of cultural change.[11]

The technological subsystem has been described in general terms as the whole package of knowledge, methods and means with which humankind manipulates its natural environment in order to provide its material needs.[12] A specific technology consists of a collection of artifacts, behaviors and knowledge that is transmitted from generation to generation. A transformation of the technological knowledge of artisans may be caused by:

- A change in demand concerning the function of the artifacts. This change can involve mechanical, social or ideological function.
- Trial and experiments.
- Economic processes such as competition, which stimulate the development of techniques and experiments, the manufacture of artifacts for specific functions and the development of more effective production techniques and standardization of style.[13]

In this respect, the changes recorded within the technological subsystem in Central Tyrrhenian Italy here under study during the transition from the Iron Age to the so-called Orientalizing period[14] and then to the Archaic period can both be connected to the three aspects mentioned above. Major sources of information in both cases are funerary contexts, where it has been suggested that the elaborate furnishing and rich funerary goods recovered from the tombs of Etruria and *Latium Vetus* mirror the rise of competition between individuals and social groups, as well as a change in demand concerning the function of artifacts.[15]

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11 Renfrew 1972, 19-28, 486-504. In this work, Renfrew gave a detailed explanation of how to apply so-called "systems theory" (Clarke 1968) to archeological research. It may be appropriate to recall that this theoretical frame has not been immune to critique: for some scientists, the systems approach is associated with generalization, because it explains patterns of events. Hodder for example argued in favor of a greater emphasis on the specific archaeological context and sought to know more about the surrounding particular information (Hodder 1986, 146). Nevertheless, it seems difficult to conceive any explanation of cultural transition that does not incorporate specific information as well as a general outline.

12 Hughes 1987, 51-82.

13 Schiffer & Skibo 1987, 302.

14 Traditionally dated between 780 and 510 BC. About absolute and relative chronology in Central Italian sites, see infra chapter 2, section 2.1.1.

15 Representative examples for Etruria are the sites of Veii (see mainly Bartoloni 1997; Bartoloni et al. 1994, 1-46), Tarquinia (see mainly Bonghi Jovino 2001) and Caere (see especially "Caere. Necropoli dell Banditaccia" 1956 and more recently Bagnasco Gianni 2002). As for Latium Vetus, see the overviews in Fulminante 2003, Fulminante & Stoddart 2013 and Guidi 2008. At Satricum, fundamental burial evidence for the period spanning from the 9th to the late 7th BC comes from the so-called Northwest Necropolis recovered in 1896-1898, later on reconstructed by Waarsenburg (1995). Additionally, two different necropoleis both dated to the 5th–early 4th BC have been identified: the Southwest Necropolis (Gnade 1992) and the smaller one on the temple hill (Maaskant-Kleibrink 1992, 101-105). A fourth, later necropolis (end 5th–4th BC) is still under investigation in the lower settlement of ancient Satricum (Poggio dei Cavallari): see Gnade 2002, 2006a, 2009, 2010, 2011, 2012, 2014.

Returning to the study of change and its possible application to the archaeological record, we shall now focus on a particular type of technological subsystem: pottery manufacture. A pottery-making system consists of a product and the people who produce and use that product: to quote P. Rice, "a pottery-producing system is itself a subsystem of a larger cultural system, with which it interacts."[16] According to her view, understanding change in pottery production subsystems can help to reconstruct the social world involved in that change. And culture indeed plays a central role in shaping pottery's technical subsystems; however, "its governing principles may not appear to generate that much internal coherence and homogeneity. In real life, potting traditions, including finished products, manufacturing techniques, and beliefs and attitudes toward actors and materials, incorporate elements of different origins, mostly depending on the respective histories of social groups," as O. Gosselain rightly argued.[17] Due to this inherent lack of cohesion, change affects the different components of pottery subsystems unequally: depending on the component observed, the same potting tradition may in fact show aspects of both remarkable stability and high variability.[18]

From an archaeological perspective, we can assess transformations in pottery manufacture by simply observing the clay artifacts commonly recovered in the field. Drawing from M.T. Stark, changes in ceramics are identifiable when looking at either specific vessels' attributes or the entire assemblage. In case of vessels' attributes, change can be detected in the variation of morphological and stylistic components, whereas at the assemblage level it can be observed when new decorative patterns or vessel shapes gradually start to emerge. As Stark further emphasizes "ceramic change occurs in the techno-functional and stylistic domains, as well as in the organization of ceramic production":[19] the introduction of new technologies, increased demand for products and competitive emulation can in fact result in higher production volumes and more intense trade exchange.[20] However, reconstructing these processes through the fragmentary evidence of the archaeological record is a more complicated issue. Archaeologists have bridged this gap using the analytical tools provided by ethnographers (the ethnoarchaeological approach). At the core of ethnoarchaeology lies the hypothesis that the transformations detected in modern material culture systems respond to the same factors triggering change observed in the archaeological record.[21] Indeed, ethnographic and archaeological records are complementary: in fact, quoting Stark, "the nature of the ethnographic record provides detail on the cultural contexts in which ceramic change occurs [while] the archaeological record provides evidence for the long-term results of such changes".[22]

The fusion of these two major lines of inquiry (archaeology and ethnography) has not been completely painless: the main problem arises from studies that show that these changes do not seem to coincide (at least in the archaeological record) with other major social or political changes that are known through

16 Rice 1984, 230.
17 Gosselain 2000, 190.
18 See infra section 1.2.2.
19 Stark 1991, 195.
20 On competitive emulation, see Miller 1985, and for the importance of external influences, see Papousek 1984, Stark 1991 and M.T. Stark 1995.
21 Ceramic ethnoarchaeological studies have now become traditional in archaeological research: for a review of the key trends in this line of inquiry, see Stark 2003 and more recently Williams 2018.
22 Stark 1991, 195.

historical records to have taken place.[23] On the one hand, many scholars have concluded that from an ethnographic point of view, change in pottery does not consistently and predictably accompany other kinds of cultural change.[24] On the other hand, archaeological records keep showing us that pottery does change and that change indeed occurs in all aspects—forms, decoration and technology—of pottery. The problem to solve is, therefore, the relationship between behavioral and material changes, the way pottery does respond to cultural changes and what kinds of change the nature of archaeological data may permit us to robustly investigate.[25]

Because of the compressed and often partial nature of the archaeological record and the diachronic emphasis of much archaeological work, archaeologists' perceptions and descriptions of ceramic change are often comparatively simplistic. To understand pottery change from an archaeological perspective, it is necessary to first determine what constitutes change and the kinds of pottery that change—more specifically, which functional categories of artifacts are more resistant or more sensitive to change[26]—and in which ways, more specifically which attributes of a pot, such as shape, surface treatment, decoration, more patently show alterations. With this in mind, it becomes difficult to expect a one-to-one correlation between ceramic changes and cultural transformations, because not all aspects of pottery-producing systems are equally responsive to social systems, and thus to change.

Ceramic change does not affect only design elements, but it can also include variation in vessel frequencies as vessels of other materials become available, alterations in quantities as the availability of raw materials changes and adjustments in productive and distribution strategies because of altered demographic patterns. Drawing most heavily on Rice's work, it is possible to summarize the major categories of nontechnical factors that induce change in pottery as follows:[27]

- *Environmental change*: drastic environmental alterations can affect the accessibility of resources (clays, tempers, fuels) and it can also, indirectly, impact agricultural productivity, resulting in population increases or decreases, which would influence market demand.
- *Hydraulic agriculture*: this method of agricultural intensification may bring about changes in population density and market demand because of increased productivity.
- *Trade* can promote pottery change by making available new techniques and tools, new vessel forms and designs, new eating habits and new ideas, values, status symbols or rituals necessitating a different repertoire of ceramic vessels. Trade in pottery itself may create competitive emulation between different workshops and escalation in the scale of production.

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23 Ethnoarchaeologists use direct historical analogy to identify focal points of both continuity and discontinuity through time. Seminal works especially focused on "continuities" are Kaplan 1994; Stahl 1999; Walde et al. 2000 and Underhill 2003 (for a detailed list, see Stark 2003, 206).

24 Hodder extended the noncorrelation of social and ceramic traits to the noncorrelation of spatial and behavioral traits with material culture in general (Hodder 1978); for the lack of covariation of ceramic and cultural change throughout a long period, see Adams 1979.

25 About technological tradition and individual creativity, see Silva 2008, 236-241.

26 Functional categories of ceramic artifacts were first introduced by Binford (1962, 219) and then rectified by Rice (1984, 252).

27 Rice 1984, 252-253.

- *Diffusion and migration*: as with trade, these two factors can introduce new ideas, styles, techniques and resources into the social system. At the same time they could considerably modify the population size, altering market demand and potters' statuses.
- *War, invasion and/or conquest*: such dramatic events could result in restricted access to resources, elimination or introduction of rituals or cultural habits, relocation of manufacturing centers away from traditionally used resources and markets, and changes in food supply and population size.
- *Population growth*: one of the major causes of transformation in any production system but is also inherent in the mechanisms listed above being related, for example, to agricultural production, migration and warfare.

Within this list, which makes of course no claim to completeness, the latter factor (*population growth*) needs to be more systematically dealt with, because of its impact on pottery-making systems. In general, any population change (in absolute size, in density, in age and in sex structure) plays a crucial role in the development or innovation of technology: demographic changes bring about significant changes in relations between a population and its environment in terms of the resources used to provide goods necessary for the survival of that population.[28] Under conditions of stress, a system will be forced to adapt to its physical and social environment: these internal adjustments may involve changes in technology, such as the level or intensity of production to meet increased demand, the material mode of production and the products themselves. Given these assumptions, *specialized production* has often been interpreted as the natural response to any demographic increase within the system.[29]

The possible effects on pottery and potters are directly related to the type and intensity of this growth: an absolute population increase will result in an increased number of consumers (or producers) and in more vessels being needed. An increase in population density can reduce distances between markets and consumers, facilitating transportation and distribution procedures. Any change in age and structure within a group of people will amplify both the demand for artifacts and the need for a greater income: consumers will buy more, and artisans will produce more or in a more efficient way. A higher demographic rate, increased market demand, reduced distances and an overall stronger interaction between different social groups are usually indicated as decisive factors in innovation in technological systems, as we will see in the next section.

The large number of possible effects outlined above helps us understand how population growth and increased density have traditionally been linked to the emergence and establishment of specialist production over the long term, leading to socially more complex structures. Yet demographic increase is a very gradual process in most instances and, as already said, it is not a direct cause of pottery change: rather, it changes the relationship between people and their productive environment, creating stresses within the system. These alterations are hard to recognize and document in the archaeological record, partly because they are slow to occur, but also because they may have a considerable time lag.

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28 Agricultural products as well as any raw material: wood for cooking and firing, stones for tools or construction, water, clay sources etc.

29 For the relationship between population, technology and growth, see Boserup 1981 and Galor & Weil 2000. On the debated link between changes in production and the emergence of specialized artisans, see infra section 1.4.

Considering the overall lag in response time of pottery to cultural changes, one might thus ask how to identify and characterize the products of more or less specialized production archaeologically? In order to answer this question, we should take a step back and investigate in more detail the mechanisms triggering change, innovation and eventually standardization within any technological system.

1.2 Current approaches to innovation and tradition in technological knowledge systems

The knowledge that a maker translates into production events materializes a whole suite of social as well as technical sets of information that depend on the different roles, statuses and genders experienced by the individual. Though embodied individually, knowledge systems occur in social contexts so are also shared, modified, restricted and replicated within a community. Bodily and conceptual knowledge are inseparable, as both are made meaningful within a specific social environment. In other words, we perceive and understand the world through our body, not only through the way we materially engage with things but mostly through the complex of customs and practices we learn from and share with our community. The groups in which we live or that we align with set the path and boundaries of our knowledge experience by structuring the learning process of specific techniques and their meanings. Through repetition and interaction within the community, such techniques become established ways of doing, and along the process they contribute to establishing a communal understanding of the world. Socially established practices, however flexible, dynamic and susceptible to change, construct around us a safe space made of collectively learned and shared beliefs as well as a shared way of making and doing things.

Knowledge systems—social as well as technological—are structured by and within communities and, depending on the group we decide to assimilate into, these conceptual frameworks will vary. Technological knowledge and practice are contextually and socially situated, and by extension also our physical engagement with them, i.e., any technical action carried out to produce material culture largely also depends on people and context. The dynamic interaction between people and artifacts is mediated through the technological process, therefore any variation in such a process reflects the agency of both people (individuals and communities) and objects.[30]

1.2.1 The adoption of innovation and its social context

Technological innovations—as aptly described by Fogarty, Creanza and Feldman—can occur via multiple interacting processes and at multiple scales.[31] In many models of social learning, new information penetrates a population via trial and error or individual interaction with the natural

30 Whether objects do possess innate agency remains a matter of debate. Among the advocates of things as agents, see Hoskins 2006 and Tilley 2001, contra Knappett 2005 (11-34). Discussing the terms of the question here would stray from the purpose of this manuscript; however, it is unanimously acknowledged that objects and their subsequent actions and legacies are dependent on human interaction and societal intentions. We do, indeed, imbue objects with a certain purpose; whether this purpose can be considered true agency depends, ultimately, on an individual's perception of the state of materiality in the world.

31 Fogarty et al. 2015, 736-754.

and social environment, which is then culturally transferred. The accumulation of newly acquired information may explain for instance some of the bursts of building activity that are observed in the archaeological record at Satricum, like the consecutive increases in complexity near the transitions from the 7th to the 6th century BC and from the mid-6th to the early 5th BC, as reflected in the succeeding temple phases excavated on the acropolis or in the sophisticated road system implemented in the lower settlement at the turn of the 6th BC. The introduction of new ideas and information may provide an account of the dynamics of technological development at Satricum also in historical times if we think for instance of the dramatic changes that intensive agriculture and uncontrolled urbanization caused in the area in the last century.

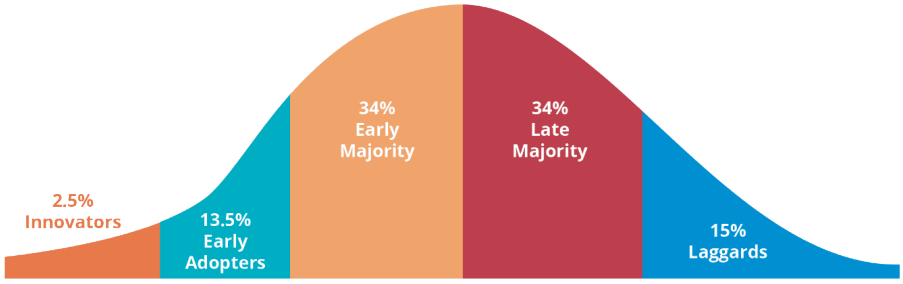

Figure 1. Adopter categorization based on innovativeness (readapted by the author after Rogers 1983, fig. 7-2, 247)

The ways in which new information travels have been the subject of sociological research since the 1930s, when diffusion of innovations and contagion theories were formulated and used to examine the spread of new ideas and techniques. One such study by E. Rogers focused the discussion on the variability in uptake of new technologies within a community. In this seminal work on the mechanism triggering the diffusion of innovation, he demonstrated the importance of interpersonal relationships and social interaction as opposed to knowledge. From this follows Rogers's well-known interpretative model that splits adopters into different categories depending on their predisposition to novel information and technology (Figure 1). From the cosmopolitan and adventurous innovators eager to try new ideas through the early adopters, usually profiled as respectable local elites with the highest degree of opinion leadership, innovation spreads to the early majority, whose innovation-decision period is relatively longer but who play a fundamental role in the diffusion network. They are in fact an important link between the innovators and the more skeptical late majority up to the last ones in the social system to surrender to new information, lagging far behind in the innovation-decision process.[32]

Such a classification is admittedly a simplification; however, it serves to break the diffusion process into different stages and visualize a focal point, i.e., the gap in innovation uptake at both community and individual levels. The distance between knowing about an innovation and adopting it represents the gap, and the size of the gap will vary through time, depending on the attitude toward that innovation

32 Rogers 1983.

(either positive or negative) manifested by various groups. The eventual adoption (or rejection) of the innovation proves to be a socially and culturally situated practice, thus reiterating the significance of interpreting technology as a social construct.[33]

Archaeology, then, is in a privileged position to understand how ancient communities perceived and transferred new ideas and techniques, because observing phenomena over a longer span of time provides a greater awareness, if not necessarily understanding, of the prerequisites for the adoption of innovation. Small wonder then, that the painstaking documentation of continuities and discontinuities in artifacts lies at the core of much archaeological research into ancient technological systems. In fact, the material remains of standardization or variation in craft production narrate the perpetuation, reproduction, rejection and adaptation of learned customs and information as expressed through technological processes. From the introduction at Çatalhöyük of clay pots used as cookware in place of clay balls, to the emergence of the potter's wheel in the Southern Levant, to the Carolingians' adoption of the stirrup in the early 8th century AD,[34] there are innumerable examples in archaeological scholarship illustrating the interdependency between innovations in technological knowledge and practice and changes in sociocultural systems.

The visual impact of changes detectable in the material world plays a crucial role in giving substance to changes of meanings, behaviors and relationships occurring in a community. In this sense, approaching material culture by tracing the chain of technological events and choices resulting in a product—or *chaîne opératoire*—enables us to understand not only the information and actions involved in its making but also the shared norms that trigger either replication or variation within established models.

1.2.2 Ceramic variability: The visible and the invisible

The formal characteristics of artifacts, such as shape, style and decoration, are visible to both the maker and the user, and are therefore well suited to exploring technological actions as well as social meanings within a community. On the other hand, technical features such as the raw sources exploited, tools used and technical gestures carried out are visible only to the makers and their restricted community, and completely invisible to the users.

The collective choices determining whether to conform to shared standards, thus influencing the degree of variability of objects, depend equally on the physical features of raw materials and tools available to manufacture these objects and on the ways of making and using them chosen by the community. In fact, the identification of which part within the technological endeavor enables the maker to have more space for creativity and individuality provides us with a good starting point to infer to what extent a community can agree with innovation and accept more or less significant variations to an established

33 This is the so-called "knowledge-attitude-practice gap" (KAP gap) theorized by Rogers, which highlights how the "attitude" or social reaction may affect the spread of new ideas and technologies. The effectiveness of the KAP gap as an analytical tool has however been profoundly revised by sociologists, arguing that it treats attitude as only a dichotomy of positive or negative and that it examines relationships and time only. Such a limitation was overcome by incorporating space into the equation. In fact, understanding how environment and space affect the transmission of ideas is key to understanding social and technological transmissions (Barash 2011, 15).

34 Respectively Hodder & Mol 2016; Roux 2003; Curta 2008 and Cresswell 2010.

model. At the same time, assessing variability enables us to grasp how well the level of experimentation sought by the maker is received socially and whether it is considered appropriate within the community. At the other end of the spectrum, when an artifact's visual attributes and production techniques reveal increasing degrees of standardization, these may reflect adherence to aesthetic and technical precepts deeply rooted in both craft communities and society at large. Any deviation from the norm would then have a significant impact on technological and social knowledge systems. When a community innovates and accepts and incorporates new technologies and subsequent changes in its knowledge systems, the coefficient of variation within the technological practice increases accordingly, thus leading to proportionally more varied end products and broadening the meanings and uses associated with them.

In this light, ancient pottery craft systems are fertile sources of investigation, providing direct evidence of technological knowledge and practice and embodying the material expression of established styles, aesthetics and behaviors as determined by society and time. By going beyond the mechanistic reconstruction of potters' operational sequences, it is possible to trace phenomena of innovation or tradition in both craft communities and society at large, thus contributing to disentangling the complex interaction between material and culture.

In his classic work on craft traditions among African potters, Gosselain warned researches about the dangers of considering pottery *chaînes opératoires* "simply as functionally oriented and monolithic systems."[35] According to his formulation, potting traditions are "heterogeneous cultural aggregates"[36] that articulate a "mix of inventions, borrowed elements, and manipulations that display an amazing propensity to redefinition by individuals and local groups."[37] Due to their heterogeneous nature, these aggregates are not equally susceptible to innovation. Instead, some parts of the production/consumption sequence of a pot are more often affected by change, while others tend to remain constant over time. By observing the formal and technical features of ceramics, it is then possible to distinguish which events in the life of a vessel are characterized by significant fluidity as opposed to stability.

As briefly mentioned before, there are multiple characteristics that enable us to trace different degrees of variation within artifacts' technology, thus materializing the choices of both producers and consumers. However, these characteristics have different degrees of visibility and therefore require different analytical methods in order to be detected. The surface of a pot preserves visible traces of certain tempering methods, forming and finishing techniques and some post-firing treatments. As rightly pointed out by Gosselain, the visual characteristics produced by these techniques connect the maker and the user in a relationship, as users can see the material evidence of the maker's behavior; therefore, the latter's choices will largely depend on consumers' reaction to the end product. The interdependency between maker and user triggered by visual characteristics makes these characteristics the most likely to display fluctuations over time. Visual attributes are then key means of materializing aesthetic, economic and

35 Gosselain 2000, 190.
36 Gosselain 2018, 2.
37 Gosselain 2000, 190.

symbolic meanings within society, and their variability (or lack thereof) mirrors the instilled knowledge and practices of individual makers learning within an enclosed community.[38]

This is for instance the case for the Asurini potters, an Amazonian indigenous pottery-producing population inhabiting a village on the margins of the Xingu River, Pará, Brazil. In her analysis on ceramic variability, F.A. Silva illustrates how the Asurini vessels always show a strong correlation between height, wall thickness and rim diameter, demonstrating a consistent pattern and proportionality followed by all potters regardless of the domestic group they belonged to.[39] Standardized capacity seems to point to a shared metric system within the community, which certainly is an important factor when purchasing a container, one that the consumer may have easily discerned at first sight. There was, however, space for improvisation and creativity in the making of these vessels: the Asurini craftswomen manifested their individuality to the fullest when it came to decorating their pots. The great variety of geometric motifs available within the Asurini iconographic tradition enabled potters to combine them in different patterns, producing a highly diversified and very peculiar repertoire. Interestingly, Silva notes that "although there is a common repertoire of Asurini graphic art motifs, the domestic groups make use of it in a distinctive manner":[40] in fact, the creation and naming of specific designs can be assigned to one specific potter, and their use was usually restricted to the members of the same close-knit group. The Asurini pottery tradition therefore demonstrates that the same techno-system may reveal a strict adherence to prototypes as much as leave space to subjective individual creativity. There is no contradiction between the metric standardization of the Asurini vessels and their decorative diversity: both are visible attributes immediately discernible in the finished product. And while the first probably met consumers' demand for containers of a specific capacity, the other may well have served potters to recognize and distinguish their own work. However, depending on the single attribute considered, be it metric proportionality or painted design, the same assemblage will alternatively result in quite standardized or highly variable work.

Contrary to the manufacturing stages that left very evident traces on the vessels analyzed in the Asurini case mentioned above, the selection, extraction and mixing of clay as well as primary forming and firing techniques are hard for a nontrained eye to detect on the finished product. These activities were likely to have been less dependent on the customer's approval and more so on the shared practices established within a bounded community of potters.[41] Studies conducted on several potters' communities scattered across the globe, spanning from Papua New Guinea to New Mexico and Madhya Pradesh, demonstrate how such an activity is often charged with symbolic, ritualistic meaning.[42] Among the Azera potters of Morobe Province in Papua New Guinea, for instance, the act of extracting clay is traditionally strictly ruled and no outsiders are allowed to observe the procedure. Only married women—not yet mothers—can collect clay and only at certain time periods, provided that they comply with several prescriptions, such as wearing a traditional dress and using a particular container typical of the area to carry the clay.

38 Kohring 2006, 101.
39 Silva 2008, 2019.
40 Silva 2008, 238.
41 Gosselain 2000, 192.
42 See respectively May & Tuckson 2000 on pottery traditions in Papua New Guinea, Ortega 2005 for New Mexico, and Geedh & Nadgauda 2013 for Madhya Pradesh.

As documented by May and Tuckson in their extensive survey across the country, in several potting communities there seems to be an underlying connection between good blood, good health, the ability for procreation and good potters' clay, like how sickness, bad blood and infertility are believed to cast a curse, causing the soil to be unsuitable for potting activities.[43] Similarly, the way in which the Jicarilla Apaches exploit the micaceous clay crops in northern Rio Grande (New Mexico) to manufacture the majority of their pottery defies Western economic supply-and-demand laws. Deeply connected with their land, the Jicarilla hold that micaceous clays are sacred and blessed with divine power, since they provide for their daily needs. Every clay pit is taken care of by the whole community that used it, embodying in a way the health and status of that community. Traditionally, offerings are brought to the crops, where potters wait "to sense whether the time is opportune to dig or whether more offerings should be made. Sensing that the time is correct, the potter has the responsibility to gather enough material to make his or her creations and no more."[44]

These cases illustrate well how the selection and extraction of raw materials is a collective endeavor, during which potters assist each other and work in close collaboration. The same applies to the firing process, which often takes place in shared facilities whose preparation and supervision usually requires the involvement of potters from a whole village over a few days. On the other hand, the last invisible manufacturing step—i.e., the primary forming or "roughing out," in Courty and Roux's terminology[45]— is an operation that potters carry out individually. The gestures performed by a potter to fashion the roughout are typically learned through repetition and trial and error during his/her apprenticeship period. Once they become a routinized practice, these internalized motor habits tend to remain unchanged throughout a potter's life time, being so firmly grounded in the way of making and knowledge of his/her peers. Thus, depending on the artifact's attributes we are taking into account (shape, surface treatment and decoration as opposed to clay paste and roughout), the degree of standardization or variation will dramatically change.[46] For this reason, a correct approach to assessing ceramic standardization will include both ends of the equation.

The remainder of this chapter will explore the several analytical models traditionally used to determine the degree of standardization (or lack thereof) in pottery technological systems, including both the production and consumption of ceramic vessels. But first, it is worthwhile to linger on the terminology applied in this work.

1.3 Ceramic standardization, variation or variability? Terminology and major lines of inquiry

The concepts of standardization and variation have been central to the understanding of classification, stylistic development and the formulation of relative chronologies in world archaeology. Likewise,

43 May & Tuckson 2000, 14 and 130-136.
44 Ortega 2005, 3.
45 Courty & Roux 1995, 20.
46 About the choice of attributes to study to assess standardization, see Chapter 4, section 4.2.2.

standardization and variation lie behind culture history and the assumption that standardized sets of material culture signify ethnicity. This assumption was called into question by proponents of New Archaeology and has gradually disappeared ever since[47] from the relevant literature, with only a few exceptions.[48]

After the contribution of New Archaeology on the subject, more explicit and extensive discussion on ceramic standardization and variation has appeared in the archaeological literature, particularly in the last three decades. Both concepts have mostly been put forward to address issues related to different aspects of production and, to a far lesser extent, dissemination and consumption. Yet, this attention has resulted in isolated, relatively small-scale works, which are spread across a wide range of journals and collective volumes and are not always easily accessible.[49] Relevant literature covers different aspects of material culture (lithics, bone and antler, textiles and ivory), but the greatest efforts have been put into ceramics.[50] Scholarship on the archaeology of the American Southwest has carried out much of the work on ceramic standardization, mostly drawing its approach from ethnographic studies.[51] In comparison with overseas studies, the issue has randomly been taken up by archaeologists dealing with the prehistory of the Aegean and the Eastern Mediterranean[52] but has largely been missed by ceramic specialists of other periods. With the exception of the work of D. Pullen on the entire ceramic assemblage of Hellenistic Halieis,[53] the notion of ceramic standardization makes a timid appearance in both Greek and Italian pottery studies. Moreover, the methods used to approach the issue are often not systematic, as the lack of a clear terminology evidently reflects.

Since the notion of ceramic standardization was introduced, there has been some confusion in the literature, which can be traced to imprecise use of terminology. As recently argued by A. Kotsonas in his work dedicated to ceramic standardization, the lack of conformity in terminology has probably had its own part to play in generating not only the wide array of terms currently in use, but also the lack of conformity in the way the issue is addressed in the relevant literature.[54] Terms such as diversity, standardization, variation and variability seem to be interchangeable, whereas they not only define different concepts but also interact differently with each other. In the remainder of this section, I will try to sort out this confusion.

47 See, for example, Jones 1997, 15-39, 106-127; Shanks & Tilley 1987, 137-139. For ethnographic work suggesting correspondence between traditions of ceramic production and linguistic grouping, see Gosselain 1998, 92; Shanks & Tilley 1987, 145-146. For skepticism on this correspondence, see MacEachern 1998.

48 On the persistence of this assumption within the archaeology of the Iron Age Levant, see Whincop 2009, 88-95.

49 A small number of essays on the issue is grouped in Mills & Crown 1995a, as well as in Volume 7 (2000) of the journal *Archaeological Method and Theory*.

50 For a collection of references, see Eerkens & Bettinger 2001, 493. More recently Miloglav & Vuković 2018.

51 For the American Southwest, see again the collection of studies in Mills & Crown 1995a. For the contribution of ethnographic research to ceramic standardization, see Longacre 1981, 1991, 1999; Longacre & Stark 1992; Longacre et al. 1988; London 1991.

52 Benco 1988 (Roman and Islamic Cyrenaica); Frankel 1988 (Bronze Age Cyprus); Davis & Lewis 1985, 84-86, 90; Berg 2004, 2007, 98-103 (Late Bronze Age Cyclades).

53 Pullen 1981.

54 Kotsonas 2014, 7-9.

Archaeologists have long used the term *diversity* in an intuitive sense, as a synonym of variation.[55] We owe to Rice the first formalization of the concept of diversity into relevant scholarship.[56] Rice's understanding of the concept derives from population ecology, where the term is used to describe the structure of an ecological community. In this respect, diversity is dissimilar to variation in that it refers to the properties of a population or collectivity and not to the individuals forming this population.[57] Furthermore, diversity is a quantitative concept and therefore comes closer to the statistical quantity "variance."[58] Over time, Rice came to use the term as an antonym of standardization.[59] The concept has, however, proved thoroughly unpopular in recent literature.[60] No reasoning has been given for this neglect, but one cannot help but understand scholarly skepticism toward a term that was developed in a different discipline and is not entirely problem-free.[61]

In an early, influential article by Rice,[62] as well as in the work of other scholars,[63] the antonym of standardization is not diversity but *variability*. Later, however, Rice referred to variability as "an overarching term for the two opposing concepts of standardization and diversity."[64] This is actually how a number of studies understand the term variability; in their case, however, variability encompasses standardization and variation (rather than diversity).[65] To complicate things further, there is a different version of the same scheme according to which variation is the general concept, embracing the antonyms of standardization and variability.[66]

The terminological and conceptual inconsistency with respect to the antonym of standardization, as well as the relation between the terms variation and variability, has largely escaped scholarly attention. To start with, *variation* and variability have often been used as synonyms.[67] In the early 1990s, van der Leeuw made a passing reference on the matter that, however, went unnoticed.[68] Later on, Blackman, Stein and Vandiver elaborated on the formal definition of ceramic as the difference seen on the attributes of ceramics (such as fabric, technique, shape and decoration) or the process by which this difference is caused.[69] In this respect, variation best fits as an antonym of standardization, to which I return below. On the other hand, variability can be taken to refer (often at an abstract level) to the susceptibility of

55 Jones & Leonard 1989, 1-2; Rice 1989, 110.
56 Rice 1981, 1987, 201-204; 1989, 1991.
57 Jones & Leonard 1989, 2; Rice 1981, 222; 1987, 202; 1989, 110-111.
58 Jones & Leonard 1989, 2; Rice 1987, 203; 1989, 111; 1991, 273.
59 Most explicitly in Rice 1991, 273 and 1989, 111, but also in 1987, 201-204, though not in 1981, where (on page 221) variability is cited as the antonym of standardization.
60 Underhill 1991 is one of the few studies that make use of the term.
61 These worries were expressed by Rice herself in Rice 1987, 203.
62 As explicitly noted in Rice 1981, 221.
63 Arnold 1991, 364; Costin 1991, 35-36; Costin & Hagstrum 1995, 622.
64 Rice 1987, 201-204; 1991, 273.
65 For variation as an antonym of standardization, see ; Blackman et al. 1993, 61; Longacre et al. 1988, 103; London 1991, 182-204.
66 Eerkens 2000; Eerkens & Bettinger 2001, 493-494; Frankel 1988, 34. Note, however, that Eerkens 1998 used the term variance instead.
67 Explicit cases for interchangeable use are frequent in the literature, see Longacre 1991, 111; 1999, 102; Longacre et al. 1988, 103.
68 Van der Leeuw 1991, 23-25.
69 Blackman et al. 1993, 61. Unfortunately, a similar set of references is used in a definition of formal variability: Skibo & Schiffer 1995, 1987, 28.

ceramic attributes to change and become more varied or standardized. In this respect, *variability* should be seen as the overarching term covering both standardization and variation.

The proposed definition of ceramic variability is in agreement with the wider understanding of variability in world archaeology. This concept was introduced in the 1960s by New Archaeology[70] and constitutes the mainstay of Binford's *New Perspectives in Archaeology*.[71] According to the proponents of the New Archaeology, variability seen in the archaeological record is the ultimate source of archaeological knowledge. This is because by understanding patterns of artifact variability, scholars engage in understanding the societies that produced and consumed these artifacts.[72] Clearly, this conception of the term does not involve any assumption about the degree of standardization or variation seen in artifact assemblages but encompasses the full range of possibilities.

In the light of these considerations, I make use of the term variability to denote the *continuum* linking standardization and variation, as also suggested by A. Kotsonas. Furthermore, I take ceramic *standardization* to refer to 'the relative degree of homogeneity or reduction in variability in the characteristics of the pottery, or [to] the process of achieving that relative homogeneity', drawing on Rice's formulation.[73] Conversely, *variation* can be defined as the relative degree of heterogeneity in the characteristics of ceramics.[74] As made clear in these definitions, standardization and variation are relative concepts; as such, they can only be defined through comparison of two or more assemblages with differing degrees of homogeneity. The two concepts should then be understood as a *continuum* and a matter of degree, rather than a fixed state of being.[75]

1.4 Ceramic standardization and modes of production: A challenging link

As already mentioned, ceramic standardization or its antonym variation have been discussed mostly with reference to production, distribution and consumption. The titles of relevant scholarship usually place emphasis on standardization but do discuss both concepts. At the same time, previous scholarship places particular emphasis on production, at the expense of the other aspects of the ceramic life cycle.[76] Clearly, this bias is unjustifiable and potentially misleading. In fact, the same literature has established that the range of factors that have a potential effect on ceramic variability pertains to different aspects

70 Johnson 1999, 26-27.
71 Binford & Binford 1968.
72 Miller 1985, 1-14; Redman 1978, 163.
73 Rice 1991, 268 (see also Rice 1981, 220; 1987, 201-202, see also 482). Definition adopted in Berg 2004, 75; Blackman et al. 1993, 61; Stark et al. 2000, 324.
74 A comparable description, rather than a definition, is found in Blackman et al. 1993, 61.
75 Arnold & Nieves 1992, 94; Berg 2004, 75; Blackman et al. 1993, 61; Costin 1991, 35; Eerkens & Bettinger 2001, 493; Mills 1995, 204; Rice 1989, 116; 1991, 268; B.L. Stark 1995, 233.
76 As noted in Rice 1987, 202; 1991, 268.

of production and consumption.[77] This range includes the variety in and availability of raw materials, the preferences and level of expertise of potters, the local craft tradition and production techniques, the mode and scale of production, the availability of measurement aids and related tools (including molds), the role of efficiency, cost effectiveness and routinization, the need to communicate information on status and group affiliation, the effect of regulations or consumers' choices etc.

Standardization, however, is most often addressed with reference to the scale and mode of production and has served as indirect, material evidence for the identification of specialized production, particularly producer specialization.[78]

After the contribution of G. Childe, who first established a direct correlation between craft specialization and social evolution, archaeology has been largely concerned with the assessment of such a production mode and its implications for understanding the rise of complex forms of social and political organization.[79] As noted above, one vector through which to approach specialization has been to look at standardization, which is expected to be a correlate of increasing specialized production.[80] At first, this link was based on "common sense" notions and mainly focused on pottery attribute variation. An early remark on the subject was made by A.O. Shepard in 1957/1958,[81] while the first formulation of standardization as a direct consequence of specialization is clearly mentioned later on in the work of van der Leeuw and Peacock.[82] Subsequently, much effort has been made to investigate the relation between specialized manufactures and standardized products.

The assumption "that pottery made by specialists is more standardized than that of nonspecialists is a long-standing one"[83] in the literature dealing with economic and developmental models. According to Hegmon, Hurst and Allison "specialists are expected to make standardized products both because they are more skillful and because they may be motivated to increase their efficiency by simplifying and standardizing their products".[84] Moreover, a pottery assemblage tends to exhibit higher standardization

77 On the range of factors see Arnold 1991, 364; 2000; Arnold & Nieves 1992, 108-112; Berg 2004, 76, 83; Blackman et al. 1993, 61, 75; Crown 1995, 147-148; Eerkens & Bettinger 2001, 500; Feinman et al. 1984, 299; Frankel 1988, 34-35; Hagstrum 1985, 69; Hegmon et al. 1995, 46, 51; Kvamme et al. 1996, 125; London 1991, 200; Longacre 1999; Longacre et al. 1988, 105; Rice 1987, 201; 1989, 110-111; 1991, 268, 273, 275; Roux 2003, 769, 777-780; Sinopoli 1988, 586-587; B.L. Stark 1995, 233-234, 237-238.

78 See, for example, Arnold 2000, 334; Arnold & Nieves 1992; Benco 1988; Berg 2004, 74; Blackman, Stein & Vandiver 1993, 60-61; Clark 2007; Clark & Parry 1990, 293; Costin 2000, 378, 382; Costin & Hagstrum 1995; Hagstrum 1985; Hegmon 1992, 526; Hegmon et al. 1995, 31-35; Kenoyer et al. 1991, 45-48; Kvamme et al. 1996, 116; Longacre 1999; Longacre et al. 1988; Milliken & Vidale 1998; Mills 1995; Mills & Crown 1995b, 5, 10-11; Rice 1981, 1987, 201-204; 1991 (with a collection of references to relevant work on page 269); Roux 2003; Sinopoli 1988; B.L. Stark 1995; Toll 1981, 100-106; Underhill 1991. A less direct link between specialization and standardization can be found in Arnold 1991; Berg 2004, 76; Longacre et al. 1988, 105; M.T. Stark 1995.

79 See above, Intro.

80 See above Intro.

81 Shepard 1957/1958, 452.

82 See above, 7-8.

83 B.L. Stark 1995, 231.

84 Hegmon et al. 1995, 34. On the role of skill in pottery production, see also Arnold 1999, 56; Blackman, Stein & Vandiver 1993, 75; Hagstrum, 1985, 68; Longacre 1999, 45.

when crafted by a smaller number of potters, a phenomenon termed *ratio effect* by B.L. Stark according to which the level of standardization rises as the proportion of potters to vessels reduces.[85]

Assuming that standardization is a corollary of specialization, it should be then plausible to deduce patterns of production organization straight from archaeological materials by comparing the diversity of artifact's types or assemblages. A variety of ethnographic studies have demonstrated that items crafted by nonspecialists tend to be less standardized compared to those of individual specialists.[86] In contrast, Berg, Longacre, and Stark document considerable variability in the level of standardization recorded across specialists, showing also that in some instances nonspecialists may achieve higher standardization levels than specialists.[87] The link between standardized outputs and specialized craftmanship is thus not as straightforward as commonly assumed nor it does apply to all cases.

As aptly stated by B. L. Stark "Standardization of manufactured goods in the realm of modern mechanized production implies controls of various sorts (e.g., dies, molds, and electronically controlled machining) to maintain an acceptable level of uniformity in parts and products. In the case of completely handmade goods, controls on uniformity depend on the judgment and skill of the maker".[88] Reasons to normalize production can derive from different practical or economic needs: arranging items in piles inside a kiln or in a cargo ship is typically more convenient when dealing with dimensionally and morphologically standardized vessels, however, minor alterations in size or shape do not obstruct the correct stacking of pots.[89] In addition, since the functional purposes served by pots often permit deviations from the standard in their size or shape, customers may still identify and accept products despite some variability. Likewise, even though economic systems based on monetary exchange promote standardization, slight variations are still acceptable as they may depend on minor differences in the use of raw materials.[90]

Few scholars, mainly ethnoarchaeologists, rightly point out that standardization cannot be discussed only with reference to complex modes of production but should also be discussed with reference to simpler systems, particularly household production. The relevant line of inquiry involves assessments of design variability at the intracommunal level: by plotting the distribution of particular design elements against surviving architecture, scholars have come to determine the number of kin groups occupying a site in a certain period.[91] As already noted, the relevant argument has found some support in ceramic ethnography. Scholars, however, have emphasized that agents other than kin groups could generate a similar pattern in the archaeological record.[92]

85 B.L. Stark 1995, 256-258.
86 Costin & Hagstrum 1995; Hegmon et al. 1995; Rice 1991; van der Leeuw 1977.
87 Berg 2004, 76; Longacre et al. 1988, 105; B.L. Stark 1995.
88 B. L. Stark 1995, 232.
89 Arnold 1999, 75-76; Hegmon et al. 1995, 34; Rice 1987, 202; Rottländer 1967, 37; B.L. Stark 1995, 232.
90 B. L. Stark 1995, 232.
91 Longacre 1964. Also cf. Hill 1977, 58.
92 Plog 1980, 1-12.

Research dealing with ceramic standardization and variation has also pursued other lines of inquiry, for instance to detect and identify the work of individual potters and painters. Ethnographic and ethnoarchaeological studies have shown in fact that the producers themselves can distinguish the hand of colleagues and neighbor workers judging by vessel proportions, the form of individual vessel parts and surface treatment;[93] in some of these cases, a number of consumers were also found to be in a position to identify the maker of a vase.[94] Scholars have, on the other hand, used standardization in metrical analysis and, to a lesser extent, in surface treatment for the identification of the work of single producers.[95]

Less frequently, the concepts of standardization and variation have been involved in inferences about the provenance of particular vessels. Interesting results have been achieved by simply examining the metrical morphological attributes of ceramics and their relatively subtle difference in ratios.[96] The significance of this line of inquiry for the tracing of the provenance of Mediterranean ceramics by non-analytical means seems clear, especially in the commonly attested case where more than one center of the same region or subregion was producing ceramics of similar form and decoration.

Although several aspects have been largely overlooked and much more work needs to be done to explore them, the notions of standardization and variation show a wide range of possible applications to the study of pottery production systems and more widely to the study of ancient economies, especially when not limiting the research to the detection of specialized manufacture.

1.5 Ceramic standardization and the study of distribution and consumption patterns: An underexplored link

I have already noted that scholarship on standardization has overemphasized the use of the concept for the study of ceramic production, at the expense of distribution and consumption.[97] In the following, I review comparable work done on the significance of standardization for the study of ceramic distribution and consumption and strongly recommend the conduct of further research in this field.

Standardization has attracted some attention with respect to the transport of ceramics, particularly transport amphorae but also fine wares. I start with the latter class of material, specifically with shallow open vessels such as plates and bowls. Standardization is important not only for the stacking of these vessels within a kiln[98] or in a cupboard[99] but also for the ease of transport. When standardized, these shapes stack or nest as well, are easier to transport in quantity and can therefore have a wider distribution.[100] The link between the standardization of open vessels and their wide distribution has

93 Costin 2000, 389; London 1991, 193, 201; Longacre 1981, 62; 1991, 102-103; 1999, 48-49; Sinopoli 1988, 590-593.
94 London 1991, 193; Longacre 1999, 48-49.
95 London 1991 (particularly 196-202); M. T. Stark 1995, 249-250.
96 Stark et al. 2000, 303-304.
97 The brief comments made in Rice 1987, 202 form a welcome exception.
98 Rottländer 1966, 76; 1967, 37; Stark 1995, 232.
99 See Arnold 1999, 75-76 for the nesting of cutlery used on specific occasions.
100 Arnold 1999, 75-76; Hegmon et al. 1995, 34; Mills & Crown 1995b, 308; Rice 1987, 202; Rottländer 1967, 37.

mostly been studied in the case of Roman Arretine wares and African Sigillata.[101] Nonetheless, it is also applicable to earlier periods. It does, for example, account for an observation made by J. Papadopoulos concerning the distribution of early Greek pottery in the Mediterranean.[102] Papadopoulos noted that the majority of those early Greek exports basically conforms to a few types of fairly standardized shapes and highly standardized decoration.

The significance of the standardized form of these vessels in conveying certain cultural connotations, particularly of wine consumption, to the importing communities has often been noted. Scholars have not always acknowledged, however, that practicalities—such as the high potential of these vessels for nesting during transport—could have also played a considerable role in their wide distribution. This role could be highlighted by an assessment of dimensional standardization of groups of such vessels found in select contexts of the Mediterranean. Such an approach would show that particular pieces could belong to a single stack, which arrived at the site in a single shipment.

The significance of standardization for the distribution of bowls and plates does not also apply to other ceramic shapes. It has been noted that for other types of vessels that cannot be nested into a pile, it is variation in size, rather than standardization, that is more desirable for nesting with efficiency of space,[103] as is the case for instance for Italian black gloss tableware often shipped in combination with transport amphorae.[104]

The issue of the variability of transport amphorae is more complex.[105] Greek and Roman amphorae produced in a certain region over a certain period were normally of standardized material and shape; where decoration was added, this was also standardized. Morphological standardization enabled ancient producers and consumers alike, as well as modern archaeologists, to identify the region of origin of each amphora type and establishes the general class of transport amphorae as the earliest consumer packages. Clearly, standardized vessel shape was important for the transport of amphorae. They could be packed in layers in a pattern similar to eggs and interlock to prevent shifting and maximize the space in the hold of a cargo ship.

Sources of the Hellenistic period suggest that amphorae of a certain provenance were of standardized capacity. These sources do not specify, however, whether these amphorae were originally tested by being filled from containers of standard size, as Cato the Elder suggested (De Ag. 154) in later times. Contrary to what the written sources imply, several modern studies on amphora capacity conducted by archaeologists have shown that, in most cases, these vessels show considerable variation in capacity, despite overall standardization.[106] A notable exception to this pattern, identified by V. Grace, regards 5th century amphorae from Chios. These vessels are not only of standardized style but also of standardized capacity, even if this underwent a notable change in the second half of that century because of a decree

101 Peacock 1982, 121-122; Rice 1987.
102 Papadopoulos 1997, 220.
103 Arnold 1999, 75-76.
104 Cibecchini 2004; Tchernia & Brun 1999.
105 See mostly Greene et al. 2008; Twede 2002.
106 For a review of literature on amphora capacity, see Manacorda 1989; Tsatsaki 2004, 348-352.

passed in Athens that asked the city's allies to comply with its standards.[107] Likewise, standardized capacity, changing slightly over time, has been seen in Rhodian 3rd century amphorae.[108] In this case, scholars have found the slight variability seen over time as unsurprising for nonmodern economies set within a network of other economies with varied weights and standards.[109]

Whereas scholarship on Roman pottery has addressed the link between standardization and distribution only in relation to size and capacity of vessels (mainly transport amphorae), other fields have introduced new, promising perspectives. Greek scholarship, in particular, has investigated this link in relation to vessel decoration.

In a controversial but no less interesting work, J. Whitley opted for an understanding of ceramic variability in its archaeological context, which in this case was Attic graves of the Early Iron Age.[110] In the multivariate analysis he employed in his study of burial data, Whitley made reference not only to the number and type of artifacts deposited in graves as well as tomb architecture but also to the variability in the decoration of ceramics. This method involved a large set of variables for each grave, occasionally over 70. To cope with the complexity, Whitley used computer-based factor analysis and a clustering program. The analysis demonstrated that during the 9th century, the decoration of pots found in tombs and the overall assemblage of these tombs were considerably standardized, a pattern that was taken as evidence for the establishment of aristocracy in early Athens.

Because of its innovative methodology and important results, this work is considered to be a representative example of the innovative perspectives introduced in archaeology.[111] Nonetheless, this study found no followers in the last two decades. As a result, the link between ceramic standardization and consumption has remained underexplored and awaits further attention.

1.6 Ceramic standardization and the study of Archaic household ware pottery in the Central Tyrrhenian region

Traditionally, scholarship on pre-Roman pottery from the Central Tyrrhenian region has largely concentrated on the distribution and consumption of ceramic tableware, especially decorated fine wares, locally imitated or imported from Greece and South Italy. The reason for this strong partiality toward fine wares lies in the formative years of the discipline, when ceramics were mainly investigated to build chronologies, identify style zones and boundaries and illuminate interactions on both regional and interregional levels. As we will see later on,[112] in many Central Italian sites, decorated Attic and

107 Grace 1949, 296. See also Wallace 1986, 88-89 with further references. For the possibility that this degree also affected the production of Thasian transport amphorae, see Mattingly 1981, 85-86.
108 Wallace Matheson & Wallace 1982. See also Wallace 1986, 89, 92-93.
109 Wallace 1986, 89, 92; Wallace Matheson & Wallace 1982, 294. On the standards of amphorae and coins, see Mattingly 1981, 85-86.
110 Whitley 1991.
111 Shanks 1996, 138-143; Whitley 2001, 56.
112 See section 4.1.

Corinthian wares have represented a solid, if not the only, chronological reference for assigning precise dates to contexts and related finds, particularly when stratigraphic data were not available.[113]

In his fundamental work on the early Republican pottery from Satricum, J.W. Bouma strongly underlined the difficulties in dating especially 5th BC pottery due to the almost complete absence of imported pots: "this lack of imported pots has made it difficult to ascribe a fixed date to most of the local Latial pottery in ordinary ware."[114] For a long time, scholars dealing with the very simple shapes of the plain cooking and household ware have questioned whether an internal formal development in this class of poor material could be established at all.[115] This position rests on the assumption that because of the functionality of the forms, this pottery was not liable to change. Therefore, the possibility of this pottery having followed a morphological development over time was considered highly unlikely.[116]

The early skepticism on the archaeological worthiness of ordinary vessels is nowadays outdated. Over the last 30 years, the intensive archaeological research carried out in many Central Italian sites has yielded an enormous amount of evidence and the majority, not surprisingly, consists of coarse ware pottery. The systematic investigations of settlements and household contexts have consistently promoted a large-scale study of this ceramic class. Remarkably, this wide analytical approach has contributed not only to providing answers on the typo-chronological development of the artifacts but, more importantly, also to asking new questions and stimulating new lines of inquiry within ceramic studies. The issues to be addressed concern the whole cycle of pottery-making systems: reconstruction of modeling techniques, identification of workshops, modes of production, distribution networks and consumption processes. It is not possible to address these questions without formulating a clear methodology: archaeological data can achieve scientific value only in the light of a scientific framework. As widely explained on the previous pages, Greek and New World pottery studies have spent lots of energy to substantiate their archaeological practice with a solid theoretical background, drawing on philosophy of science, sociology, anthropology, ethnography and economy. In this view, pottery—as the most common and tangible marker of ancient communities—has become the perfect field of study to assess operational rules as well as explanatory models.

Issues concerned with the cycle of the ceramic production system lie at the heart of much work on Latial and more widely Central Italian pottery. The identification of craft centers (especially on account of archaeometric research),[117] assessment of modes of production,[118] description of socioeconomic

113 See for instance the case of ordinary ware from Veii (Murray Threipland 1969, 3; Torelli & Murrey Threipland 1970, 70); see also below, section 2.1.

114 Bouma 1996, 305: "In this respect the Republican period sharply contrasts with previous Late Orientalizing and Archaic periods (late 7th–6th c. BC). These periods saw, on an international and interregional level, the import of (Proto-)Corinthian and black- and red-figured pottery from Greece on the one hand and Etrusco-Corinthian pottery and bucchero ware from Etruria on the other. Around c. 500 BC these imports gradually diminished and showed a strong decrease especially after 450 BC."

115 Coarelli 1986, 83. For an overview of the difficulties in studying Latial coarse pottery, see also Gnade 1992, 17.

116 Artena 1990, 68.

117 For a general overview of the state of the studies, see Olcese 1995; for production centers in Satricum, see Beijer 1991; Nijboer et al. 1995.

118 For a general introduction, see Cuomo di Caprio 2007 and Nijboer 1998; for Satricum, see Bouma 1996, 305 ff; Nijboer et al. 1995.

distribution patterns[119] and refinement of technological and functional artifacts features[120] are only a few examples. This being said, it must be stressed that all these aspects still miss an organic picture: the questions far outnumber the answers, especially regarding the difficult correlation between specialized production and standardization of products. Although this topic has been taken up in some studies on Latial pottery, its treatment is, in most cases, empirical and has largely ignored the theoretical questions formulated and methodological tools employed outside the context of traditional Mediterranean archaeology. Several works on Latial pottery have dealt with different degrees of variability within Archaic and post-Archaic ceramic assemblages, but often showing opposite results. If we compare, for instance, the analysis of Archaic pottery productions from Rome undertaken by Carafa with that argued by Nijboer on contemporary assemblages from other Latial sites, we find quite contrasting considerations:

> In the mid-6th c. BC coarse ware products appear to be remarkably popular and typologically almost totally transformed comparing to the earlier tradition. The shapes, particularly storage jars, do show a significant morphological variation, which sharply contrasts with both the greater standardization of Orientalizing products and the lower variability of the earlier cylinder-ovoid coarse ware jars. It would seem rather difficult not to consider such an evident phenomenon as a symptom of a *drastic change* into the entire pottery producing system.[121]

Nijboer stated: "Concerning the ceramic craft, the *evolution* toward specialization must have been *gradual* with a continuation of domestic production well into the 6th century BC side by side with the manufacture by potters of more standardized and technologically advanced pottery."[122]

I do not intend to discuss the socioeconomic implications of these two studies here, whose relevance cannot, of course, be extrapolated from such a small sample. These cases serve only to epitomize a methodological problem: even though the evolutionary models proposed by the authors largely depend on the assessment of standardization, no clear reference was made in both these analyses to the criteria and mechanisms through which the assumed different degrees of variability were established. Unfortunately, this is a common problem in the relevant literature on the subject. Technical terms such as variation/standardization and continuity/discontinuity are often interchangeable and used in an intuitive way, without applying any of the methods developed in different fields to assess ceramic variability.

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119 A general overview can be found in Bonghi Jovino 1986; Brandt 1996; Carafa 1995; Cristofani 1993; Maaskant-Kleibrink & Attema 2001; Zifferero 2000. For the distribution of individual ceramic classes, see recently Burkhardt 1991 and Naso 2004 (south Etruscan *bucchero* productions), Menchelli 1995 (north Etruscan productions), Piergrossi et al. 2004 (*impasto rosso* production), D'Alessio 2001 (coarse ware production) and Angelelli 2001 (*impasto chiaro sabbioso* production).

120 A general overview of the relationship between form/function/fabric can be found in Bianchi & Fabbri 1997; more specifically, see Chiaramonte Treré 1997; Zifferero 1996, 2004.

121 Carafa 1995, 258. In the original text: "Negli anni centrali del VI secolo a.C. possiamo notare come i prodotti in coarse ware raggiungano una incredibile diffusione, accompagnata da un pressoché totale rinnovamento dei tipi di tradizione piú antica. Le forme, soprattutto per quanto riguarda le olle, raggiungono ora una differenziazione tipologica, che contrasta fortemente con la maggiore standardizzazione dei prodotti orientalizzanti, ma anche con la minore variabilità tra i tipi più antichi di olle a cilindro ovoidi in coarse ware. Sembrerebbe difficile non riconoscere in un fenomeno così radicale la spia di un qualche mutamento nell'intero sistema di produzione." Emphasis added.

122 Nijboer 1998, 28.

In this respect, the amount of pottery uncovered in Satricum, spanning more than a millennium, from the early Iron Age to the post-Imperial period, provides an exceptional case study. Contexts dating to the Archaic and Early Republican period have yielded consistent bodies of pottery. Among these ceramics, coarse ware pottery far outnumbers other ware classes. The massive occurrence of ordinary vessels manufactured for everyday consumption makes this assemblage especially well suited to shed light on the pottery-producing system of a Latial community between the 6th and 4th centuries BC. To do so, I wish to integrate typo-morphological and contextual analysis with the analytical tools provided by modern pottery studies carried out elsewhere in the world.