Technological Choice in Middle Neolithic Ceramics From the Peloponnese, Greece

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'That tent of blue the prisoners call the sky'

The Ballad of Reading Gaol, Oscar Wilde

IN MEMORY OF MY FATHER, SEAMUS

A TOKEN OF APPRECIATION TO MY MOTHER, BRIDGET, FOR HER BELIEF AND SUPPORT THROUGHOUT MANY, MANY YEARS

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ABSTRACT

Ceramic ecology has been used effectively to examine ceramic assemblages. It relies on an examination of the technical, physical, mineralogical and chemical properties of ceramics. It also considers the production, consumption and discard of ceramics. Whilst this has provided useful insights into style and function it has tended to ignore some factors which influence the ceramic fabrication processes. Technical style, using the concept of technological choice as a means of identifying style in the production sequence of artefacts has been developed through ethno-archaeological research. It proposes that human agency as opposed to environmental and technical constraints have a far greater impact on the fabrication methods used in pottery. At each level of the production sequence a potter has options that allow them to make choices. These choices represent a style, or technical style to give it a fuller title. Technical style can be used in conjunction with ceramic ecology to identify social groupings, examine the process by which technological knowledge is transmitted horizontally and vertically through society, and in doing so inform on social processes at intra-site and inter-site scales.

The Middle Neolithic site of Kouphovouno is located in the Laconia Valley close to the modern town of Sparta. It is, to date, the only large Middle Neolithic site recorded in the region. It is a tell site with occupation from the Middle Neolithic to the Late Roman Period. The recent excavations there by the British School at Athens and L'École Française d'Athènes have provided new material for understanding early settlement in the Laconia Valley. An intensive survey was conducted and a number of trenches were excavated across the site as well as two deep soundings to give a temporal perspective to the site.

This thesis presents the results of a study of an assemblage of Middle Neolithic ceramics from Kouphovouno. Focussing on surface features on the ceramics it uses a study of technological choice, primarily in forming techniques, to attempt to determine technical styles in this assemblage. The results of this study are combined with comparative material from other Middle Neolithic sites in the Peloponnese to attempt to determine technological choice and technical style in the assemblage. The results of this study and the excavation record are then used to consider settlement patterns, production strategies as well as the nature and extent of social interaction between Middle Neolithic communities in the Peloponnese. It also attempts to address a number of questions relating Middle Neolithic ceramics and the Middle Neolithic more generally, such as firing practices, production rates

and ceramic use or function. This is a preliminary study, the final chapter of the thesis outlines further work which could be undertaken on the assemblage and suggests future directions in which this work could be taken.

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1. INTRODUCTION

1.1 Preamble

The intention of this thesis is to examine a recently excavated Middle Neolithic ceramic assemblage from the site of Kouphovouno, near Sparta in Laconia, from the perspective of technological choice/technical style. Identifying technological choice can help determine technical style within the *chaîne opératoire* of ceramic fabrication (Gosselain 2000: 190; Sackett 1990: 34). Technical style has proved to be useful for the examination of social processes and influences, which guide ceramic fabrication activities. It has also yielded fresh perspectives on the organisation of production and the transmission of technical knowledge both vertically through time and horizontally across sites and regions amongst ceramic producing communities (Gosselain 2000; Loney 2007: 183-287; Stark 1998: 1-11).

The excavation at Kouphovouno, a Middle Neolithic site in Laconia, provided a ceramic assemblage which could be analysed to identify technological choice. Using this approach it is intended to examine Kouphovouno as an apparently isolated site within a wider regional framework with a view to understanding the nature and scale of social interaction in the Peloponnese. Evidence to date indicates that the region was populated by small communities spread out over large geographic distances (see Chapter 2). As communities seem to have been small in number there was a real and practical necessity for contact with other communities for reasons of subsistence and genetic multiplicity, which would have made interaction purposeful and directed. There are indications of communication among Middle Neolithic communities through exchange of obsidian and other materials, such as andesite and spondylus (Perlès 2001: 296), although this type of contact can be transitory and indirect. As such it is not particularly useful in understanding the nature or organisation of deeply rooted and long term interaction between communities in Southern Greece during the Middle Neolithic.

Previous work on the nature, organisation and scale of interaction in Middle Neolithic communities using ceramics has been undertaken by Washburn (1983: 138-64) and Cullen

(1985a & 1985b: 77-100). They analysed the decorative syntax from all available excavated Middle Neolithic sites in southern Greece. Their work, which concentrated on decorative symmetry (Washburn) as well as syntax and style (Cullen), noted similarities in how decoration was constructed on pots and identified zones of interaction between communities in the north- eastern Peloponnese as well as with Asea and Ayioryitika. They considered that these similarities resulted from the movement of people, perhaps women, through exogamy or raiding. They were also able to note smaller scales of social interaction within the region (see Chapter 2.5.6 for a fuller discussion).

There are, however, some issues in the use of decorative style as a medium of study for ceramic analysis in this case. Firstly, decorative styles are open to influence and styles can change frequently (Gosselain 2000: 187-217). Whilst this does signal social interaction at one level it does not necessarily reveal the structure of more deeply seated social groupings and so is problematic when used to understand how ceramic knowledge is transmitted. Secondly, almost all the ceramics available to Washburn and Cullen were from broken pots that did not contain complete motifs or decorative syntax frameworks. This restriction was further compounded by the discard bias practised at Lerna, Corinth, Asea and Ayioryitika. The result was that they were not able to fully examine the decorative syntax as complete units. Thirdly, it was only from Franchthi Cave that stratified material from secure contexts was available, which would have allowed examination, to some degree, of temporal changes throughout the period. Fourthly, the material from Kouphovouno, which contains data not only from secure but also well stratified contexts and would have added an extra regional dimension to the study, was not available to Washburn and Cullen.

This thesis will be able to build on Washburn and Cullen's work in the region. It will investigate aspects of technical style in the fabrication procedures used for ceramics, while also examining some aspects of decoration. The benefit of this, as will be elaborated in Chapter 3.5 & 3.6, is that forming techniques are not as open to influence as decorative style and so are not subject to short term change. This makes them a useful tool to examine the social organisation of ceramic production. This study, due to the nature of the excavation at Kouphovouno will also be able to add a temporal dimension to their work. Finally, it will also extend the regional scope of their analysis by bringing Laconia into the picture, which will give a fuller, more holistic view of Middle Neolithic pottery in southern Greece at this time both at intra-site and inter-site scales.

1.2 Research Issues in Middle Neolithic Ceramics

For this study the ceramic data needs to be put in the context of ceramic research to date. Within this field there are several issues that need to be addressed. The first is the nature of ceramic production. It remains unclear whether it is conducted at a domestic scale, with each production unit producing what it needs (Vitelli 1999: 190), by specialists (Perlès 2001: 294; Perlès and Vitelli 1999: 97-98), peripatetic potters, or if there is shamanistic involvement in the process (Vitelli (1993a: 210; Björk 1995: 134; Perlès 2001: 216; Mee 2007: 209-10). Another issue relates to whether ceramics are fired on site in bonfires or kilns (Vitelli 1974: 2, 29, 1993a: 184-5, 1997: 21-40, 2007 95; Youni 1996: 69). As in every study of ceramics, their function, or perhaps more correctly their use, is central to understanding their role in society. Are ceramics at Kouphovouno used as part of the same social strategies as they appear to be at other Neolithic sites (Halstead 1995: 11-22; Mee 2007: 204-5; Vitelli 1993a: 216, 1999: 194-5)?

Previously there have been varied attempts to estimate production and consumption rates of ceramics but unfortunately each attempt seems to be specific to one site (Björk 1995: 108-110; Pyke: 1996; Vitelli 1993a: 210; 1999: 193; Wijnen 1994; Youni 2004: 4-6). This has made comparisons difficult, especially as there is often a bias in the way ceramics are retained after excavation. The complete ceramic recovery strategy used and the new data from Kouphovouno in conjunction with material from other sites will attempt to better clarify of production rates. These problems will be elaborated on in Chapter 2.5.2. It is intended that the results of the analysis in this thesis will be able to address the issues outlined above.

1.3 Why Focus on Middle Neolithic Pottery?

Pottery from the Middle Neolithic period is of exceptional quality. 'Urfirnis Ware' is handmade, well fired, highly burnished and elaborately decorated with painted geometric motifs (Kunze 1931; Phelps 2004; Vitelli 1974, 1993a). It is made using a three stage firing technique in an oxidising atmosphere, followed by a reducing atmosphere and once again an oxidising atmosphere, similar to that used for Classical Black and Red Figure pottery (Vitelli 1995: 56). The shapes for the most part are elegant and open. This, along with the highly decorated and stylish nature of the vessels, such as pedestalled bowls and dishes, has led to

general agreement that it had a display function and was used for the sharing of food, or possibly in some form of competitive feasting (Halstead 1995: 11-22; Vitelli 1995: 56; 1999: 194-5).

As such, due to its ornate nature, open shapes and suitability for use as a display item, pottery appears to have had a major function as a vehicle for social discourse. It is, therefore, well placed within Middle Neolithic society to enable a study of technological choice and through it, the social processes of interaction between people at Kouphovouno and beyond. This study is the first to undertake a comprehensive examination of a Middle Neolithic assemblage from Laconia. It aims to conduct analysis at many levels, i.e. decorative and technological attributes, forming practices and production rates. The intention is that this will provide new data for Laconia, support the findings of other studies of ceramic ecology, such as those undertaken by Björk (1995), Vitelli (1993a, 2007) and Youni (1996, 2004) and complement decorative analysis undertaken by Washburn (1983: 138-64) and Cullen (1985a; 1985b).

1.4 Why Kouphovouno?

The site of Kouphovouno is located in Laconia and is to date the only large Middle Neolithic site known in the region (Cavanagh 1999, 2004). This represents a stark contrast to the dense settlement of Thessaly. Thus, its importance to Neolithic research in this region cannot be overstated. Kouphovouno facilitates a greater understanding, not only of the processes of settlement in Laconia, but also, as will be the main focus of this thesis, the interaction between communities during the Middle Neolithic period. The distances between sites in the Peloponnese are large, i.e. in excess of 30kms (Cullen 1985b). This indicates that interaction between these sites was not opportunistic or casual. Instead it seems directed and deliberate and almost certainly necessary.

The Kouphovouno Project provided new data for an examination of the Neolithic in Laconia, which is an area of study in the region that has suffered from a lack of focus until recently. The systematic excavation, complete recovery and retention of ceramics as practised at Kouphovouno during these excavations provided a very useful dataset, temporal as well as spatial. The excavation procedures ensured that this data came from well understood, secure contexts and the 100% ceramic recovery procedures have ensured useful, non-selective

samples of ceramics for the analysis, unlike other sites in the region, such as Asea, Corinth, Lerna and Ayioryitika. The complete recovery of material will allow comparative work with material from Franchthi Cave. The thesis will focus on a 2 metre square sondage, which extends to a depth of 4.35m and contains pure Middle Neolithic contexts. The pottery from this trench will be examined using non invasive analysis to look at surface features and decoration. The use of ceramic material from the sondage (Trench C Sondage, see Chapter 4) provides a valuable ceramic sequence that will allow the examination of temporal changes in ceramic manufacture processes, decoration and use. This will be augmented by examination of material from other contexts on the site to gain a spatial picture. Trench C Sondage will also give an indication of the changes in the use of space and the nature of settlement on the site, providing a useful chronological sample for the site as a whole. Data from Kouphovouno, in conjunction with other Middle Neolithic sites, will provide a better regional understanding of social interaction both in and between settlements in Southern Greece during this period, as well as allowing region-wide comparisons of fabrication practises and use of ceramics.

1.5 Structure of the Thesis

Chapter 2 is a review of current research on Neolithic Greece. It contains an analysis of settlement patterns and a short summary of subsistence strategies as well as a discussion of interaction amongst smaller communities and between separate communities. The bulk of research in these areas has been conducted in Northern Greece and Thessaly, the most densely populated region of Neolithic Greece. Southern Greece, however, is also well represented through survey and excavation. Any apparent discrepancy is due to the relatively sparse nature of settlement in the region as opposed to a lack of fieldwork. The chapter also presents a detailed examination of work on Middle Neolithic pottery, particularly Urfirnis ware. It provides a background to the study undertaken here and highlights issues addressed in this thesis using data from Kouphovouno.

In Chapter 3 a review of the concept of technological choice and technical style is undertaken. This is followed by a brief outline of how choice can be recognised in an archaeological assemblage. As much as choice can inform on social processes, it is important firstly to acknowledge and secondly to try to understand why there is sometimes an active choice to avoid particular options which may appear to be more efficient or technologically better. This

has implications for how we view the social ramifications of technology, namely that society is not necessarily driven by what may be called 'technological progress'. Thereafter, there is a discussion of one of the central concepts of this thesis, which is the processes of transmission of technical knowledge and the degree to which social processes and other factors in the *chaîne opératoire* can influence technological choice or technical styles. Finally, there is an outline of the usefulness of the pursuit of technological choice and technical style as a mechanism to examine material culture and to understand social processes.

Chapter 4 introduces and describes the site of Kouphovouno as well as outlining a brief history of research undertaken there. Thereafter there is a report on the excavation of Trench C Sondage from Kouphovouno that forms the basis of this study. The trench proved to be very rich in pottery from secure contexts. Following this there is a discussion of the results of the archaeological deposits in the trench. A surprising similarity was found in both the architecture and use of space between Kouphovouno and many archaeological sites in Thessaly, despite a geographic distance between them of several hundred kilometres. It seems that Kouphovouno, although geographically remote, was by no means culturally isolated from the rest of Greece during the Middle Neolithic period.

Chapter 5 begins with an outline of how the analysis was conducted, followed by a broad description of the ceramic assemblage. Successive sections of the chapter describe the results of detailed analysis of the assemblage from the C Sondage conducted during the 'Kouphovouno Project' study seasons in April and July 2007 and May and July 2008. The analysis focussed mainly on non destructive surface feature analysis but decorative features and metric data were also recorded in a standardised manner. Particular attention was paid to how the constituent parts of pedestal bowls and collar jars were joined together, as well as to the identification of variation in forming practices, decoration, and evidence of use wear. Where possible, this data has been quantified.

Chapter 6 focuses on comparative material and is divided into two parts. The first gives a spatial picture from Kouphovouno and the second puts the Kouphovouno ceramics in a wider regional context. Trench C Sondage, despite its temporal benefits, is spatially limited. Therefore, the first part of this chapter deals with the examination of two other contexts (Contexts 1019 and 2016) complementing the work undertaken on the assemblage in C Sondage, i.e. Both of these contexts were examined in the exact manner as those from C

Sondage and the results are presented accordingly. Kouphovouno, although an isolated site in Laconia, must be put in its regional context. The second part of Chapter 6 is an attempt to do this. In March and April of 2008 and July of 2009 the available Middle Neolithic material from Franchthi Cave, Corinth, Lerna, Asea and Ayioryitika was examined. It was not possible to undertake as full an investigation of these ceramics of that conducted at Kouphovouno because of time constraints and, therefore, at some sites only samples of the entire assemblage were looked at. Nonetheless, surface features, use wear and decoration were recorded in detail.

Chapter 7 attempts to draw the strands of this study together. Firstly, the ceramic data is put in context using the new data from Kouphovouno. It proposes some thoughts on settlement patterning in southern Greece, and comments on aspects of firing practices and use of ceramics. Following this there is a consideration of how to identify choice in the various steps of the production sequence in a ceramic assemblage. After this there is a discussion of the organisation of production. Evidence for the existence of peripatetic potters, household and specialised producers is debated. The possibility of relationships between decoration, both applied and painted, as well as attachment styles is then considered to determine whether decoration could be linked to potting traditions. Thereafter, the degree of social control over ceramic production and the existence of social boundaries at Kouphovouno, which may be reflected in motor/potting traditions, are discussed. The same question is applied at a regional scale to examine any visible patterns. These observations of the data from Kouphovouno and other sites are used to draw some broad conclusions about aspects of social organisation, along with the scale and nature of interaction in Greece during the Middle Neolithic period. The final part of this chapter presents the conclusions of this thesis.

The last chapter, Chapter 8, discusses some future directions for this study, particularly using petrographic and other scientific methods to resolve some uncertainties in the analysis, and thereby achieve further refinement and of the categorisation of potting traditions. It briefly discusses other methods of quantification before outlining the benefits of a holistic multi-technological approach to considering social networks. Finally, it proposes broadening the scope of the study both spatially into Central and Northern Greece and temporally into the Late-Final Neolithic and Early-Middle Helladic periods.

2. NEOLITHIC GREECE: A REVIEW

This chapter provides an account of research to date in Neolithic Greece, concentrating on the Middle Neolithic period but is informed by earlier and later periods when necessary. It is an attempt to put this study in context by concentrating on issues relevant to this thesis, such as settlement patterns, practices and organisation, subsistence, along with a more detailed examination of research into Middle Neolithic ceramics.

2.1 Introduction

The Neolithic period in Greece is a long period covering roughly 4,000 years. It is roughly divided in to 5 sub-periods. Beginning with the debated Pre-ceramic (Perlès 2001: 64-97) 7,000-6400BC. The Early Neolithic dates from 6400 to 5900 BC, followed by the Middle Neolithic, on which this thesis focuses, until 5300 BC. This is followed by the Late Neolithic, which lasts until 4,400BC. The period ends with a very long Final Neolithic; extending until roughly 3000 BC (Tomkins 2008: 22). The Neolithic is a period which sees the development of agriculture and sedentary lifestyles and the beginning of more complex social relationships.

2.2 Settlement

Neolithic settlement throughout Greece differs significantly in location and nature. This diversity consequently poses questions that are crucial to the understanding of settlement patterns and the choices that they reflect. How, for instance, did Early and Middle Neolithic Thessaly develop into a densely populated landscape (Figure 2.1), alongside 120 Early Neolithic Sites in Northern Greece (Andreou *et al.* 2001: 319), whilst large settlements remained a rarity in Southern Greece until the Late and Final Neolithic, at a time when Thessaly was witnessing a decline in settlement density?

To understand this, we must understand the rationale driving settlement patterning and acknowledge the impact of subsistence practices and environmental constraints upon it. Do

contrasting settlement types and patterns reflect Neolithic preferences for location and subsistence? A number of sites display features such as walls and ditches with an as yet undefined function but which clearly indicate a specific use of space. The arrangement of architectural features can be a useful guide to the ideological motivation and organisation of a society and interaction within the population. Early to Middle Neolithic Greek architecture is largely focused on sites through successive generations with evidence of intra-site cooperation in a highly socialized environment. However, Sesklo has two distinctive yet contemporary settlement types, which suggest a different use of space; an alternate subsistence strategy and social interaction which is different from the perceived norm in Thessaly (see Section 2.1.4).

2.2.1 Distribution

The Greek Neolithic settlement distribution demonstrates considerable regional variation. In Macedonia there is evidence for the predominance of larger open settlements, albeit with short term occupation (Grammenos 1996: 42; Halstead 2006: 12). Eastern Thessaly is densely occupied with, arguably contemporary; tell settlements closely associated at an average distance of less than three kilometres between them (Perlès 1999: 46, 2001: 135-143). This suggests either a planned settlement pattern or the influence of socio-economic factors upon it (Johnson 2007: 163) (Figure 2.2).

A number of factors have been proposed as influences on settlement patterns, including a preference for different microclimates and crop diversification (Perlès 1999: 42), a preference for workable soils (Kotsakis 1999: 73) and access to water resources and floodwater farming (Van Andel and Runnels 1995: 481-500). Perlès (1999, 2001: 131-5) was unable to find a link between settlement, water source, site type or soils in Thessaly as a whole. Perlès (1999: 46-7), however, also noted that Van Andel and Runnels' (1995) study had concentrated on a specific area, and that, therefore, their overall results were biased. Furthermore, unpredictable flooding at the wrong time of the year for agriculture has negative implications for farming practices. Finally, settlements are located away from active floodplains and are permanently occupied (Halstead 2002: 106). It is plausible, therefore, that floodplains were used instead for seasonal pasturage (Bogaard 2004a: 158). Unsuitable water resources, i.e. those too wet or too dry, may actually have resulted in a lack of settlement, as areas of extreme wet and dry conditions were avoided (Perlès 1999, 2001: 143).

2.2.2 *Thessalian and Peloponnesian Settlement Distribution: A Comparative Study*

The two geographically diverse regions of Thessaly and the Peloponnese display contrasting settlement patterns throughout the Neolithic (Figure 2.1 & 2.2), suggesting that environmental concerns can influence settlement patterns. Thessaly, being generally flat, with good soils and reasonably well-watered, would be an obvious choice for early agriculture, as reflected in the density of settlements there. In contrast, the Peloponnese has less workable land, is regionally divided by high mountains and does not benefit from sufficient water resources. It would follow then that restrictions on water may have limited settlement in the Peloponnese (Perlès & Johnson 2004: 77). It has, however, been demonstrated that precipitation was adequate in the Peloponnese for rain fed crops (Cavanagh 2004: 167-8) and that dew on mountains can make a contribution to marginal agriculture (Forbes 1982: 202-3). The Peloponnese, therefore, is hardly as uninhabitable as its settlement distribution would suggest.

It should also be considered that the landscape in Thessaly is topographically similar and extreme weather events, such as drought, or extremes of temperature, could have had a significant impact on the region. The Peloponnese, alternatively, due to regional variations in altitude and geology, would be less sensitive to climatological stress over a wide area and so arguably could be better suited to deal with resource difficulties. Finally, given Perlès' (2001: 143) demonstration that a link between settlement and water sources or workable land could not be found in Thessaly, the explanation for such regional differences in settlement patterns must lie elsewhere. Given that that both landscapes are suitable for supporting settlement, how might we explain the appearance of such different patterns of settlement?

The Early and Middle Neolithic are well represented in Thessaly but the Late Neolithic period initially witnesses an abandonment of settlement in higher areas and a preference for good, well-watered soils (Johnson 2007: 144). Perlès and Johnson (2004: 73) speculate that this move to more habitable areas may have been caused by water shortages rather than erosion. In the later phase of the Late Neolithic there was a re-exploitation of previously abandoned areas, whilst the Final Neolithic period witnessed a dramatic reduction of settlement in Thessaly. Some Final Neolithic sites in Thessaly, such as Argissa and Arapi (Gallis 1996a: 65), are surrounded by large ditches indicative of resource stress and socio-political uncertainty (Demoule and Perlès 1999: 400) which could indicate settlement contraction. Alternatively, Perlès and Johnson (2004: 75) suggest low site visibility during survey as a product of the

poor quality of Final Neolithic pottery, although ceramics recovered from a number of Final Neolithic sites in southern Greece contradict this conclusion (Cavanagh 2004: 168-9).

The converse appears to be the case in the Peloponnese. Survey and excavation data from the Peloponnese indicate little Early Neolithic activity in comparison with Thessaly. There is evidence of only a limited number of settlements, which fluctuated in both size and permanency of occupation until the Final Neolithic period (Cavanagh 2004: 180) (Figure 2.3). There are a number of Early and Middle Neolithic sites with indications of short-term occupation (Cavanagh 2004: 176) existing in tandem with sites inhabited for longer periods, such as Franchthi Cave and Kouphovouno (Figure 2.4). The latter sites appear spatially isolated. In Laconia, Kouphovouno is the only large settlement in the area found to date and, apart from two smaller sites to the south, at Apidia and Ayios Strategos (Cavanagh 2009: 57; Johnson 2007: 151), no other Middle Neolithic sites are recorded. The dearth of such sites could be a product of post-depositional visibility and erosion (Bintliff 2000: 5). No doubt natural processes will destroy or even hide sites but, as Mee (2001: 5) has commented, Late and Final Neolithic, as well as Early Helladic, sites would arguably be subject to the same post-depositional processes, yet there is an increase in their representation compared with Middle Neolithic sites. Furthermore, Middle Neolithic pottery is distinctive, often has a fine fabric and is durable and highly fired. Low-fired Final Neolithic Pottery in a coarse soft fabric would be most prone to destruction by natural processes but is the most common pottery of all periods found in the Peloponnese (Cavanagh 2004: 168). Furthermore, chipped stone, especially obsidian, is very resilient and can be distinctive. Therefore, site visibility and erosion are unlikely to account for the absence of Middle Neolithic sites in Laconia.

Kouphovouno is isolated in Laconia during the Middle Neolithic period (Cavanagh 1999: 34), whereas in the North - Eastern Peloponnese settlements are located at a considerable distance from one another (Cullen 1985b: 88) (Figure 2.4). It should be noted, however, that a number of smaller sites have been identified and recorded since Cullen's work (Cavanagh & Crouwel 2002; Forsén *et al* 1996; Wells & Runnels 1996). The Late and Final Neolithic periods are marked by cave and upland exploitation. Upland exploitation has a number of advantages for herding, such as access to upland pastures and the use of caves as penning facilities but it is not as suitable for arable farming, due to the poorer, drier nature of the land (Johnson 1996b: 284). Lower temperatures can retard growth but there is some evidence for exploitation of

barley, which can better tolerate drier conditions and would arguably make subsistence in there extremer conditions somewhat easier (Demoule & Perlès 1993: 400).

A number of Final Neolithic sites of short-term occupation in the Berbati valley have been interpreted as transient pastoralist sites (Johnson 1996a: 65; Johnson 1996b: 286). Similarly, other sites, such as Corinth, Kephalari, Klenia, Didyma and Prosymna are located on mountain routes or in caves and may have served as pastoralist sites (Jacobsen 1984: 32-3). It is of note that, during this period, the islands start to be exploited seriously, despite possessing fewer identifiable water sources than the Peloponnese and featuring more inhospitable terrain, although a preference for settlement on the best available land is clear (Johnson 1996b: 284). This settlement pattern indicates that the stimulus that saw expansion into the Peloponnesian uplands also encouraged exploitation of the islands and that poorer resources alone are inadequate to explain a lack of dense settlement in the Peloponnese during the Middle Neolithic.

Arguments that population pressure forced an exploitation of marginal regions cannot be maintained for two reasons. Firstly, there is insufficient evidence of population increases in the Peloponnese (Cavanagh 1999: 52). Secondly, tracts of fertile land were not exploited in the lowlands of the Peloponnese (Cavanagh 1999: 31, 37). Although the more marginal land is less productive, less effort would have been required to clear upland regions of vegetation compared with the fertile lowlands. Also, the development of newer farming practices and the introduction of new domesticated plant species, such as barley and the olive, more suited to the cultivation of marginal land would have allowed these regions to be exploited. Furthermore, the pastoral expansion of the Late and Final Neolithic into marginal lands might represent the exploitation of another resource that may have appeared a more attractive agricultural prospect as it required less manpower.

Perlès (2001: 143) concludes that the driving force behind settlement patterning in Thessaly was socio-economic. Halstead (1981: 328-9) argued that changes to the settlement pattern were due to a change in subsistence methods, such as the exploitation of milking animals and the olive, which could be undertaken in more extreme landscapes at temperatures as low as -13° centigrade (Johnson 2007: 160). In addition, the upland expansion was part of an overall increase in herding due to the role of livestock as a mechanism for social interaction, indirect storage and, ultimately, wealth (Halstead (1996b: 35). Johnson (1996b: 287) suggests that the

change in emphasis from intensive gardening to pastoralism may have provided another stimulus.

Increased pastoralism is indicative, in this case, of a demand for wool in the Final Neolithic – Early Helladic period. This theory is supported by the increased appearance of spindle whorls in Final Neolithic contexts compared to those of earlier periods (Johnson 1996b: 287). The upland landscape of Southern Greece and that of the previously unexploited islands is suitable for pastoralism, although whether this was extensive or specialist in nature is unclear (Halstead 1996b: 27-32). No definitive botanical or archaeo-zoological evidence exists, although widespread hilltop erosion has been noted for the Bronze Age. Johnson (1996b: 286-7) argues that, as settlement is concentrated near the coast, this would suggest that trade was a significant part of the economy of the Final Neolithic to Early Helladic period. Halstead (1990b: 72-5, 1996b: 22) argues that the exchange of secondary products was an important component in the subsistence activities of extensive pastoralists. Perlès (1992: 153-5) suggests that, with changes to subsistence in the south, the exploitation of marginal lands became more profitable than exchange with Thessaly, which found itself isolated and unable to compete. Tomkins (2004: 56-7) contends that it was a shift towards individuality, where people were no longer bound to certain communities out of necessity, that saw this flourishing expansion onto marginal land and allowed the exploitation of: 'alternative value systems, social relations and economic practices'. It seems that the exploitation of more marginal lands in the Late and Final Neolithic is a combination of a development in subsistence strategies, both floral and faunal which was perhaps influenced by a growth in exchange mechanisms, both in terms of the scale of exchange and the range of materials. This growth in exchange systems was perhaps responsible for changes in social relations between communities.

How is one to explain settlement practice in the Peloponnese and its variation from that of Thessaly? Environmental factors and population pressures do not appear to be stimuli for settlement development in the Peloponnese during the Early and Middle Neolithic periods (Cavanagh 2004: 180-1). Cavanagh (2004: 181) suggests that the difference could be related to territorial control, with the landscape controlled by larger settlements that can determine settlement patterns. Such a model would give each 'village' control over a large resource area and would render them largely self-sufficient. This, in turn, argues for the presence of some form of organisational power responsible for maintaining the landscape and controlling settlement within it. The seemingly organised settlement pattern in Thessaly and the apparent

rigidity with which settlement on magoulas are arranged, tends to support this argument (see Section 2.1.3 below).

Certainly in the Peloponnese there are fewer settlements competing for available land. Johnson (1996b: 283) argues that the paucity of large settlements is due to constraints on new settlements resulting from competition for limited resources. The Laconia valley, however, is sufficiently well-watered and has capacity for a denser settlement pattern, yet Kouphovouno is the only large site in the region, with intensive survey suggesting an estimated size of four hectares (Mee 2001: 03-05). This is considerably larger than the one hectare average estimated for Thessaly by Halstead (1981: 314) but falls within the range of 2-5 hectares suggested by Demoule and Perlès (1993: 370) and Gallis (1996b: 33). Johnson (2007: 144) further refined these estimates, finding a difference in the average size between sites on hills of 3-10 hectares and between those in the lowlands of between 1 and 3 hectares, which could plausibly reflect an attempt to restrict settlement on good arable land in a densely settled landscape, with the exception of the considerably larger settlement at Sesklo (Kotsakis 1996: 49). If Kouphovouno was not subject to resource competition and 'controlled' a larger area than that of a Thessalian magoula, within a landscape capable of supporting a population similar to that of Thessaly (Cavanagh 2004: 168), then a larger size could be expected but it does not explain why settlement during this period is so sparse. It seems that Neolithic settlement was influenced by a combination of key factors, rather than one overriding motivation and that research to date cannot offer a sufficient explanation for the settlement pattern in Laconia during the Middle Neolithic, nor for the disparity between Thessaly and the Peloponnese.

2.2.3 Settlement Layout and Type

Perlès (2001: 173) argues for extensive inter-site variation but localised micro-regional differences are not yet understood due to limited excavation. There is, furthermore, little apparent commonality (Halstead 2006: 11), with houses built using locally available materials suited to local climates. Neolithic settlement in Greece tends, for the greater part, to take the form of tell or magoula sites; consistently occupied, sedentary settlements (Halstead 1999: 78, 2005: 49). The layout of domestic architecture on Neolithic magoulas appears to demonstrate independence among structures, typified by a great deal of architectural freedom (Halstead 1995: 11) and constrained only by available resources, rather than by any formal patterning, which, considering the limited area available on a typical magoula may seem peculiar. The individuality of house location seems at odds with the regularly patterned landscape of

Thessaly (Perlès 1999: 51). The evidence of repeated rebuilding on magoula sites, in both Thessaly and the Peloponnese at Lerna (Caskey 1958: 143), Kouphovouno (see Chapter 4.4.3), Tsangli (Wace and Thompson 1912) and Otzaki (Gallis 1996a: 63) to name a few, suggests that settlement was not as random as it might first seem. Fraser (1968: 47) noted that the more sedentary a group becomes, the greater the emphasis on land, property and fixed spatial organization, which in turn, implies some degree of order within the Neolithic magoula settlements. Indeed, the cremations at Soufli are located near the edge of the magoula, which suggests a specifically functional separation of settlement space (Perlès 2001: 275) and must be the product of some degree of social consensus.

This phenomenon is not limited to Greece At the Late Neolithic site of Sabi Abyad in Syria, Akkermans and Verhoevan (1995: 29) attest to the continuity of place in the building sequences as a method of emphasising traditional values and social coherence, suggesting the existence of 'social conventions and the presence of common identities, experiences and ideas of place' (Akkermans & Schwartz 2003: 121) as well as some degree of social authority to oversee the process. This view is shared in the Balkans, where Tringham (1991: 121-2) argues that continuity is indicative of inheritance and Stevanović (1997: 388-9) suggests that it is a means of legitimising ownership. In some instances the limitations of available land, such as in marshy areas could be a factor, with the previous houses acting as platforms whereby marshy areas are built up like Opovo in Serbia (Tringham *et al.* 1992: 382). On the other hand, Halstead (1981: 307-39), using site size and occupational density, estimates a population range of between 100-300 persons per tell. This reaches the upper limit at which an egalitarian society could operate but the combined evidence of settlement patterns, the arrangement and continuity of space and of communal cooperation in building ditches/walls (see below) all seem to point to the presence of a form of social authority to direct the settlement.

The walls at some sites, such as Middle Neolithic Sesklo (Kotsakis 1996: 52), Hatzimissiotiki (Kotsakis 1999: 71) and Late Neolithic Pefkakia and Dimini (Kotsakis 1996: 54), along with the ditches at Servia, Soufli and Achilleion (Demoule & Perlès 1993: 370), are not substantial enough to function as defences, nor is there any supporting evidence to imply a requirement for such at this time, although they have been re-evaluated as a statement of preparedness for defence and an indication of mistrust of neighbours (Runnels *et al.* 2009: 172-77). The ditches encircling Makriyialos retained a sufficient area within it (28 hectares) for crops or grazing and so might have been intended as a security measure against raiding or predation (Halstead

2006: 15, 30). These features have been variously identified as serving a retaining or delimiting function (Kotsakis 1996: 52; Grammenos 1996: 43; Andreou *et al.* 2001: 274), as a mechanism for expressing a collective village identity (Halstead 2006: 15-16), or for the purposes of drainage (Jacobsen 1981: 314). It seems, however, that both walls and ditches are more likely to have a demarcatory or social function. Certainly at Sesklo the wall separates the magoula from the open settlement (Kotsakis 1996: 52) and at Zarkou it delimits a Late Neolithic cemetery (Andreou *et al.* 2001: 278). The presence of walls and ditches undoubtedly had an impact on occupational and architectural density and layout as both constrain the area of a magoula.

Equipment recovered from structures within these walls and ditches, along with quantities of food remains and tools, suggests domestic usage (Perlès 2001: 192-6). Such activity was not, however, restricted to these settings. Evidence for the use of domestic space is, unfortunately, rather limited but appears to display a great diversity, with little relationship between form and function (Papaconstantinou 2006: 92). Early Neolithic houses at Achilleion and Nea Nikomedeia had evidence of either storage or refuse pits, as well as plastered surfaces with associated domestic equipment, hearths and ovens (Perlès 2001: 195-6). At Sesklo, one excavated house was found to have a range of domestic equipment (Andreou *et al* 2001: 263) and, at Tsangli, two houses were found with a store of stone tools including celts, chisels, hammers, pounders, pestles, grinders, millstones and mortars (Wace and Thompson 1912: 121; Halstead 1995: 13). Some sites, e.g. Achilleion (Winn & Shimabuku 1989: 32-68, 334) and Nea Nikomedeia (Pyke 1996: 50-52), have external hearths or ovens suggesting that household activities could take place both inside and outside the building and thereby facilitate communal social interaction (Halstead 1995: 11-22). It is possible that external hearths also transmitted social signals relating to competitive feasting. Indeed, Perlès (2001: 196) has suggested that the use of fire might have served more than a domestically functional activity.

The development of the magoula, as a spatial concentration of houses in an environmentally unconstrained region, is an interesting pattern and has been the subject of much debate. Competition for limited land necessitating rebuilding in the same area, or issues of land ownership, have both been suggested as plausible motivations for the growth of the magoula form (Demoule & Perlès 1993: 363). Halstead (1999: 88) argues that rebuilding in the same area might have reinforced ancestral, or long-term, land rights (Halstead 2006: 30-1). Halstead's point is certainly valid and there are several examples of continuity of 'place' in the

Neolithic, at Otzaki in Thessaly (Gallis 1996a: 63, Andreou *et al* 2001: 274), in the Southern Argolid at Lerna (Caskey 1958: 143) and in Laconia at Kouphovouno (see Chapter 4.4.2). Whether this is linked to ancestral access rights, however, is far from clear, although the proposal may find some support in the EBA use of the magoula for burying the dead (Halstead 2006: 17; Kotsakis 1999: 74;).

Halstead further suggests that the stability and longevity of tell sites could be due to the dependence of communities on subsistence, as they are bound together through sharing and necessity (Halstead 1996a: 305). This adherence to a specific area might, alternatively, be a deliberate imposition. With settlement expansion restricted, this forced conformity may have been a mechanism means to express collective identity (Souvatzi 2008: 98), or an indication of social organisation that had a constraining effect on how land was apportioned (Cavanagh 2009: 57, 64). Perlès (1999: 51) posits that the Thessalian landscape as planned and structured and it is reasonable to suggest that the magoulas were subject to the same regimented arrangement. Whether the architectural arrangement of these magoulas as a social phenomenon, could be considered an indication of ancestry or ownership or an expression of group identity is unclear, it is, nevertheless, clear that the architectural patterns of the magoulas imply the development of Middle Neolithic social organisation.

Other European parallels tend to express the same concept. Bogaard (2004a: 164-5) proposes that repeated activity (tilling, manuring and weeding) at plots of cultivated land on Linearbandkeramik (LBK) settlement sites could have generated a concept of ownership; these activities representing an investment in land that people were unlikely to surrender easily (Jones 2004: 172-3; Van der Veen 2004: 160;). Competition for land and ownership has been proposed for Neolithic field boundaries in Ireland (Cooney and Grogan 1999: 39) and Britain (Fowler 1981: 46-7). The visible contrast between varied architecture and permanence of location indicates that location, rather than architecture, transmits social information, with settlement permanence displaying association with a locality and perhaps even an identity. Chapman (1991: 155-6) suggests that, in the context of size, magoulas displayed a degree of monumentality which would have supported a concept of place and ancestry as suggested by Halstead (1999: 88). However, Halstead (1999: 87-8) has noted that the monumentality of a magoula is not readily recognisable from the ground and, in a landscape with a large number of magoulas, their impact would have been somewhat diluted. Nonetheless, they could have served as known landmarks in the landscape. One wonders if a single isolated example, such

as Kouphovouno in Laconia, might not have had a greater impact, although the latter example is, at 5m, not very high, and hardly "dominates" the landscape. Chapman's (1991: 155-6) view fails to account for the initial magoula settlement but allows scope for ancestry building as the site developed. Bogaard (2004a: 147) argues that LBK village expansion was constrained by the ability of the inhabitants to manure the village hinterland. This may well have influenced magoula development through an unwillingness to sacrifice for settlement land that had been made fertile and manageable.

Extensive settlements are not as common as magoulas; examples have been found at Sesklo, Vasilika, Thermi and Makriyialos (Andreou *et al* 2001: 304-5; Kotsakis 1999: 67) and Nea Makri (Halstead 2006: 11) but none as yet in Southern Greece. They differ considerably from magoulas, as they are usually low-lying and cover a larger area. They display little or no evidence of occupational continuity, but rather show frequent instances of occupational hiatus. This settlement layout suggests a radically different social structure to that of magoulas (Halstead 2006: 12), which, Souvatzi (2008: 200) suggests, may relate to 'ideological structures and dominant manifestations of identity'. Sesklo is unique in that it is the only Neolithic site; thus far, contain evidence of both a magoula and an extended settlement. The contrast between them is very informative.

2.2.4 Sesklo: Contrasting Settlements

At Sesklo there are two distinct settlement features. The first is long term settlement on the magoula (Sesklo A) with evidence of rebuilding and continuity throughout the entire Neolithic. The second, to the southwest, is the extended settlement (Sesklo B) with short term occupation and evidence of frequent abandonment, separated from Sesklo A by a wall (Figure 2.5). Houses on the magoula are well-spaced and share no common walls. In the extended settlement, houses are closely packed, share walls and seem to vary in both size and location in the area around the magoula. Yet, apart from this, there is no distinction between the architectural forms of the houses on the magoula and the extended settlement (Kotsakis 1999: 69-71). This is a remarkable contrast when one considers that, in the limited space of a magoula, settlement is spacious but in the potentially limitless area of the extended settlement, occupation is clustered. Why should there be such different settlement forms and why does Sesklo possess both? The wall clearly delimits the boundary between the magoula and the extended settlement. At Sesklo it does not appear to have had a defensive function (Halstead 1999: 89-90), instead it probably fulfilled a structural purpose as a retaining wall (Kotsakis:

1996: 49-52). Alternatively, a symbolic role as a clear, purposeful distinction between the magoula and the extended settlement cannot be discounted.

Kotsakis (1999: 72-3) contends that extended settlements are the result of agricultural practices. Labour-intensive cultivation, such as tilling and manuring, could well have dictated that the settlement be located close to the area being worked, resulting in a kitchen-garden pattern of settlement. A similar pattern is suggested for *Langweiler* 8 in the Rhine-Meuse basin (Bogaard 2004a: 146), where a lack of expansion indicates that this settlement pattern was constrained. The practicalities of intensive garden agriculture limit somewhat the potential for expansion in an extended settlement context (Kotsakis 1999: 73). They do not, however, prevent the development of new settlements in a similar pattern. The random movement of settlement would suggest that plots were being moved to allow areas of land to recover fertility (Halstead 2006: 31), although manuring would have helped to reduce soil fertility exhaustion (Bogaard 2004a: 46; 142). Furthermore, such a dynamic pattern can only operate in areas of low population density and it usually reflects a slow but definite, migration of people, (Davis-Stone 1991: 41), not witnessed in Thessaly at this time.

The lateral movement of houses across extended settlements implies an absence of the same "sense of place" seen on the magoulas. This suggests that the same 'criteria' of place, or ownership, might not have applied (Halstead 2006: 30-1). In contrast, magoulas are located in fertile areas on land that would have required less tillage or manuring and which was better suited to diversification. These fertile areas could arguably constrain settlement, forcing magoulas to develop by limiting the use of valuable fertile land for settlement. Whilst this suggests a possible reason for the existence of settlement forms, it does not explain why both appear together, in a well watered, fertile landscape densely populated with magoulas. Kotsakis (1999: 73) postulates that both settlement types reflect a change in social interaction, wherein the magoula represents individual land ownership, perhaps with a genealogical basis and the extended settlement reflects communal land use. It is unclear whether the activities in the houses on the magoula differed from those in the extended settlement, since both have evidence of domestic activity and self sufficient units (Kotsakis 1996: 52).

The ceramic record displays a greater amount of higher quality painted pottery found on the magoula compared with the extended settlement (Andreou *et al* 2001: 264; Maniatis *et al.* 1988: 264-274). There is also considerable variation in raw materials used, suggestive of

differences in resource access (Kotsakis 1986: 01, 1996: 52), although Kotsakis (1986: 1) was unable to identify a functional difference between assemblages. More importantly, different potting traditions with respect to how the pottery was made and decorated were noted between both areas (Pentedeka and Kotsakis 2008: 305-311). The distinction at Sesklo is more than simply one of habitation and suggests control of access to resources and, or some degree of social differentiation (Pentedeka and Kotsakis 2008: 310). However, the ceramics from the extended sample are from a small area and may be somewhat biased (Demoule & Perlès 1993: 385). Valamoti (2003: 131-20) compared magoulas in the Central Balkans with extended settlements in Macedonia during the Late Neolithic and identified a potential difference in emphasis on household storage and surplus production between tell and extended settlements. She concluded that, rather than resulting from different environmental conditions between the two regions, this might be the result of different cultural concepts of production organisation. Halstead's (2006: 15-16) argument for ditches as markers of collective identity, would suggest that there is a clear differentiation of space at Sesklo, a deliberate marking out of an area and the exclusion of one group of people, with a clear distinction of house type and ceramic style (Halstead 2006: 18).

2.3 Subsistence and Economy

Perlès (2001: 152) argues that biases in recording methods, as much as research methodology, can lead to differing interpretations of Neolithic subsistence. The exploitation of resources, whilst primarily an issue of choice, is influenced by cultural practice and is delineated by environmental limitations as much as geographical ones (Forbes 1989: 87). Chisholm (1968: 41) warns against assuming that production is aimed at maximizing profit or, in this case, produce but instead argues that general trends are geared towards producing enough for subsistence at a certain standard of living.

Perlès (2001: 153) notes correctly that an understanding of Neolithic economy and subsistence must include a familiarity not only with those plants and animals exploited but also with habitation and cultivation practices. The absence of evidence for large scale herding, and the difficulties associated with herding in a wooded landscape, suggest that it was plant food and not domesticated animals that formed the basis of the Neolithic diet (Halstead 1992: 20). Consequently, cultivation provided the main food source for Neolithic communities, and

livestock, as Halstead (1993: 67-8) argues, acted as a store of food rather than a regular provider. Provision for periods of scarcity and resource stress forms an integral part of any subsistence regime and Neolithic society in Greece showed itself well adjusted to such a concern, by devising a number of potential coping strategies.

2.3.1 Crop Husbandry

Plant food made a significant contribution to the calorific needs of the Neolithic diet (Halstead 1981: 317-9, 1989b: 30, 1992: 20). Cultivated seeds and pulses dominate the archaeo-botanical record and, between them, provide a large part of the caloric requirement of a diet (Valamoti 2003: 98, 2007: 90-8). Furthermore, they indicate diversification (Halstead 2002: 107) to negate risk of crop failure and perhaps a program of crop rotation indicating that attention was paid to soil fertility (Forbes 1982: 223; Halstead 1981: 322; also Valamoti 2004: 122, 130 for arguments against the identification of crop rotation).

Preservation of archaeological evidence, however, is dependent on extreme conditions of survival, for instance, carbonisation and as such, the record is largely biased in favour of consumption rather than production (Halstead 2002: 105). The grain requirement for an average settlement of 200 people has been estimated at 200 kilograms per person per year, requiring a cultivated area of some 60 hectares (Perlès 2001: 165). In a region such as eastern Thessaly this must have put a strain on available land, especially if crop areas had to be shared with grazing animals. The land, therefore, would require a management strategy that was both highly efficient and productive.

Intensive garden cultivation would appear to be the most realistic model to apply. Although, there is no evidence for large scale land clearance, there are indications for the close herding of animals and an integration of herding/cropping practices (Halstead 1989b: 30, 1996a: 302). Forbes (1982: 225) recorded an integrated system of crop and animal husbandry, which incorporated strategies of manuring, avoidance of crop damage and the feeding of weeds to animals on Methana (1982: 262), while Rowley-Conwy (1981: 94-5) has outlined the contribution of animals to cultivation practices. Intensive garden cultivation, while very labour intensive and requiring the integration of animal and plant husbandry, is a high yield strategy suited to a region with restricted land availability (Bogaard 2004a: 159). The proximity of settlement to a plot can also affect the intensity of agriculture practised.

Variation in plot usage, although providing a mechanism against total crop failure and, in some cases, making use of microclimates to stagger and maximize productivity, is an ineffective use of both labour and time (Forbes 1982: 324-356, 1989: 90-91). Distance from a plot can affect the intensity of production (Chisholm 1968: 43-66, 131; Davis-Stone 1996: 119-20), although this can be remedied, somewhat, by the efficient use of time at a given location (Forbes 1982: 326). The LBK site of Vaihingen in Germany demonstrates a correlation between nucleation and intensive agriculture within its immediate environs, which decreases with distance (Bogaard 2004a: 146). Sesklo has evidence of shifting settlements, which, Kotsakis (1999: 73) argues, is a result of intensive garden cultivation and a requirement for proximity to the settlement to carry out manuring. This does not, however, explain the lateral mobility of the settlement at Sesklo, since manuring would have prevented soil exhaustion. Bogaard (2004a: 165) suggested that repeated intensive garden cultivation practices could have given rise to concepts of ownership over plots of land, while Van der Veen (2004: 160) argues that labouring on the land to improve potential returns constitutes a substantial investment unlikely to be discarded without maximum potential exploitation; a view shared by Jones (2004: 172-3). However, the lateral mobility of architecture at Sesklo does not support this.

The landscape of Thessaly, where surveys have demonstrated intense settlement patterns and restricted arable land (Perlès 1999: 42-56), would be suited to a system wherein crops are grown close to a settlement. In Laconia, however, no such restriction appears, with Kouphovouno the only large settlement in the region during the Middle Neolithic. Yet, we see a preference, during the Late and Final Neolithic, for marginal uplands over fertile lowlands (Cavanagh 1999: 31). Pastoralism has been suggested as one possible motivator (see above Chapter 2.2.2); however, if there is indeed a correlation between distance from settlement and intensity of activity, it is not surprising that some areas on the valley floor remained unexploited (see Chapter 2.2.2).

2.3.2 Animal Husbandry

Interpretation of animal husbandry is reliant on both osteo-archaeological and residue analyses, which like archaeo-botanical remains, are largely biased towards evidence of consumption and not of production. Faunal data indicates that, during the Neolithic, animal husbandry was practised with largely mixed species, in a strategy that was not specialised towards either meat or milk production (Halstead 2002: 108). Halstead (1981: 316) considers

that an average community of 40-240 people would have needed between 1000-6000 sheep per year to maintain their food requirements, or more if sheep provided the sole food source. This figure would have been neither sustainable nor practical in a wooded environment, or even, one would imagine, in a landscape as densely settled as Neolithic Thessaly but may have been manageable in the less densely-settled Peloponnese. Halstead (1981: 317-9, 1989a: 70), therefore, contends that, despite their potential nutritional contribution, animals did not dominate the Neolithic diet, but rather that plants provided mainly for the caloric needs of Neolithic societies supplemented by meat, wild fruit and nuts. Osteological evidence for the presence of sheep, goats, cattle, pigs and dogs is noted from the Early Neolithic onward, while residue analysis identified similar evidence from ceramics at Late Neolithic Makriyialos (Urem-Kotsou & Kotsakis 2007: 237-44). Sheep and goat dominate the early bone assemblages but consumption of cattle and pigs increased in the Late Neolithic period (Halstead 1981: 324). There is little evidence for either pastoralism or animal penning in earlier Neolithic Greece (Perlès 2001: 153), although the Berbati valley has evidence for short-term occupation of sites on natural communication routes during the Final Neolithic which could indicate pastoral activity (Johnson 1996a: 65-9). Neolithic societies need not have practiced transhumance or sedentism exclusively. Indeed, depending on seasonal labour requirements and available labour, the two might be employed within a complimentary strategy (see Jarman 1972: 728-9).

Animals are a source of meat, wool, leather and milk (Halstead 2002: 108). Their dung can contribute to land cultivation as part of an integrated farming practice (Rowley-Conwy (1981: 94-5). They can also function as a means of indirect storage and diversification (Halstead 1996b: 24). As such, animals act as a symbol of affluence which, in the context of social symbolism, encourages the maintenance of large herds or flocks. (Halstead 2002: 108). Despite the variety of animals recognised at Neolithic sites, the skills and resources needed to maintain a diverse range of animals was, it seems, beyond the capabilities of individual households. Animal husbandry was restricted by labour shortages, land requirements and the nutritional needs of the livestock while feeding and breeding management may have been beyond the capabilities of smaller individual households (Cavanagh 1999: 56-7; Halstead 1996b: 20-3). The question arises whether households would have been able to consume a whole carcass prior to the meat rotting, although this rather depends on the size of both the domestic unit and the carcass itself. Consumption patterns, preservation methods and the time

of slaughter could have increased the utilisation period of the meat, although there is, as yet, no clear evidence for any method of long-term carcass preservation (Halstead 2007: 29-39).

2.2.3 Risk Buffering

There is no doubt that Neolithic society faced resource stress brought about by drought, disease, crop failure, climate change and fluctuations in available labour (Halstead 1989a: 71-73, 1990: 147-9). Production for subsistence is risky, and leaves a society vulnerable to crop failure and raiding. As such, it would have been necessary to prepare for stressed periods through overproduction and perhaps the conversion and storage of this excess into an accessible resource (Halstead 1990a: 155, 2004: 155).

The reliability of long-term storage is a huge concern. Grain has a short life-span and the likelihood that more than a single year's supply could be stored is very slim. Neolithic farmers must, therefore, have continually planned to produce enough to negate crop failure (Halstead 1989a: 73). They must have also considered other methods of indirect storage, for instance as animal fat (a practice still used in modern Greece), to bank surplus feed for recuperation as and when required (Halstead 1990a: 152, 1992: 24; Valamoti 2004: 125). It may be the case that the animals themselves acted as 'capital'; not only as a symbol of wealth but also a resource that could be converted traded when necessary (Halstead 1998: 10-11, 1996b: 23), or as 'social technology' in the creation and maintenance of social relationships and obligations (Hayden 2001: 26, 55-6). In addition, plants could have been employed to increase milk yields and were not restricted solely to utilisation for meat production. The probability, however, of a single farmer suffering crop disease or environmental catastrophe, as part of a larger community, is small. It is probable; therefore, that reciprocal sharing, or the precautionary banking of resources, might have taken place outside the community. That Neolithic society in Thessaly was highly socialised is evident from the settlement pattern. Considering the proximity of settlements and internal settlement layout, it follows that such 'storage' mechanisms were also present.

Direct evidence for storage is scant, although perishable items, such as animal skins and baskets, no doubt existed and Halstead (1990a: 151) has identified a variety of non-ceramic methods of storing and preserving foodstuffs in modern Greece. It is doubtful that ceramics existed in sufficient quantity to store grain in quantity (Mee 2007: 202-7; Tomkins 2004: 43; Vitelli 1989: 26; Yiouni 1996: 191-3), although smaller ceramic vessels suggest a strategy to

preserve and thereby maximise, food supplies. Rather than risking spoilage by repeatedly exposing the contents of a large jar, quantities stored within smaller vessels could be opened and consumed almost immediately, thereby reducing waste. There is currently little evidence for large-scale household storage, although this could easily be a product of excavation bias, or a result of storage being maintained at a village or communal level. In this case we might expect storage to take place at the settlement limits, an area that is often neglected during excavation (Tomkins 2004: 43). One would expect that communal storage might occur, not at the perimeter of a settlement but, rather, close to the centre in order to deter raiding or loss to wild animals. Conversely however, storage away from the settlement would reduce the potential of loss through fire and theft (Forbes 1989: 96). Late Neolithic coarse pottery and deep pits have been found which, despite the latter being subject to a degree of wastage (Halstead 1989a: 75-6), suggest less concern for resource sharing and instead an emphasis on resource stockpiling and a more introspective social outlook during the Late Neolithic (Halstead 1995: 19).

It is plausible that long term storage was not critical to Neolithic subsistence. Diversification spreads the risk of disease, climate, fire, theft or crop failure, by reducing reliance on any one resource (Halstead 2002: 108). Maintaining a diverse crop and keeping a variety of livestock, along with the exploitation of wild resources, would reduce the risk of starvation (Halstead 1990a: 149) and supplement diet (Bogaard 2004a: 42). Crops can be sown at different periods and altitude which can affect the timing of the harvests themselves and therein reduce the need for long term storage (Halstead 1996: 303, Forbes 1982: 246-7). There is a clear regional diversity, with cattle grazing in the wetland flood plains of Thessaly, paralleled in the Late Neolithic by an expansion onto the islands and into the Peloponnesian uplands, aided by the domestication of hardier plant species such as barley and olive (Halstead 1981: 328-9).

2.3.4 Wild Resources

The expansion of settlement prior to the Final Neolithic, suggests both a demand for land resources and perhaps a need to exploit wild flora and fauna to supplement existing subsistence practices. There is, however, limited evidence for the consumption of wild resources. A variety of animal species are recorded including, deer, hare, auroch and boar, but they are not widespread. Perlès (2001: 171) sees this as representing a deliberate choice against exploitation and which may, at least in part, be supported by the absence of projectile points in the Early Neolithic (Perlès 2001: 205, 293).

The majority of recovered plant remains are domesticated varieties. There is, however, no evidence for the cultivation of fruit, fungi, or nuts, with recovered material tending to represent low numbers of wild varieties (Halstead 1981: 317-8). Consumption methods may well point to a preservational bias in favour of domesticated resources (Björk 1995: 119; Perlès 2001: 162). There is a significantly varied range of such produce attested, although this is small in quantity and its role in routine diet cannot be confirmed. Some wild foods, such as vetch and acorn, require additional processing; others, such as fruit and nuts, leave tangible archaeological remnants of consumption in the form of shells and pips. While fruit and nuts may have been consumed away from the settlement, their relative scarcity suggests they did not form a major constituent of the standard Neolithic diet (Halstead 2002: 108). Cultivation practices could have provided sufficient food to make reliance on wild resources unnecessary except, perhaps, as a supplement in times of stress.

Other factors could have affected availability, e.g. the consumption of fruit and nuts by wild animal and bird species raises the issue of resource competition, while, in a landscape as heavily settled as that of Thessaly, denudation of the land through intensive subsistence practices, could have limited the presence of wild resources available for consumption. Alternatively, scheduling conflicts with autumn sowing practices could have limited opportunities for their exploitation (Bogaard 2004a: 58-9; Hansen 1991: 164; Jarman 1972: 728-9). These issues would have dictated a shift by the community toward more readily available sources of nutrition. At Franchthi Cave there is a clear shift away from the consumption of wild resources in the Mesolithic in favour of cultivation in the Early Neolithic (Hansen 1991: 163-4). While this may have been affected by land clearance, it is reasonable to suggest that a similar move away from wild resources in Thessaly was not due to resource exhaustion but to an apparent cultural choice of subsistence strategy. This marginalisation of wild resources could have been culturally driven, with only opportunistic exploitation as a method of risk-buffering, as opposed to a fundamental subsistence strategy.

2.4 Intra-site/Inter-Site Interaction

2.4.1 Intra-site/Inter-Site Cooperation

The distribution of sites and subsistence strategies in Neolithic Thessaly suggests that interaction within and between communities was necessary and frequent, and more so at times of labour deficiency or during those enterprises that necessitated a co-operation which could be reciprocated throughout the community (Halstead 1999: 79, 2006: 27). Logistical problems, such as those associated with maintaining grazing, or the individual household keeping a mixed herd, might imply the presence of specialist herders and the reciprocal exchange of livestock through a community (Halstead 1992: 23), while restocking after decimation by disease would make interaction necessary (Halstead 1992: 54).

Halstead (1999: 79) questions the validity of regarding one structure as a household or 'social unit', suggesting, instead, that the household unit might have consisted of several rooms on a tell site. This makes the interpretation of 'household' much more difficult; a problem also recognised by Souvatzi (2008: 7-20). Interdependence within communities suggests that the social unit might, in fact, have been larger and could have incorporated several neighbouring magoulas. Smaller social units, alternatively, would have been too small to be viable (Halstead 1999: 83, 2006: 26) with insufficient latitude for fluctuations in available labour as a product of sickness, death and the involvement of children.

Co-operation amongst communities spreads the risk of resource failure by allowing some degree of diversification in crops. This highly socialised environment, Halstead (1999: 83, 89, 2006: 28-9) argues, is reflected in both the architectural arrangement and the ceramic material from Early Neolithic and Middle Neolithic magoulas. This interdependence is perhaps manifest in the obligations of food-sharing, represented archaeologically by the existence of multiple outdoor cooking facilities and the ubiquity of ornate and highly decorated open shaped ceramics, with the latter perhaps also representing signifying a mechanism for competitive feasting or the facilitation of the exchange of food for labour (Halstead 2004: 158). Also, sharing of food can operate, on different scales both within and between households, as a mechanism for reaffirming household links (Souvatzi 2008: 15-16).

Perlès (2001: 291) does not agree that external hearths signify an obligation to share resources, citing ethnographic examples where public cooking does not carry a requirement to share.

Indeed, the presence of hearths inside houses indicates that some activity took place behind closed doors. Perlès (2001: 290) argues that there is no evidence for communal organisation with regard to production, citing the absence of shared grain storage, animal pens or tools for working the ground. The absence of communal storage is, however, logical. If grain is kept in smaller parcels, it reduces the risk of the store being compromised or spoiling. While the likelihood of recovering and recognising a cache of communal tools seems rather low. Food exchange, at both an intra and inter-site level, can act as a mechanism of resource banking and lead to the creation of social obligations, useful during times of labour or resource shortage, whilst simultaneously spreading risk and in the case of stock, reducing maintenance costs (Halstead 1992: 23-4).

The estimated average population of a tell (100-300) implies not only a high demand on resources but the existence of a potentially large labour force with which to exploit the local environment, within which were probably contained several 'social units'. Certainly, the ordered nature of Early – Middle Neolithic settlement in Thessaly (Perlès 1999: 54) suggests the existence of cooperation. Perlès (1999: 53) proposed that the fission of settlement implies the retention of links to older magoulas. Halstead (1999: 89-90) speculates that a system of reciprocity and cooperation could, in turn, have led to competition. This is difficult to interpret between magoulas. At Sesklo, for instance, there are differing scales of rebuilding which might suggest competition, however, competition could be controlled by interdependence during times of labour sickness, stress, or crop failure as well as alliances, perhaps through kinship (Halstead 1999: 89-90). Perlès (1992: 121) argues that localised exchange and mutual need would have, in turn, prevented conflict over resources or territory. There is no clear evidence of warfare in the Early to Middle Neolithic, although some landscape features and artefacts may be interpreted as evidence of it (Runnels *et al.* 2009).

Halstead (1995: 19) argues for a change from co-dependence in the Early – Middle Neolithic to individualisation and accumulation during the Late and Final Neolithic. Settlement patterns indicating an exploitation of caves, marginal and upland regions support the view of individualisation of settlements. The erection of walls on some settlements, perhaps to restrict views to and from cooking facilities may also be an indication of the aforementioned transition. Furthermore, an increase in the visibility of storage pits and an increased reliance on wild resources, may well result from a lack of available co-operative labour. A similar shift away from public presentation may be evident in the ceramic assemblage, styles become less

decorative and shapes tend toward storage rather than display, thereby reinforcing the notion of a progression towards individualisation. Conflict could have been caused by communities facing similar stresses, such as competition for alliances through marriage or similar, at the same time, indicating some degree of control. Halstead (1995: 20) concluded that isolation and individualisation was a process apparent throughout the Neolithic, delayed by the necessity of cooperation which eventually evolved into competition for alliances and obligation. This competition, in turn, manifested itself in architectural monumentality and the appearance of regional material cultural styles.

Interaction and cooperation between communities in Early and Middle Neolithic society is thus represented by a highly-integrated society within settlements and across regions, facilitated by mutual need and resultant cooperation. This inter-dependence not only aided community subsistence but existed as a mechanism that prevented conflict. The intramural relationships between people seem to have been highly socialised. This is reflected in architectural layout and material culture, both of which, perhaps, served as devices to reinforce the bonds between communities. It is probably not coincidental that changes in settlement patterns and subsistence led to the severing of certain communal bonds and their replacement by a more private, individual outlook.

In the Peloponnese the evidence for interaction is much more obvious and this is aided by the disparate settlement patterns. The presence of obsidian and spondylus shells at all sites indicates that exchange was taking place, alongside evidence of more closely knit interaction in ceramic decoration (Cullen 1985a, 1985b, Washburn 1983). Talley (1987: 161-9) argues that clay figurines, where they can be suggested to have served as tokens, imply close personal interaction. More convincing is the evidence for interaction at geographically remote Early and Middle Neolithic sites. The distances between sites in the Peloponnese suggest that interaction there would have required more intentional action than might have been the case in Thessaly. While suitable for cereals, this may have had implications for dairy products and meat, both of which can spoil quickly, unless the animals were transferred by hoof.

2.4.2 Trade/Exchange

The reasons for exchange can be varied: the procurement of generally unavailable goods, social storage, and the prevention of inbreeding in both human and animal populations and the maintenance of alliances as outlined above (Chapter 2.4.1). The settlement patterns on the

plain of Thessaly are not conducive to the isolation of villages and are suitable for exchange but paradoxically they can also cause conflict over resources and form social barriers to exchange (Perlès 1992: 121). Both exchange and inter-site social relations may have been more organised than implied by extant artefact distribution.

The exchange of food between communities could have possessed a greater significance than exchange within groups. As part of a risk reduction strategy having a 'bank' of food at a distance could potentially offset catastrophic crop failure, disease or environmental change which are likely to impact across entire local networks. Exchange of animals and plants can be difficult to trace over short distances if they remain within their native area (Halstead 1992: 19). Long-distance exchange of livestock would have been necessary in instances of catastrophic loss from disease or overgrazing (Halstead 1992: 23), while the limited genetic variation in flocks and herds (and even humans) would have necessitated inter-site exchange to maintain genetic viability. Nonetheless, the exchange of animals to maintain genetic variation, although an important breeding strategy, does not require much contact. Rather, it requires only that males be exchanged if their progeny have been assimilated into the breeding herd, which, depending on the herd/flock structure, could be possible within a single community.

The exchange of ceramics is discussed in detail below (Chapter 2.5.6). Ornaments have no discernible stylistic variation, are found in low quantities and have specialised production, use and distribution. They are related, perhaps, to an elite; their exoticism contributing to their prestige, their 'worth' increased by rarity and distance. Obsidian provides the clearest evidence of exchange, although local flint sources continued to be exploited throughout the Neolithic. Its ubiquity suggests that it was a much sought after resource with a relatively simple mechanism of procurement, despite the distance involved. The manner by which obsidian was procured from Melos is much debated; more specifically whether it was directly sourced by each village or whether it was distributed through an exchange mechanism. Perlès' (1992: 116) contention that the logistics, knowledge and capabilities required for such an undertaking were probably beyond the general population seems highly likely. Production areas for chipped stone are few and widely dispersed but the distribution of chipped stone is widespread, indicating that it was perhaps in the hands of a few who had the specialist knowledge required to source and process it. This has led Perlès (1992: 137) to conclude that, as she was unable to identify any stylistic variation in the lithics, they must have been a

utilitarian item with large scale production and distribution, perhaps facilitated by travelling craftsmen whose interest was purely economic.

Perlès (1992: 115) contends that the study of exchange is all too often parcelled into one category and that utilitarian and prestige items are all considered to be part of the same exchange mechanism. Furthermore, studies focus on the general distribution of individual artefact types as a whole without examining item distribution in detail for particular spatio-temporal preferences. Perlès (1992: 119) correctly argues that no one system of analysis can inform about exchange and that all exchanged items must be examined and compared with regard to production distribution and consumption. Souvatzi (2008: 186) asserts that ceramics, stone tools and shell each indicate different patterns of production and distribution within and between sites, indicating significant differences in the economic roles of households both locally and regionally. Perlès (2001: 295-6) suggests that village specialisation might have been in operation but there is, as yet, little clear evidence to support this. The extent of Neolithic craft specialisation is not be debated here, although both lithic and ceramic data implies some level of specialist knowledge, albeit with no clear link between specialised production within the Neolithic and the distribution of artefacts.

2.5 Neolithic Pottery: Production, Functionality, Potters and Society

2.5.1 The Organisation of Ceramic Production

Clear evidence of the organisation of production is lacking. It is unclear whether it is conducted by specialists, household producers, itinerant potters or if it has a shamanistic element. Arnold (1985: 101) felt that the female association with child care and household domestic practices made women the more likely candidates for making pottery. Vitelli (1989: 17, 1993a: 208, 1999: 190) suggests during the Early Neolithic period it was organised at household level produced for use by each discrete household, probably by women familiar with the materials and procedures necessary for ceramic production. This would have been due to their engagement with domestic activities, such as the collection and preparation of food, as well as awareness of the properties of clay and its reaction to heat (see below Chapter 2.5.1, for a fuller discussion). Vitelli (1993a: 210) speculates that five potters are recognisable at Franchthi Cave in the Early Neolithic, although there is no evidence that they were contemporary. Ethnographic studies have shown that it is usually women who make pottery in situations of household production (Balfet 1965: 162, Phillips 1971: 341-52) and their

movement among Middle Neolithic communities would provide a mechanism for the spread of technical knowledge (Vitelli 1993a: 217).

Björk (1995: 133-4) examined the similarities in decoration between Achilleon and other sites and subsequently suggested, in conjunction with lithic evidence for inter-site contact, the possibility of itinerant craftsmen/women from whom the craft was adopted by locals. Low production rates are estimated for Franchthi Cave (Vitelli 1993a: 210) and Nea Nikomedeia (Perlès 2001: 214; Yiouni 2004: 1-22) (see below Chapter 2.5.2), which suggest annual production rates within the capabilities of a single potter, allowing scope for an itinerant potter. During the Middle Neolithic the broad stylistic homogeneity, similarity in technical proficiency and use of local fabrics across the Peloponnese support the case for the existence of itinerant potters. The argument is further strengthened by visible similarities in ceramic technique, shapes (Perlès 2001: 219) and local fabrics (Cullen 1985a & b). Vitelli (1993a: 209), however, argues that there is sufficient evidence of local forming practises to indicate localised production. Furthermore, Cullen (1985b) found there was a great deal of similarity between particular sites in the execution of decoration in the Northern Peloponnese. She identified two differing axes of interaction: North, between Asea, Ayioryitika and Lerna, and South, between Corinth, Lerna and Franchthi Cave, whereas Washburn (1983) noted broader relationships between Southern, Central and Northern Greece. Cullen concluded that possibly pastoralism, through seasonal contact, or more plausibly exogamy or raiding, could be responsible for the similarities in decorative styles between sites.

Perlès and Vitelli (1999: 98) argue that the possession of exceptional skills and technical knowledge necessary to fabricate Urfirnis pottery, also evidence for experimentation and innovation, points to the existence of specialist potters in the Middle Neolithic period. Technological expertise, however, does not necessarily indicate craft specialization. It can be a result of competition between potters (Costin and Hagstrum 1995: 621; Mee 2007: 209-10). Furthermore, the evaluation of a perceived skill level is relative to our understanding of available resources and therefore the use of labour input or technical knowledge is insufficient to indicate craft specialization (Costin 2001: 281-2; Kalogirou 1997: 15-16). Clearly other criteria must be found to consider the question of specialist potters in the Greek Neolithic.

Potters appear to occupy a wide range of social positions across the ethnographic record (Arnold 1985: 196-8) and this prevalence often depends on the relative importance of potting to subsistence resulting in a general demand for pots. Vitelli (1993a: 217, 1995: 59-60) argues

that pots held some symbolic power and that pots were perceived to have magical properties, hence potters were perceived in a shamanic context and were granted enhanced status. This view is shared by Björk (1995: 134), who argues that their association with cultic or ritual activities would have enhanced their social position.

Perlès (2001: 216) argues that pottery production was kept deliberately low as a utilitarian medium because of its ritual function. The lack of increased production and technological change is thus a deliberate choice by the potters, due to social constraints, which saw them keen to retain their own position but the changes visible in the clay, in colour, texture and even spalling, may not have been a new experience for Early Neolithic people. The manipulation of clay and the effects of fire upon it would have been made familiar through the use of the hearth, or through familiarity with buildings destroyed by fire. It is perhaps the control of fire, or, more importantly, atmospheres, that may not have been as widespread. Tomkins (2004: 46) argues that experimental work has proven the process of fabrication to be quite simplistic and not a closed technology. It seems that, in the Early Neolithic, ceramics were a new medium and the slow expansion rate has more to do with its adoption, versatility and the widening technological abilities of the potters that allowed experimentation leading to the development of elaborate Middle Neolithic ceramics. It seems, therefore, that pottery fabrication's association with shamanism is unlikely.

2.5.2 *Rates of Production*

Despite the ubiquity of ceramics on Early and Middle Neolithic sites, the scale of production is still an unresolved issue, suffering the vagaries of variable survival compounded by the use-life of ceramics, sample biases influenced by retention biases (Björk 1995: 108-110) and variation between estimation methodologies (see below). Estimations are problematic and dependant on ceramic use-life, site type and site abandonment (Mills 1989: 134-5). Nevertheless, some attempts have provided valuable insight into the scales of production and the role or status of potters in Neolithic Greece (Youni 2004: 1-22). Vitelli (1993a: 210, 1999: 193).

Assuming that production and discard at Franchthi Cave remained constant and that each Early Neolithic vessel weighed c.1 kg, Vitelli (1993a: 210, 1999: 193) suggests a ceramic output of 12-13 vessels per year by five active potters, increasing to 125-50 vessels in the

Middle Neolithic. The finishing of the vessels produced varied considerably, which suggests unfamiliarity with production and is perhaps symptomatic of irregular activity within the abilities of low numbers of potters. Production estimates at Sesklo and Nea Nikomedeia are, likewise, low (Perlès 2001; Pyke 1996; Wijnen 1994), although differing methodologies were used to calculate the relevant estimates. Yiouni (2004: 4-6) re-evaluated the estimates at Nea Nikomedeia, Achilleion and Franchthi Cave focusing on recovery rates and raised the quantity substantially. She estimates that 13-14 vessels per house were in use annually at Nea Nikomedeia and that pottery was common. Björk (1995: 110), however, noted a different discard pattern for rim, body and basal sherds at Achilleion indicative of a reuse of bases and occasionally body sherds, which would bias sherd counts. Vitelli also indicated evidence for the mending and reuse of sherds at Franchthi Cave (1993a: 208), suggesting that ceramics were too precious to be wasted. At Knossos, Tomkins (2001) attempted to average the maximum and minimum number of vessels in circulation per stratum but found that he could only reach very broad conclusions relating to trends and phases at a site-wide level and was unable to identify individual potters or techniques.

The discrepancy between Vitelli's and Youni's methods of estimating ceramics was highlighted at Kouphovouno (Mee 2007: 202) where weight and recovery rates were applied to the same assemblage. Here, the results varied considerably, with weight estimates suggesting an annual production rate of 2500 vessels, compared with sherd recovery estimates of c.10,000 vessels annually during the Middle Neolithic. This demonstrates that the problems of production estimation are not just limited to those issues outlined by Mills (1989: 135-42), namely use-life, site type and site abandonment but include a number of additional issues and the use of those implicit assumptions discussed in detail in Chapter 5.6.1. Further research is needed to overcome the multitude of variables and unknowns which currently confuse production estimates. Nevertheless, the use of one method provides a reference and allows comparisons between contexts and phases on sites and, in some cases, between sites, although for the latter a coherent method of primary data collection must be implemented across all those involved.

There is a significant increase in both the quantity and quality of pottery in the Middle Neolithic Period (Vitelli 1993a: 210), which could, plausibly, have a link to function. The function of Early Neolithic pottery appears to be limited in scope (Björk 1995; Vitelli 1993a; Wijnen 1994; Yiouni 1996). Cooking is not readily apparent, with consumption, storage and

display better represented (see Chapter 2.5.4 below for a more detailed discussion of function). It is possible that the functionality of pottery was yet to be fully understood. People were not, as yet, fully aware of its capabilities, or it may be that ceramic technology had yet to prove itself against existing Mesolithic technologies related to food processing, consumption and storage. The increase in quantity and improvements in quality during the Middle Neolithic leads one to infer that a greater familiarity with the nuances of ceramic production on the part of the potters lead to the appearance of high quality Urfirnis ware.

2.5.3 Firing Practices

Despite the hardness of the Neolithic Urfirnis Ware, there is insufficient evidence to suggest that it was fired in a kiln. There is no clear evidence that firing of this kind took place on tells and, as yet, no conclusive evidence of pit firing has been found, although Gimbutas *et al.* (1989: 46-50) speculated on its use at Achilleion. Evidence of bonfire firing is similarly absent. Vitelli (1974: 2, 29) found that bonfire ash degrades rather quickly, which may go some way to explaining the lack of firing installations identified at Early and Middle Neolithic sites but some possible ceramic firing installations have been found at several Late Neolithic period settlements (Souvatzi 2008: 181-2). Vitelli (1993a: 184-5, 1997: 21-40) proposed that a large bottomless vessel found at Franchthi Cave was a mobile kiln. Arnold (1990: 927-8), however, noted among household potters in Mexico that the amount of available space had a direct relationship to the method used. Kilns were used where space was restricted, while bonfires were employed on sites with sufficient available area. On a tell site with restricted space one could imagine that kilns would have proved the more suitable option, particularly as simple updraft kilns are technologically simple to build and operate and allow the maintenance of relatively stable temperature and atmospheres (Arnold 1990: 928). It is plausible that firing took place off-site, away from domestic architecture to negate the risk of fire or smoke pollution and that these installations remain unexcavated due to a strategic focus by excavators on the core of settlements rather than their peripheries.

Despite this absence of primary production sites, the evidence from the ceramics themselves is more informative. Vitelli identified stacking/firing circles at both Franchthi Cave (1993a: 199-201) and Lerna (2007: 95) (See Chapter 6.2.2.6) and argues (see Vitelli 1993a: 200-2) that large stacks of pots can act as kilns. By sacrificing those on the outside of the stack, pots can be protected from direct contact with fuel, specific atmospheres can be achieved, while clouding is reduced and temperatures maintained. Use of these stacks could have negated

those problems associated with bonfire firing; changes in temperature range, direct contact with fuel, maintenance of temperatures and the fluctuation of atmospheres (Vitelli 1993a: 199-202). Were this the case, we might expect to find larger numbers of wasters, although if firing took place away from the settlement, these might not necessarily occur on-site, also 'wasters' do not have to be heat warped, vitrified, more often than not they are just cracked and so can be difficult to detect archaeologically. Estimated production rates range from 125 using Vitelli's (1993a: 210) criteria to in excess of 2,000 per year (Mee 2007: 202) during the Middle Neolithic. If firing was carried out no more than a couple of times a year, these suggested numbers could have facilitated the practice put forward by Vitelli, although the lack of wasters makes it unlikely. Firing in a small bonfire would allow greater attention to be paid to each pot by the potter to prevent fire clouding and thorough oxidisation, if desired. While Youni (1996: 69) and Sillar (2000: 47) noted that complete oxidization could be achieved using bonfire technology, to produce pottery that is consistently completely oxidised and fired hard in the bonfire is an outstanding achievement. This could have contributed to the view of Early and Middle Neolithic ceramics as prestige or value items and perhaps even to suggest ceramic production as a specialist activity (Vitelli 1993a: 216, 1997: 21-40). Although the use of kilns cannot be ruled out, there is little evidence for their existence and it seems that firing probably took place in small bonfires, likely located at distance from settlements.

2.5.4 Functions of Ceramics

There has been much discussion about the function of Neolithic pottery. The development of a ceramic tradition and the emergence of agriculture appear roughly contemporaneously (i.e. the Early Neolithic). This has led to the belief that ceramics, food preparation, cooking and storage were inextricably linked. However, some arguments favour a pre-ceramic Neolithic that implies the existence of farming prior to the development of ceramic technology (Perlès 2001: 64-97). There is also a presumption that early ceramics serve the same functions across different Early Neolithic sites (Yiouni 2004: 20-1). This link between food and ceramics has been supported by a wealth of historic-period and modern ethnographic parallels. Although food processing was carried out prior to the appearance of the first ceramic vessels, they undoubtedly expanded the scope of processing activities, providing many new and, in some respects, more efficient methods. From an archaeological point of view it raises several interesting questions. Can functionality be readily discerned from ceramic assemblages? Is there any tangible evidence for the exclusive association of food with ceramics? Did Early - Middle Neolithic subsistence practices necessitate ceramics as a new medium for food

processing? What advantages did the 'new' medium now present over already existing ones? Is there evidence of uses other than food processing or storage? Finally, is there any suggestion that specific design elements of the ceramics reflect specific functions? In answering these questions, one would hope to elucidate the functionality, technology and rationale behind Early Neolithic pottery production. Ceramics will be discussed under five headings: Storage, Cooking/Processing, Consumption, Display and Other.

Storage

The evidence for storage in the Early - Middle Neolithic relies mainly on the calculated capacity of grain storage. Vitelli (1989: 26) estimates the amount of grain necessary for the next year's crop is 100kgs per hectare, which would provide the caloric needs for three to four people for one year. If this was stored in ceramic vessels, they would have needed to be either very large or very numerous. Vitelli (1989: 26-7) estimates a volume for an EN jar of 4 - 8 litres, implying a vessel requirement at Franchthi of 30-65 annually. She doubts whether the first pots could have been made so large and found no evidence for large pots at either Franchthi Cave or Lerna. Björk (1995: 115), similarly, noted that large vessels were not found at Achilleion. Yiouni (1996: 191-3), upon calculating the requirement of ceramic vessels to store 12 months supply of grain and pulses at Nea Nikomedeia, found that the estimated ceramic production potential was a long way short of that required, however, there was capacity for a year's seed grain. The simple ability to store grain at Nea Nikomedeia is not conclusive evidence that ceramics were used in such a manner.

Similarly, autumn crop sowing, as practised in the Neolithic (Bogaard 2004b: 183), reduces the need for storage. Sown grain provided a more secure method of storage negating spoilage, theft and accidental wastage, although it is still required that seed grain is stored for at least part of the year. Youni's calculation does not factor in alternative modes of storage, such as baskets lined with animal skins, which could fulfil the capacity, security and durability conditions necessary for storage as outlined by Björk (1995: 115). In fact, these alternatives may well prove more suitable, being relatively easier to fabricate and, with a greater capacity for shock absorption, more resistant to breakage. Natural materials, however, can be manipulated into a limited range of shapes (Arnold 1985: 138) and, whilst more durable to shock, they are less durable to rodents or moisture (Arnold 1985: 140). Evidence of this and other modes of storage, such as lofts and pits, are absent at Achilleion and other Neolithic sites but Tomkins (2007: 185) argued that clay stoppers at Early Neolithic Knossos could have been

used to seal non-ceramic vessels. Furthermore, in the Aceramic layers, pits with carbonised grain and a possible granary were found. Björk (1995: 115) questions the concept and necessity of large scale storage and suggests a diet more reliant on wild plants, thus reducing the need for storage.

At Kouphovouno, a sampling exercise found that the pottery is mostly fine and painted ware and that the coarse ware is generally from open and pedestalled shapes, unsuitable for storage (Mee 2007: 204-5). Nevertheless there are shapes that do have the physical and mechanical attributes conducive to storage, e.g. collared jars can be sealed producing anaerobic conditions (Figure 2.6), while piriform jars have a low centre of gravity and are relatively stable (Mee 2007: 205) (Figure 2.7). Vitelli (2007: 96) noted a series of ledges on the insides of collar jars at Lerna and Franchthi Cave, with the Lerna examples possessing an additional series of pierced holes at the rim. Both could, theoretically, be indications of the use of stoppers to seal the pots. The presence of particular jar shapes suggests storage while the capacity of these shapes implies storage of a scarce, or perhaps precious, commodity. Nevertheless, with jar shapes among the most common in Middle Neolithic contexts, their relatively low capacity could arguably be a technological constraint necessitating a larger number of smaller volume vessels, or could result from a strategy of risk avoidance, i.e. a means of preserving a scarce commodity by distributing it among multiple vessels. Being physically easier to distribute amongst the community, smaller storage units would support the idea of sharing, which Halstead (1995: 11-22) believes existed in the Early and Middle Neolithic. Tomkins (2007: 187-9) argues that at Aceramic and Early Neolithic Knossos there is evidence of both large-scale bulk storage and smaller-scale storage in ceramic and non-ceramic containers. It is evident that ceramics were suitable for use as storage containers but it is equally evident that the range of storage roles was potentially vast; from storing future resources, to processing and also redistribution.

Cooking/Processing

There is botanical evidence from Nea Nikomedeia and Franchthi Cave of a varied range of foodstuffs: many wheat varieties, pulses, legumes, lentils, some wild plants as well as animal produce and marine resources, although little evidence of wild animal exploitation (Perlès 2001: 163-71). These resources do not necessarily require ceramic vessels for processing. There is evidence in Neolithic Greece for multiple varied preparation methods: roasting on heated stones, grilling, or cooking in ovens. If ceramics are used for preparation, heat is not

necessarily required, with soaking or fermenting, for example, providing plausible alternatives (Valamoti 2003: 103, 2007: 96-8).

Ceramic use offers a number of advantages over other cooking methods, notably, an increased efficiency of temperature and time and an impact on taste, the collection of juices and the prevention of burning (Arnold 1985: 133-5). It can also allow facilitate the consumption of an increased range of foodstuffs by allowing extended cooking processes and detoxifying procedures (Arnold 1985: 136; Ikawa-Smith 1976: 515; Valamoti 2003: 9-100). Using ceramics to cook food, however, presents a number of dangers to the cook. It is laborious (Pratt 1999: 81) and requires maintenance of constant temperatures over a period of time (Ikawa-Smith 1976: 514). Alternatively, there are a number of ways to cook using indirect heat that do not rely on ceramics (Brown 1989: 207; Valamoti 2003: 98). The majority of these employ organic materials. The use of heated stones in vessels is widely attested in archaeological and ethnographic literature (Arnold 1985: 128; Brown 1989: 207; Sassaman 2000: 148-86). Indirect heating has a lower thermal gradient and low thermal stress which would allow for longer vessel use-life (Brown 1989: 207). There is, however, little to suggest it was used in Greece (Tomkins 2007: 184). Direct evidence, such as fire-cracked stones, are not widely reported but could have been easily overlooked during excavation and their presence has been suggested at Aceramic Argissa (Tomkins 2007: 184). The small size of Early Neolithic vessels leaves little room for the displacement of food and would affect the amount of food being cooked.

The clearest evidence for the association of food with ceramics is residue analysis. Urem–Kotsou and Kotsakis (2007: 237) report animal fat on cooking vessels from Makriyialos as well as plant remains on large pans. Björk (1995: 87-8) found evidence of lipid and protein residues at Achilleion, although the specific context of those residues is uncertain At Nea Nikomedeia the occurrence of bitter vetch implies at least limited processing of food using heat, since vetch must be boiled prior to consumption to remove its poisonous properties (Valamoti 2003: 99-100). Its presence in Mesolithic contexts indicates that, if consumed, prior processing must have been carried out in non-ceramic containers.

Attempts have been made to identify cooking wares. Björk (1995) felt that the fabrics at Achilleion did not have sufficient properties, or that surface treatments, such as burnishing, which would prevent thermal shock and allow the exposure of vessels to heat, were not

appropriate for cooking. Likewise, use-wear evidence and the absence of basal sooting suggest a role in actions unrelated to cooking. A majority of shapes, (c. 80%), although open, possessed pedestalled bases, and were unsuitable for use over fire because of diminished heat efficiency. She identified only a handful of the shapes at Achilleon which possessed what she deemed to be the 'necessary rounded shape and thermally appropriate fabric' that would allow for use over fire (Björk 1995: 87). Björk (1995: 112) suggests that the absence of a clear association between food processing and ceramics is probably due to such a link not having been made during the Early Neolithic period. At Early Neolithic Nea Nikomedeia two fabrics were recognised as being rich in calcite and limestone making them suitable to resist thermal stress, but only a small percentage, (c. 8%), had rounded bases (Yiouni 1996: 186-8). Youni (1996: 190) noted a range of shapes demonstrating exposure to fire by sooting and oxidation; evidence that has also been noted at Makriyialos (Urem-Kotsou *et al.* 2002: 112).

At Franchthi Cave, Vitelli (1989, 1993a) noted that, prior to the latter stages of the Middle Neolithic, few shapes possessed the physical and mechanical properties necessary for cooking. Vessels with high pedestal bases were common but these are not conducive to heat convection and possess angles which create zones of potential weakness, where repeated exposure to heat would risk vessel failure (Vitelli 1989: 24, 1993a: 213-4). Furthermore, like Youni, she suggests that a rounded shape increases the surface area directly in contact with the heat source and reduces the area of potential weakness but notes a lack of sooting on vessel bases, perhaps the clearest indication of heat exposure. Two wares from the later Middle Neolithic phases, Sandy Burnished Ware and Lime Burnished Ware, do possess physical and mechanical features that support their suitability for use over a fire but these two wares represent less than 20% of the total assemblage present at Franchthi Cave (Figure 2.8). They have a deep, globular shape with a rounded base, thereby eliminating areas of potential weakness and exposing the maximum surface area to heat (Vitelli 1993a: 213-4, 1995 56).

The criteria used to identify cooking ware are problematic. The presumed necessity of rounded bases and thermal shock resistance (Kingery 1955) has been successfully challenged. Woods (1986: 159-63) noted that, from the Later Neolithic through to the Romano-British period, cooking pots tended to have flat bases or carinations close to the base, nonetheless, rounded bases tend to have been the norm (Rice 1987: 237-8). Resistance to thermal shock has long been considered crucial in determining fabrics for cooking vessels. Tite & Kilikoglou (2002: 1-5) identified shell as the most suitable temper in vessels exposed to heat, having a lower

expansion range at higher temperatures than quartz, for example. However, they noted that a range of tempers could have been used in the production of adequate cooking pots. Furthermore, if a pot can survive firing it will more than likely endure use over fire but perhaps not the continual friction of expansion and cooling over its uselife. Woods (1986: 168) noted that both calcareous clays and sandy fabrics were used to make cooking pots in Britain through to the medieval period, while Tsirtsoni & Youni (1999: 106) were unable to identify a fabric at Dikili Tash that was solely used for cooking wares, rather suitable fabrics were used in a variety of additional vessel types. It seems, therefore, that thermal shock resistance and rounded shape were not as important for cooking vessel production as previously thought. Porosity, which allows expansion in a heated fabric and which helps to prevent cracking but which can equally reduce conductivity (Sassaman 2000: 159), is perhaps a more reliable indicator of cooking fabrics (Rice 1987: 237; Tsirtsoni & Woods 1986: 170; Yiouni 1999: 104). Urem-Kotsou *et al.* (2002: 116) caution against the reliance on fabric type for the identification of function as, at Makriyialos, sherds with are found in a range of fabrics and shapes, which may be related to different cooking activities. Furthermore, Sassaman (2000: 159-60) noticed that Middle Savannah potters in the south-east United States incorporated features suited to direct heating into their ceramics. These included smaller and in-turned vessel orifices which reduce the rate of heat loss and thinner walls to increase conductivity. However, traditional methods of indirectly heating food continued to be used, even though they were less efficient, suggesting that thermal features existed as a cultural signature rather than a functional attribute.

It is clear that these criteria alone cannot be used to identify cooking ware. Clearer evidence, such as sooting on bases, scorching, internal residues and even fire clouding, offer more reliable indications of use over fire. Other mechanical features, such as porous coarse fabric, pour-ability and conductive dull-grey fabric (Woods 1986: 158) are equally suggestive. This does not rule out a cooking function for those vessels identified by Vitelli (1989: 24, 1993a: 213-4) but indicates that they were not designed with an exclusive set of properties deliberately suited to use over fire. Some of those features discussed above are recognised within the assemblage, notably residues and grey fabric. Other features which could indicate a function related to food preparation over fire are found on these pots, such as the lugs near the rim which would be useful for manoeuvrability, while straight or slightly-incurving rims would help to retain heat, although they would make pouring difficult. These vessels have a maximum estimated capacity of 6.5 litres, although it is impossible to calculate how this

would translate into individual portions. Vitelli (1993a: 213-4) reports that 'cooking vessels' account for less than 20% of the Franchthi Cave ceramic assemblage, which is a sizeable proportion of the assemblage but, Foster (1977: 606-9) estimated a use-life of cooking vessels to be 6 months in Michoacán, Mexico and Mills (1989: 139) estimates it as 1.1 years among Shipibo-Conibo communities. It is reasonable to assume, therefore, that cooking wares would be a relatively common occurrence within the ceramic record and this does not seem to be borne out with Vitelli's cooking ware. However, there is plenty of evidence of other ceramics being used with heat.

Consumption/Serving

Vessels used for consumption tend to be relatively small, mobile and easily accessible. Alternatively serving vessels are required to be less mobile. They are often, although not always, made of fine fabric and decorated. Increased use implies higher breakage rates, which ensure high quantities within the archaeological record and a bias towards domestic contexts (Mills 1999: 99-114). Some Neolithic shapes possess incurving rims, for instance the 'piriform jar' (Figure 2.7) and high pedestalled bases that make pouring and decanting awkward (Figure 2.9). Some shapes, however, like those with everted rims, are more suited to pouring (Figure 2.11) (Mee 2007: 204-5). Deep bowls are suited to dipping and scooping (Figures 2.10 & 12) and scratches often noted on internal bases perhaps result from this practice (Vitelli 1993a: 215-6). These features are likely indicative of a deliberately functional design for consumption or serving vessels.

Mee (2007: 205-6) identified that 60% of shapes at Kouphovouno possess a capacity up to 1.5 litres, suggestive of communal consumption. The low frequency of highly-decorated vessels for individual consumption has been suggested as a product of occasional ritualistic or social drinking, or perhaps the existence of a social elite at Franchthi Cave (Vitelli 1993a: 216). This view is supported by the small volume of these pots and the common decoration on 'consumption' vessels, which could have contained social information spread across the wide geographical area of the north-east of the Peloponnese (Cullen 1985a, 1985b; Washburn 1983). The use of bowls, utensils of ceramic, made of wood or bone, or even eating by hand directly from a larger vessel might explain the imbalance between consumption bowls and larger serving vessels. Also, plausibly the use of softer wood could explain the paucity of scrape marks on ceramics. Certainly, wooden spoons are attested in Neolithic contexts at the Anatolian sites of Çatal Hüyük and Yakar (Björk 1995: 127). Ceramics from Greek Neolithic

sites demonstrate no contextual bias with both storage shapes and consumption shapes found together. If, however, consumption was, as it is believed to be, a social event (Halstead 1995: 11-22), we should not necessarily expect to see a contextual bias.

Display

The Early and Middle Neolithic in Greece appear to have been highly-socialised periods with large, densely distributed settlements (Perlès 2001: 125-8) and evidence of the sharing of food and resources (Halstead 2006: 16-17) (see Chapter 2.2.3). Despite the inherent difficulties of maintaining a direct association between food processing and ceramics, it is nevertheless acceptable to assume a direct association between the food itself and ceramic use in this socialised environment. Middle Neolithic vessels with pedestalled bases and highly elegant, stylish forms, such as deep bowls and wide dishes are suitable for display and could be considered as table-ware (Figure 2.9, 2.10, 2.12). The predominant Urfirnis Ware is distinctive and of very high quality. Its high-orange colour and lustrous finish, resulting from an elaborate fabrication process, gives the pottery a particular elegance and lends itself to display (Vitelli 1999: 194-5). This high craftsmanship suggests a blurring of the focus of display between the vessel and its contents. Display infers status and cult and exists as a mechanism for social interaction and the promotion of social relationships. There may also have been a degree of competition in aspects of the quality of the 'finish' of the vessels (Vitelli 1995: 56). The reuse of sherds as pendants adds to the argument that ceramics were regarded as more than just a utilitarian commodity (Björk 1995: 129). On the basis of size, however, it is unclear whether vessels were employed within small or large social groupings.

Other

Use-wear on saucer and basin shapes includes internal sooting and scraping on the internal base (Vitelli 1993a: 215-6). Vitelli further suggests that such vessels may have had a function in the burning of 'psycho-active' or aromatic substances, and that the distinctive use-wear is a product of the removal of residue. While plausible, it is noteworthy that use as a lamp would result in a similar wear pattern without the need for a psycho-spiritual element. Although supported by ethnographic parallels, a somewhat more speculative possibility is that some jars served as drums, with animal skins attached at the rim. The presence of pierced rims supports the case for the Late Neolithic 'Cheese Pot' as a drum, although ritual ceramic use in the Neolithic is largely dependent on a contextual association with hearths, clay figurines, or specific domestic locations (Björk 1995: 131-2). As noted, the re-use of ceramic fragments as pendants does imply a supra-utilitarian connotation to the material. The low ceramic

production rate during the Early Neolithic taken alongside certain aspects of the production process, such as colour change and lime-popping, suggested to Vitelli (1993a: 217) a shamanistic element to the first potters, although, as discussed above (Chapter 2.5.1), this seems improbable.

Ceramic Use and Function: Discussion

What this evidence clearly shows is throughout the Early and Middle Neolithic there is an evolution of ceramic function, apparent in the development of increasingly elaborate shapes and fabrics and directly proportional to an increased production rate. There are a number of possible reasons for this dynamic. Perhaps, as pottery demonstrated its functionality, its repertoire of use increased, in turn leading to an increased demand and facilitating development in technology and production capacity. This demand could have resulted in an expansion of access which affected its elitist or ritual connotations and which saw uptake of the material as a generally available utilitarian commodity. This is not to say that each vessel was restricted to a single function. Indeed, multiple functions are far more likely throughout an artefactual use-life.

A key to discerning functionality among ceramics may lie in their design. Potters visualise a certain shape and function when deciding on clay, shape, firing and surface treatments. Specific choices at each stage of vessel production are influenced by technological, environmental, functional and social restrictions and behaviours; the final vessel form existing essentially as a 'trade-off' between various conflicting aspects of its design. A low fired pot, for example, will shrink and be prone to breakage but will have a low mechanical strength suitable for cooking. Unfortunately our problem lies in our inability to recognise these choices and our assumption that primary function will be demonstrated by an idiosyncratic set of physical and mechanical features. This exercise has shown that the association between food and ceramics was a gradual development and cannot be assumed *a priori.* Also organic materials can fulfil some functions often associated with ceramics. It is not until the latter half of the Middle Neolithic that potters seem to be consciously producing ceramics with physical and mechanical design features that we recognise as elements to make them more useable in association with heat.

It is evident that Neolithic ceramics served a social role judging from their quality and shape, by their presence in social activities, such as food consumption and, perhaps, ritual as well as

their ubiquity across sites without contextual bias. It is also apparent that, beyond thermal properties and resistance to rodents, ceramic offered few recognisable advantages over other organic materials. Tomkins (2004: 47) argues that ceramic production was a collective action performed by the community as a mechanism both for the public expression of group cohesion and as a link to the past. Similarly, if ceramic decoration held socially-transmitted messages, this would provide another method for the group expression. Its ultimate ubiquity within the ceramic record is, therefore, an interesting observation. Was it a product of social interaction through food-sharing, or did it simply out-perform existing technologies in both a functional and social context?

2.5.5 Technology and Decorative Style

Ceramic technology undergoes continued development for most of the Neolithic. In the Early Neolithic this is typified by a shift from simple moulding to coil-building. Vessels were painted; some with pattern decoration, others were slipped and burnished. They were probably fired in bonfires and there is some evidence of fire clouding. There is also evidence of firing in differing atmospheres, which, although likely a conscious decision, Perlès (2001: 214) argues, it implies irregular practice and suggests that the potters were not yet in full control of their craft. In the Middle Neolithic, they began to match specific fabrics with vessel types, developing more elaborate shapes, higher firing temperatures (800° +) and decorated wares in increased quantities (Vitelli 1999: 193-4). What was the social impact of technological and production developments in the Neolithic? Was it a differing type of specialised production, perhaps a result of higher output rates and experimentation with shapes and fabrics? Or was it a response to a changing society, with a need for visible expressions of social status?

The similarity of ceramics, both in construction and decoration, is apparent across Greece, with regional styles becoming increasingly evident in the Late Neolithic. Washburn (1983) and Cullen (1985a, 1985b) have demonstrated stylistic similarities over distance in the sparsely-settled Peloponnese, with Cullen (1985b) suggesting a role for seasonal pastoralists, or more likely, exogamy or raiding in their distribution. The density of settlements in Thessaly, along with the distribution of lithics, andesite and shell imply scope for and proof of interaction. Mee (2007: 207-09) correctly argues that the scale of interaction must be understood prior to theorising on stylistic similarity or the nature of interaction. Decorative style also loses its social significance once it is transposed beyond those areas where its meaning is understood within a cultural orthodoxy (David *et al.* 1988: 377). Nevertheless, an

examination of technical style is potentially significant to the debate on regional style, the nature of interaction and the organisation of production. It can help to explain the scale and organisation of inter-communal interaction and the lateral and temporal transmission of stylistic knowledge amongst communities. Learning patterns, the transmission of technical knowledge and the conservatism of motor skills make it possible to identify technical styles that are both more conservative and more socially embedded than decorative styles. This will be discussed in greater detail in Chapter 3.

2.5.6 *Exchange*

Evidence for ceramic exchange in the Early and Middle Neolithic period is limited to a handful of sherds (Perlès 1992: 136-7; Vitelli 1993a: 210; Yiouni 2004: 4-6), which lead Perlès (1992: 137, 2001: 220) to suggest only low-scale ceramic exchange, overshadowed by movement of other materials, such as chipped stone. In Southern Greece, where the settlement pattern is more dispersed, ceramics are primarily locally produced with occasional examples of exotica (Cullen 1985a, 1985b; Vitelli 1993a: 209). It appears more likely that ideas were transmitted by the movement of people rather than the direct exchange of pottery (Cullen 1985a: 243-70; Perlès 2001: 220; Vitelli 1993a: 208-9). It is curious to note the paucity of evidence for ceramic exchange in the densely-settled region of Thessaly (Perlès 2001: 125-8). Perlès (2001: 220) sees this as evidence for the material as a highly prized commodity with potential ritual connotations and perhaps an associated social restriction on imports but the religious connotations of early ceramics are difficult to maintain in the general absence of evidence beyond a limited number of shapes (Perlès 2001: 264-70) and a handful of pots associated with cremated human bone (Perlès 2001: 274-6). On Crete, however, there is evidence of island-wide, long-distance, trade in Early and Middle Neolithic pottery (Tomkins 2004: 45, 48). In the Late Neolithic period exchange become more common, arising from a number of localised production centres (Perlès 1992: 146; Schneider *et al.* 1991: 48) but with wider circulation networks than previously thought (Hitsiou 2003: 176).

The distribution of ceramics poses two questions. Firstly, does the circulation of ceramics reflect any cultural biases, i.e. were the ceramics exchanged within lines of lineage or did they contain any social information? Secondly, is it the ceramics themselves that are important, or their contents? The importance of ceramic style to inter-site links was clearly demonstrated by Cullen (1985b: 94-97), while Vitelli (1993a: 213-9) attributes a non-utilitarian role to Early Neolithic ceramics at Franchthi Cave where the majority of Middle Neolithic shapes are

highly decorated open display vessels. It seems likely that ceramics, if exchanged, were not utilitarian but contained a significance of their own. Perlès (1992: 139-40) identified that stylistic patterning increases within the socialized environment of the Middle Neolithic, developing into regional styles by the Late Neolithic period. Ceramics, she maintains, are largely non-utilitarian goods with elaborate decorative styles and small scale distribution. Their circulation, due to the stylistic information they display, can be related to social interaction and inter communal bonds.

2.6 Neolithic Greece: Discussion and Conclusions

Settlement during the Neolithic period is not exclusively influenced by environmental factors, nor is it purely driven by resource access. The regional differences between Thessaly and the Northern Peloponnese may seem distinctive but closer examination of material culture and use of architectural and domestic space or spatial organisation of settlement demonstrates a clear similarity, with the distinction between settlement activities primarily being one of scale. The patterning of settlement at both the micro-scale across the magoula and at the regional macro-scale indicates a large degree of co-operation and a conceptualisation and ordering of space.

Kouphovouno, a relatively isolated Laconian magoula site of c.4ha (Mee 2001: 03) offers a useful comparison with both Thessalian and North Peloponnesian sites. A detailed study of the functionality and decorative and technical style of the pottery here would elucidate the intra-site dynamics of social interaction. Establishing the scale of intra-site interaction at Kouphovouno would help us to understand the nature of interaction with other contemporary sites. If the isolation of Kouphovouno permits the same degree of communication, to what degree is distance a factor in the organisation of inter-site interaction? Is Kouphovouno part of the same network of interaction identified by Washburn (1983) and Cullen (1985a, 1985b)? If a large degree of interaction can be demonstrated despite the geographical distance involved, it implies that such action is deliberate, directed and far from opportunistic.

Neolithic subsistence practices indicate a society aware of its vulnerability but strategically and technologically well-equipped to be able to function comfortably and confidently and as settlement patterns indicate, to ultimately flourish. This subsistence is largely dependent on social storage, mutual need and inter-site interaction. Kouphovouno's isolation would have

undoubtedly made this difficult and it is possible that the site may have had to develop its own risk-buffering strategies independent of social storage or inter-site interaction. The analysis undertaken in this thesis intends to use ceramics to understand the scale and frequency of interaction between Kouphovouno and other sites in the Northern Peloponnese, to determine if it was sufficient to allow for co-operation in risk-buffering strategies.

While there are difficulties in estimating production and consumption rates for Neolithic pottery, it remains a useful exercise. It allows comparison between contexts and sites that promote interesting, and potentially informative, questions. Kouphovouno has the benefit of having two sondages for comparison of spatial and temporal variation in production, consumption and/or destruction of ceramics and shifts in the relative visibility of specific shapes and decorative motifs. There is a great deal of stylistic and functional similarity in pottery from Middle Neolithic sites in Southern Greece. The open and highly decorative shapes of Middle Neolithic pottery could be described as a 'social technology'; useful aids for the transfer of social information through competitive feasting or similar. Gosselain (2000: 187-210) produced a model of how and why ceramics change, explaining the scale at which they change and the dependence of change on the level of interaction between potters and consumers (see Chapter 3.5-6). The excavation of Kouphovouno allows us to use Gosselain's model to trace the scale of interaction and changes to the ceramics through time and space. Before this can be undertaken, an in-depth understanding of the concept of technological choice and technical style is necessary before it can be applied to the ceramic assemblage. This is the aim of Chapter 3.

3. TECHNOLOGICAL CHOICE AND TECHNICAL STYLE

'As individuals express their life, so they are. What they are, therefore, coincides with their production, both of what they produce and how they produce it'

—Marx and Engels: *The German Ideology*

The intention of this chapter is to examine the concept of technological choice and technical style as archaeological tools in order to provide a background to the study of the ceramics in this thesis. There will be a description of the history of scholarship in the discipline followed by a discussion of how choice can be identified in the archaeological record. Technological conservatism or 'choosing not to choose' can be very informative about social influences on technology, especially with respect to learning patterns, which can cause conservatism. The role of social influences over technology is considered before factors which can affect variability throughout the ceramic process are discussed. Finally, the usefulness of the concepts of technological choice and technical style as archaeological tools to inform on social groupings and learning patterns are outlined.

3.1 Introduction

This chapter focuses on a fundamental aspect of ceramics that can be applied to all material culture within the archaeological record: the existence and nature of variability in manufacturing techniques and processes. Pottery design can be informed by the performance characteristics of its intended function (Schiffer and Skibo 1997: 29). Function and performance are in turn influenced by formal properties and technological choices (Schiffer and Skibo 1997: 31). Throughout the ceramic manufacturing process, potters face a number of choices. At each stage, from the initial sourcing of clay to mixing it, through to the final firing, potters must make a number of decisions that will ultimately determine the physical aspects of the vessel they produce and the performance characteristics of it (Schiffer and Skibo 1987: 599). With each decision many variables are introduced. In some ways this does make the archaeologist's job easier; variety is a concept used by archaeologists to classify the materials that they are studying. Choices in fabric, form, style and decoration allow archaeologists to

make divisions within an assemblage. There is a tendency to record these differences, but they are seldom investigated beyond typologies or decorative syntax (Lemonnier 1992: 3). This is unfortunate because fabrication processes and function more often than external appearance offer new and greater insights into the sociology of artefacts (Lemonnier 1993b: 11).

Pottery manufacture is a generally conservative craft; yet there is considerable variation in production methods. We must refrain from the traditional view of potters battling against environmental and technological constraints, which left them little scope for freedom of expression (Dietler and Herbich 1998; Gosselain 1998: 80; Lemonnier 1993a; Sillar 2000; van der Leeuw 1993). Where constraints exist, they are not rigid but provide a framework by which technologies can achieve their goal (Kiriatzi in press). Technological choices are dependent on a wider set of social and economic factors that affect the availability and understanding of materials, tools, energy sources and techniques (Sillar and Tite 2000: 10). Technological choices are reflective of the cultural framework within which they operate as they are a product of all the elements of the method and process of manufacture (Stark *et al.* 1998: 211-2). Decisions are never made in relation to isolated technologies (Sillar and Tite 2000: 10-11); all exist within a context of wider local perceptions. It is a necessity, therefore, to understand cultural backgrounds in order to appreciate where technological choices are situated. This can demonstrate to us why particular choices are made and how craftspeople interact with other aspects of society outside their own craft (Sillar 2000: 43-60).

Studies of ceramics often use variability as a paradigm to denote cultural differences and population movement (Miller 1985: 2-3) whilst often failing to attempt an understanding of the reasoning for this variability. Braun (1983: 109) and Gosselain (1998: 81) argue that archaeologists concentrate more on describing variation rather than understanding it and he calls for a more integrated approach to materials analysis and interpretation. A comprehension of why variety occurs rather than just recording it would prove a more beneficial and informative exercise. There was also a tendency to explain variability in artefact patterning as 'functionally specific adaptions to particular material conditions' (Dobres 1999: 12). By examining change and variability in ceramic fabrication and materials, it is possible to identify choices that potters have made. The reasons for these conscious or unconscious decisions are often affected by various factors that will be discussed in detail later in this chapter.

Technological traditions are a result of interplay between cultural choice and the innovative nature of personal choice (Sillar and Tite 2000: 10); a closer examination of choice can expose the factors that influence them. Rice (1984b: 251) felt it was important to understand to what degree choices in ceramics are a reflection of choice in society and to what degree potters are constrained by their society as opposed to natural factors. A comprehension of the choices available to potters is central to understanding the processes of ceramic change; potters must deal with natural, technological and social impediments, all of which influence their craft. It is fundamental that the nature of these impediments is understood in order to consider whether our view of them is real or imposed. In other words, potters may have had more freedom to choose and they might have been more inventive in the face of problems than we may give them credit for. Furthermore, many choices made during the fabrication process leads to the final products of different processes being similar or 'functionally equivalent'. Only sometimes would choices made during the earlier stages of the production sequence constrain later choices. It is important to consider what factors might cause conservatism or resistance in the face of technological advances. Furthermore, it is crucial to understand the nature, dynamics and the rationale driving choice. We must also investigate the degree of freedom that potters had, the stimuli for choices and how they responded to their constraints, as well as other fundamental elements, such as how we recognize choice and where choice is situated. These will be discussed in turn, but first it is necessary to review the debate on technological theory to date.

3.2 Technological Choice: A Review

For many years ceramic analysis was dominated by research attempting to identify social boundaries and cultural patterning, but this was reliant mainly on approaches that dealt with decorative analysis and shapes (Chilton 1998: 132-3; Sackett 1990; Stark *et al.* 2000: 296). Scholarship in the area of cultural identity and social boundaries was held back due to a poor understanding of the dynamics of ceramic fabrication and traditional views on style and function, as a result of a dependence solely on ceramic ecology as an analytical tool (Gosselain 1998: 79). Lemonnier (1986: 147-86) bemoaned the limited attempts to link technologies to the societies that developed and used them. He stressed the necessity to study technical systems as a means to investigate how social life interacts with material culture (Lemonnier 1993a: 27). Modern society has tended to separate technology and social

relationships and this needed to be redressed (Ingold 1990: 15). The study of technological systems can be traced back to Marcel Mauss, who, in his 1935 paper entitled *Les Techniques du Corps* (Mauss 1935: 271-93), argued that almost all actions are culturally influenced and so more complex technological behaviour was the result of social learning processes. Modern interest in technological theory and technical systems has been spearheaded by French academics, such as Lemonnier, Gosselain, Leroi-Gourhan and the journal *Technique et Culture*. Lechtman (1977: 135-60) argued that choice is sometimes used to indicate social boundaries or a social process. It is a mechanism whereby people define and display identity either explicitly or habitually or as social agency (Sinclair 2000: 196). In contrast, Wobst (1977) saw artefacts as tools in social strategies and argued that technology has its own style labelled as 'active style' by Sackett (1990: 26) and technical style by Gosselain (2000: 190). Sackett (1990: 34) advocated that as isochrestic variation (a style of making tools that represents a maker's particular choice among alternatives in a specific cultural context) was ubiquitous, existing wherever variation could occur and cross-cut traditional styles of classification. Lemonnier (1992: 90) disputed the usefulness of isochrestic style because, as a style, it has no function, neither physical nor informational and no social representation. Furthermore, whilst there is a physical indicator of the maker of an object, this information is only visible to an archaeologist. However, as this is unintended and is not used to deliberately transmit information about an artisan or a society, it is a reliable tool to identify technical styles. Gosselain (1994: 106) argued that because constraints in ceramic fabrication were flexible and could be overcome in a variety of ways, an examination of technical style was inescapable and that this technical style was as culturally embedded as decorative styles or religious beliefs. Livingstone-Smith (2000: 21) saw weaknesses both in examining environmental and physical constraints separately and in attempting to identify cultural signals in ornamentation whilst ignoring the possibility of technical style.

This marked a shift away from the belief that only decorative style could be used to identify cultural signals or even social boundaries. It heralded the beginnings of a different approach to investigation into the field of technology and an acknowledgement that studies of technology should not be limited only to identifying fabrication processes. All of the above-mentioned researchers acknowledged the benefits of an examination of technological choice as a means of understanding social processes and the relationship of technology to society. Schiffer and Skibo (1997: 43-4) proposed a framework for understanding artefact variability that considers, step by step, how individual factors relating to performance characteristics can affect

variability and how these are weighted by potters. They concluded that choices are often compromises between these individual factors. However, they put too much emphasis on mechanical constraints that can easily be overcome and they fail to acknowledge social factors and learning patterns that have a more overriding influence on potter's choices and the degree to which humans are active agents in their own social change (Chilton 1998: 159).

Technological studies in ceramics have suffered from what Gosselain (1998: 79) sees as an assumption that 'the manufacture and subsequent use of vessels is governed by so many ecological and physical constraints that technical behaviours are better explained as adaptive strategies rather than social (or cultural) choices' (see also Van der Leeuw 1993: 238-9). However, Gosselain (1998: 78-106) and Stark *et al.* (2000: 295-331) have demonstrated how available approaches, such as ethnography, archaeometry and experimental archaeology can reveal more about social and technological constraints on pottery making. They have shown, with varying results, that social boundaries and ethnicity can be detected through technical systems and styles. Loney (2007: 183-207) has considered how learning patterns can affect both changes in and choices relating to technology; she also argues that motor skills tend to influence conservatism in potting techniques, which can affect signalling and the spread of social boundaries. There has been a general tendency among researchers to record differing techniques but rarely any attempt to examine them for any deeper meaning (Lemonnier 1986: 155). Sillar and Tite (2000: 15-6) argue that material science studies tend to focus on identifying technologies and manufacturing processes to the detriment of the interpretation of these technologies. This is somewhat unfair, as the recognition of variability is the first step in understanding choice, and a number of studies have used the concept of technological choice and technical style to examine ethnographic and archaeological data with very useful results. There is plenty of material science literature that discusses the implications of variability and choice using material sciences (Courtois 1981; Freestone 2007; Stark 2000; Knappett 2004; Kiriatzi in press). As some decisions do not leave physical remains, the variety of available choices can never be fully understood. Furthermore, the nature of the archaeological record, in essence the physical remains of past societies, has led to a tendency to study only the choices that were actually made by the potters, resulting in an ignorance of the options that have not been taken. To overcome this, it is necessary to attempt to understand the problems faced by the potters and the options available to them. For this the context of production must be understood in order to identify where choice was situated (Van der Leeuw 1991: 30).

3.3 Identification of Choice

In any archaeological discussion of technological choice, one central question is how it is recognised in material culture. By identifying technical choices in the past, it is possible to understand the context in which they were made and thereby reconstruct aspects of production traditions (Van der Leeuw 1993: 283). Definitions of methods to identify choice vary: Hitchcock *et al.* (1998: 12) believe that variations 'are determined situationally through a process of decision making within a context of perceived opportunities and constraints'. Chilton (1998: 134) sees it that technical choice happens where societies choose between a number of options and that choice cannot be explained by technical logic. Lemonnier (1993b: 7) argues that 'a choice implies the existence of two or more possibilities, which must be compared in order to determine how they differ from or resemble each other, how these similarities or dissimilarities are to be explained and what their social and material consequences might be'. The existence of variability alone, although it can reveal choice (Mahias 1993: 158), is not sufficient to explain choice. Variability can be a result of overcoming impediments or constraints which are faced during the fabrication process. Choice, on the other hand, represents a clear decision to choose between two options where constraints have been removed as influencing factors. Usually a range of technological options or materials is available and choices are seldom limited by the lack of these. Surprisingly, it is utilitarian and not highly decorative artefacts that archaeologists and anthropologists have found to be more sensitive to cultural and social boundaries and much easier to study. This is due to the fact that they are less exposed to influences beyond a domestic arena and not as widely circulated as other, more highly decorated ceramics might be (Stark 1999: 28-9; Gosselain 2000: 187-217).

Outlined below (Chapter 3.7) are differing factors that can cause variability in a ceramic assemblage. The context of this variability must be understood before it can be called a choice. The presence of several options simultaneously in time and space must be complemented by a demonstration that there is an awareness of differing techniques and procedures. This, then, can indicate that there was an informed preference for one. It is the number of options that is important for identifying choice and not the frequencies with which each option is used. The influences that determine the popularity of a choice are not under discussion in this section. Rather, it focuses on the recognition of alternative methods of reaching a final product. Frequencies of preferences will be discussed later in this chapter.

In order to examine technological choice there must either be a clear situation where all constraints are removed or where the level of constraint on choices can be deemed relatively equal and which cannot be explained by mitigating factors, such as physical or mechanical properties. It is necessary to be able to identify a clear preference for a technique or material in a situation where there is scope for variability and an awareness of several options that can bring about the same result without changing the structure of the process (Mahias 1993: 159) within the 'context of environmental conditions and available technological capabilities' (Nelson 1991: 60). These decisions usually include options that vary in efficiency, speed and the ability to perform a function (Pétrequin 1993: 53). When these options are considered, they can be much more informative as they are 'competing' to some degree on a level playing field and are not intended as aids to overcome a constraint. Care must be taken at each stage to identify whether a potter has scope for choice, despite the range of options being reduced at stages in the manufacturing process. Some stages naturally have greater scope for variability than others, such as shaping in comparison to firing. This must be considered when examining the variety of technical options as it can suggest a false preference for one method over another (Gosselain 1992: 582). This caveat again highlights the importance of comprehending, as far as possible, the full range of technical options available to a potter (Gosselain 2000: 190).

3.4 Technological Conservatism

The title of this section requires some clarification. It does not mean that there are factors that reduce the range of choices but rather that there may be a reason why a choice is deliberately not taken even though there are clear options that could be considered more technologically efficient. We are conditioned to consider a skill level or method as being in a state of constant improvement, that society is always advancing, accumulating knowledge and adopting technological innovation, which is generally manifested in improvement of productivity or efficiency. We assume that craftsmen will always choose the most efficient or what is perceived as a 'technologically superior' option. Indeed, Nicklin (1979: 454-5) argues that efficiency of new elements is of prime importance to innovation. This has led to 'a tendency to equate technological change with technological improvement, as if change were unidirectional' (Loney 2000: 646), and we do not view the rejection of scientific advancement and technological change as in any way natural (Loney 2000: 648). Nor are we in a position to

arbitrarily judge efficiency in archaeological material or ancient technologies (Costin 2001: 290). Gosselain (1998: 81) warns that we are in danger of relying too much on mechanical properties and pseudo-Darwinian approaches, such as those suggested by Neff (1992: 141-93). We tend to overlook the non-use or slow uptake of what we perceive to be advances, without considering other influencing factors, such as the 'social control' over technological change. We are also inclined to overlook the physical difficulties that manufacturers might have in choosing to use a different technology (Loney 2007: 183-207). We have a habit of seeing the world as being intrinsically linked to technology, that society accommodates technology; a society without technology is somehow primitive as it seems to ignore rather than develop and manipulate technology to suit its needs as and when they arise. We must modify our perception that proficient technologies will always be chosen. Technologies of varying degrees of efficiency and function can and do coexist side by side as separate technical styles, even when there is evidence for the sharing of ideas with other areas (Chilton 1998: 132-160). Dunnell (1978: 194) warns that as our view of the world is a culturally evolutionary one, we must be careful that we do not assume that all views on technology follow this approach. We must, therefore, look at choices made by societies both past and present to understand why choices in favour of technologically superior options are not made and why people continue to use 'traditional' methods.

Ethnographic and archaeological examples illustrate situations where more efficient technologies were not chosen by a society because of underlying social issues and social functions of traditional technology. For example, in Tunisia local resistance to mechanised water distribution was due to the upset it caused to delicate social practices, inter-communal cooperation and the large effect mechanisation had on local on traditions (Bedoucha 1993: 77-107). Resistance to innovative features in aerodynamics and engine types in aircraft design were caused by aesthetics and the necessity to learn new piloting techniques (Lemonnier 1992: 71-3). The Scandinavian Bronze Age indicates an awareness of iron technology, whose innovative properties were largely ignored (Sørensen 1989: 195-202). Finally, the uptake of the use of weed-killers in vineyards at Les Corbières in France was slow because it affected unconscious and traditional modes of practice and would have upset social practices, interplay between members of society and replaced existing social signals about the perceptions of land use.

The choice of a technique or innovation is made by either one individual or, more generally, by a society, driven either by its suitability or sociological rationale, which may not make economic or technological sense to us. Choices can actively be made to avoid doing something that seems both economically and technologically beneficial, but concentrating on these factors affecting choice is to ignore the cultural aspect. The above examples indicate situations where using a newer technology would erode delicate mechanisms for social interplay within and beyond a community. Costin *et al.* (1989: 108) indicate some factors where a lack of capital or resources can cause technological conservatism. It would be unwise to view this as 'conservatism' rather than an 'impediment'. Conservatism suggests knowledge of the possible outcomes and an unwillingness to change. Other factors, such as uncertainty or perceived risk, a fear of loss of control of resources or production and the impact on existing social relationships (Paynter and McGuire 1991: 08) can influence technological conservatism and produce a conscious decision not to change. The sociological 'impediment', as we have been conditioned to see it, can provide an insight into 'core' cultural codes. Firstly, however, we must understand how choice can reveal such information.

3.5 Motor Skills and Motor Memory

A reluctance to use differing or new technologies might be conceived as conservatism, but closer examination has revealed that this conservatism can be understood when original learning patterns are considered. Several ethnographic studies have reported that when asked why a subject did something a certain way, the response received was 'that's the way I have always done it' or 'that's the way my father did it' (Gosselain 1992: 572; Sillar and Tite 2000: 10; Stark 1999: 29), or that the method used did not matter as long as the vessel was well made (Gosselain 2000: 192-3). Furthermore, potters tend to adopt the first solution they devise for a problem (Mahias 1993: 165; Sillar 2000: 56). Pottery making relies on motor skills that are transmitted through generations of potters with long apprenticeships, relying on visual inspection and imitation. They have been proven to be quite stable through time and space, depending on unconscious and repeated behaviour that maintains a continuity of technical traditions rather than choosing from a catalogue of options (Gosselian 1992: 572, 1998: 82; Karimali 2005: 189). Sinclair (2000: 199-200) argues that the 'constellation of knowledge' i.e. the relationship between the agent or the individual, the proposed object, materials, tools and techniques can result in common usage and lead to habitual action. Loney (2007: 198)

attributes learning in household production to a close association with the relevant skills from a young age (see also Arnold 1985: 235-7; Neff 1992: 150-1). Despite the existence of other methods of making ceramics, the majority of potters prefer to continue to make pots as they have always done (Stark 1999: 31-2). There is ethnographic and archaeological evidence for the existence of both hand- and wheel-made potting traditions at the same time (Gelbert 1997: 1-23; Kiriatzi *et al.* 1997: 361-8; Loney 2007: 183-207).

Loney (2007: 184-6) argues that learning how to create pottery develops a motor skill (memory), which can cause an unwillingness to change to newer or different forming methods and that 'conservatism is reinforced by the physical memory of skilled craftspeople' (Loney 2007: 198). Furthermore, if a new skill is learned, there is a decline in competence (Gosselain 1992: 582; Loney 2007: 199-200; Pétrequin 1993: 46-9; Sillar 2000: 56). During a relearning process there will be a reduction in the production levels, as well as poorer vessel performance, until the potter reaches a level of competence sufficient to match expectations and can satisfy demand for the vessel. Whether or not the potter will learn a new skill will also be affected by the time available to practise (Costin *et al.* 1989: 107). Furthermore, it is often more efficient to train new potters with new technology than to retrain older ones (Rice 1984b: 269-72). In light of this, it seems that short-term loss of production rather than long-term conservatism is more of a driving force when it comes to the non-adoption of different technology.

3.6 Social Influences on Ceramic Technology

Changes in taste and social trends can have a huge impact on ceramic manufacture and decoration. Customs, folklore and traditions can limit options, direct choice and influence the amount of time to be invested in ceramic production (Gosselain 1994: 106; Lemonnier 1992: 7). They can form internal constraints, which limit artisans by restricting manoeuvrability within the craft both in resources and technique (Bleed 2001: 154). For example, the shape of a product is sometimes determined by pre-existing examples; some craftspeople are constrained by what the shape is expected to be. Hosler (1996: 82) found that in Las Animas, Peru, technological style was linked to gender, residence and age and was used as a mechanism to reinforce social categories. Mahias (1993: 168) found that the influence on ceramics by society is embedded in learning and transmission methods. She does not;

however, consider the impact that expectations of society can have on ceramics. In India ceramic conservatism has been maintained through social status by relating technical systems to varying castes (Miller 1985). This results in any change or innovation to a ceramic procedure having a social impact. In this respect technical variations are fundamental to organisation and continuity of society.

Technological choices that are caused by social rationale are often unconscious but can emerge as material constraints or religious duties (Mahias 1993: 177). Isochrestic style or any style or systems that reflect ethnicity are found to reside where viable options are dictated by society (Sackett 1990: 33). This raises the question of who might organise this control. Costin *et al.* (1989: 107-39) investigated two differing methods that might influence technologies. First is the imposition by an elite who have the time and resources necessary to sponsor innovation or control production, through which they might gain social or political influence. Alternatively the lower 'rungs' of society might themselves effect changes that are driven by necessity or efficiency. The lower rungs of society, however, are often in an economically hazardous or reliant position and are, therefore, not in a position to learn new motor skills. The weakness in Costin's argument in favour of a top-down approach is that it assumes craft specialization and social hierarchy. Papousek (1984, 1989) noted that amongst potters in Oaxaca the elites can facilitate changes and innovation in ceramic manufacture, but they rarely initiate it. Because, however, they can facilitate it, they do have some degree of control over its production.

Gosselain (2000: 191-2) identified three distinct levels at which change can be understood and that are dependent on the level of interaction potters have with their consumers: firstly, through the exposure to influence, secondly, through post-learning interactions with other potters, and thirdly, the visibility of the traits that might change. He found that there was a relationship between the visibility of a trait and the pace of change that can be fitted into three categories of manufacturing stages. The first category is that of the finished product, where manufacture techniques, such as decoration or firing are quite visible. The techniques used are visible to consumers who can influence and impact on the methods involved. They are also visible to other potters who can mimic decorative styles. Gosselain (2000: 191) expects that these manufacturing techniques tend to be spread widely and change frequently and 'reflect more superficial situational and temporary facets of identity'. The second category identified by Gosselain is that of forming techniques that are not readily recognisable on the finished

product but that can and do involve interaction with other potters. These include the selection and preparation of clay paste or firing techniques. Consumers tend to have little or no impact on these stages of the production sequence. The information tends to be limited to a few categories of people, such as potters and their families, and is often constrained to local and regional networks and groups. It is less open to change than the first category. Finally, the third category relates to forming techniques that are not visible to consumers and are quite unlikely to change as they require learned motor habits and are often an individual act. Learning patterns tend to be taught from a young age (see Chapter 3.5). They are also relatively conservative and so provide a very useful method of tracing 'those most rooted and enduring aspects of social identity, such as kinship, language, gender and class subdivisions' (Gosselain 2000: 258).

3.7 Factors that Affect Ceramic Variability

The making of an object involves an individual's relationship with the form of the intended object, the raw materials, the tools available and the skills required to carry it out. This 'constellation of knowledge' (Sinclair 2000: 200) depends on the individual's relationship with each of these and how that relationship can be influenced by outside factors as well as feedback from experience of the technology and the object (for an example see Bleed 2001: 153-4). This is not solely based on either the performance or the efficiency of the technology. It is also important to examine what social, technological and environmental factors can affect choices and to what degree they might influence them (Gosselain 1998: 82-3). Bleed (2001: 153) writes that we must identify the range and magnitude of the constraints that limited tool design before we can understand how they are reflected in artefact appearance. Hitchcock *et al.* (1998: 12) argue 'that humans make choices on the basis of what they have been taught, their personal experiences and their assessments of the costs and benefits of particular actions'. Sillar and Tite (2000: 7-8) consider a number of indirect influences on technological choice, such as the organization, scale of production and specialization; in this area, however, the possibilities are endless. Van der Leeuw (1993: 239) argues that the availability of raw materials rarely limits ceramic production; clays can be modified and sources rarely run out. There are countless ways in which technological problems can be resolved (Gosselain 1998, 2000; Mahias 1993) and even environmental or material constraints can be overcome (Bleed 2001: 154). Furthermore, clay pastes can be modified and firing processes are flexible. It

would, therefore, appear that the greatest influence on choice in ceramics is society and that raw materials and production technology tend not to have a major limiting influence on ceramic manufacture.

Choices made during the manufacture process can affect later decisions during the production sequence; for example, the use of very plastic clay may require the addition of temper for strength, whilst the addition of calcium carbonate could determine the temperature at which a pot is fired. During the fabrication process the potters would have encountered a number of situations that caused them to make a clear choice. It would be helpful to outline some of these issues of understanding how mechanical, social and material factors affected their production methods in order to evaluate how recognisable these may be in the archaeological record. It is safe to assume that each potter has a preconception of what the pot will look like before they begin any stage of the process. We must also be aware that not all decisions will leave a physical imprint, and later decisions or actions can obliterate evidence of earlier processes: for example, scraping can be obliterated by burnishing and smoothing. There can also be other aspects to the potting process that do not leave a visible trace, such as using water from a particular source or the use of bird blood as a charm for enhancing the potting skills of young women or the sprinkling of juice of acacia pods on pots after firing to strengthen them (Gosselain 1998: 101; see Rice 1987: 124 for more examples). The intended function of a pot can have an impact on its design and can influence the technological choices that are made during its manufacture as these can have a tangible effect on an artefact's physical properties (Schiffer 1997: 31; Sillar and Tite 2000: 5). The method of manufacture does not always determine the shape of the pot, although there are some exceptions, such as very large vessels; additionally, any number of problems can be remedied in any number of ways (Van der Leeuw 1993: 243).

3.7.1 Resources

The first stage in the process is the selection of the fabric type and the modification of the paste. The selection of raw materials can be subject to secrecy about sources, rituals or taboos, such as those that limit the members of a community who can source the clay (Rice 1987: 124; Arnold 1985: 32-35, 221-5). Sources of materials might be near at hand or require travelling long distances (Rice 1987: 115-7). A potter's decisions relating to thermal properties, firing temperatures, porosity and mechanical strength as well as the social factors outlined above can affect the selection of the fabric elements (Sillar and Tite 2000: 5). Schiffer and Skibo (1997:

35) found that the practicalities of transporting raw materials is an important factor, whilst decorative materials can and do come from greater distances, largely due to the ease of transport and sometimes because of their exoticness. Gosselain (1994: 99-101) found that in northern Cameroon time was a factor when sourcing potting clays as ceramic manufacture did not generate much income and so was not worth the time investment. The processing of the fabric also demonstrates a range of methods that can be used to manipulate the paste; for example, Gosselain (1998: 86) records numerous differing methods of manipulating fabrics before shaping in Cameroon. Livingstone-Smith (2000: 25-31) also recorded variation in clay preparation amongst several different communities in the same region, which cannot be explained by environmental constraints or functional factors. Gosselain (1994: 106) found that shaping methods can be adapted to deal with difficult clays. The idea that prehistoric potters had to make do with whatever resources were available to them (Arnold 1985: 20-32; Mahias 1993: 162) is overly simplistic, as a range of social, mechanical and logistical factors can affect the procurement of resources.

Schiffer & Skibo (1987: 599) suggest that the design of a cooking vessel can be affected by the availability of fuel supplies and that the type of heat they provide will affect the thermal properties of a given design. On the other hand, van der Leeuw (1993: 238-9) argues that resources and technology rarely constrain potters, as ceramic fabrication methods and practices are adaptable to suit whatever types of materials are available to potters; again it is society and not nature that has an impact on choices that affect ceramics. There is also the possibility of the procurement of more suitable clays from outside the locale (Nicklin 1979: 441) and the augmentation of poorer quality clay. Stimmell *et al.* (1982), for example, demonstrated that changes to Native American agricultural practices in the Mississippi Valley necessitated migration to river valleys where the clay was not suitable for pottery and thus necessitated the addition of calcium carbonate and salt. Annis (1985: 253), however, found that in Sardinia the lack of suitable clay and the subsequent use of poorer quality clay had a direct impact on the types of ceramics made. Rice (1984b: 243-4) found that the reasons for changing resources are largely forced by the environment: exhaustion of resources, environmental change or natural disasters. However, it would take a serious environmental catastrophe to force a change or sustained exploitation to exhaust a clay source. Environmental effects would rarely have long-term impacts, such as wiping out clay sources and firing materials. Ethnographic data (Arnold 1985: 36; Nicklin 1979: 446-8; Sillar 2000: 43-60; Valamoti 2004: 118) show the use of renewable agricultural waste, for example prunings, cut

wood, animal dung, straw and even seaweed for firing materials. To make a generalization would be misleading but higher populations create more demand for ceramics, whilst at the same time can create more renewable resources. Greater quantities of ceramics require more fuel, such that it is possible that demands for ceramics and the generation of by-products useful in the production of pottery increase in tandem. This does of course require more investigation, but within a relatively low annual ceramic output system, such as the Earlier Greek Neolithic (Mee 2007: 201; Vitelli 1993: 210; Yiouni 2004), the availability and quality of resources does not, on the whole, seem to be a major factor in ceramic production and it is difficult to see how the potters would have been constrained by resources.

3.7.2 Shaping the Vessel

Gosselain (1998: 86-7, 2000: 201) recorded up to fifty different methods of shaping handmade pottery in northern Cameroon, which he simplified into four groups: pinching, drawing from a lump, coiling and drawing from coils. Any of these fabrication methods could conceivably use any combination of the techniques to achieve its goal. Some may require more working than others, for example, coiling requires scraping and usually paddling on the sides, but essentially the potters are free to choose any method to shape the pot. As outlined earlier, the method of manufacture is not a determining factor in the later shape of the vessel; however, the shape of the pot can affect the method of manufacture. Coiling and drawing are two methods often used for larger pots because they allow thicker walls and can prevent collapse (London 1991: 192; Mahias 1993: 163; Rice 1987: 125). In spite of differing clays requiring differing treatments to make them workable, clays are rarely a constraining factor as they can be modified to make them more malleable (Schiffer and Skibo 1997: 35). Despite the range of fabrication methods available to a potter, however, they never seem to use the full compliment but rather limit themselves to a few at most. Motor skills and learning patterns are a major reason for this conservatism (see Chapter 3.5). The degree to which function affects the method used to shape a vessel is difficult to fathom; any method can be used to shape most vessels (see London 1991: 192; Mahias 1993: 163; Rice 1987: 125). We tend to assume that, since vessels are made to fulfil a function. Form can be indelibly linked to use, such as cooking ware. Miller (1985: 53-4) found that labels in India are assigned to vessels as a means of categorizing them and that in actuality vessels of varying forms are well suited to a variety of tasks. Although some shapes and features, however, are more 'efficient' at particular tasks than others, such as non-porous vessels for water storage, but alternatively porosity increases resistance to thermal stress. Furthermore, vessels were used for specific functions but were not necessarily suited to

the task or designed for it, such as a lid used for boiling water or a water storage jar used to churn butter (Miller 1985: 55-74). In some cases function appears to have more impact on paste selection than the method of forming the vessel (see Miller 1985).

3.7.3 Finishing the Vessel

Decoration is where the greatest range of choice can be seen (Rice 1987: 136-41). There are not only differing methodologies: incised, burnished, painted, patterned, fired, undecorated, to name a few, but these categories in some case can, in turn, be subdivided by motif; the possibilities are too numerous to list here. Decoration is one area of pottery manufacture where it is difficult to see any physical or environmental factors that would affect it, except in the availability of pigments. Decorative syntax is particularly permeable to change and influences, but rarely, if ever, is this because of a physical or environmental reason. It is style or variant-rich because it is free to operate outside of mechanical constraint or functional necessity (Sackett 1990: 33). The factors that affect the choices made when selecting decoration can, on the whole, reflect the expectations of society and are often related to the communication of social information between members of a community and, on occasion, to those outside it (Gosselain 2000: 190-1, 200). However, decoration can also lose its significance once it moves beyond cultural or ethnic boundaries (David *et al.* 1988: 377).

3.7.4 Firing

We tend to assume that firing can be technologically constrained, as the lack of a kiln affects the ability to control the temperature at which pottery can be fired and the oxidization of a fabric. However, both Youni (1996: 69) and Sillar (2000: 47) noted that even using bonfire technology, completely oxidised cores could be achieved but reducing conditions can be somewhat more difficult to obtain in open firing conditions. The availability of firing material would not have had a negative effect on firing capabilities as a variety of materials can be used (see Chapter 3.7.1). Nicklin (1979: 447) noted that differing firing types had different needs; longer, slower firing needs more fuel than faster, hotter firing. Other factors which can affect firing are the choices relating to firing atmospheres. It would seem then that even when it comes to firing, there are no real constraints; simple technologies can achieve a range of desired ceramic attributes. There is a limitation, however, to some degree; bonfires are not able to sustain high temperatures over long periods and this limits the degree of hardness the ceramics reach. Kilns, although they do give greater control of firing temperatures than

bonfires, do not allow great control over the rate at which temperatures rise and fall (Kiriatzi in press).

3.7.5 Other

Other factors, such as production rates, transport and distribution (Schiffer and Skibo 1997: 36) can impact on the choices a potter makes but these are more difficult to detect archaeologically. We should not underestimate feedback as an influence on the choices a potter makes. The performance of a vessel both visually and functionally can inform potters of changes they might need to make to their craft (Bleed 2001: 153-4). Schiffer and Skibo (1997: 27-50) propose that technical choices relating to the production of pottery are based on the weighting of varying factors that can affect a pot during its use. As decisions can affect subsequent processes in the fabrication or in the performance of a function, they propose that potters weigh each performance characteristic and that this subsequently influences their choices as they attempt to develop a methodology that not only allows them to perform their craft efficiently but also to exercise their technical style to its fullest, thereby allowing vessels and fabrication methods to be 'functionally equivalent'.

3.8 What Choice Can Demonstrate

Simply noting where technological choice is situated and what factors influence it is not enough; from an archaeological point of view, research must go further. It must attempt to understand the links between variability and choice with technical patterns (Bleed 2001: 159) because, as Kiriatzi (in press) points out, 'technological choices are directly related to the specific social and cultural environments within which potters live and work and a series of concepts/representations concerning materials, tools and gestures'. Karimali (2005: 189) claims that these skills and actions 'form part of the conscious or subconscious cultural apparatus, embedded in cultural traditions'. Furthermore, Kiriatzi (in press) states that 'variability in technical systems can be a result of learning patterns and traditions, which can be affected by changes to human interaction and changes to the consumption of and conceptualisation of tools'. Having outlined above how technological choice is manifested in the *chaîne opératoire* and the influences that can affect the choices involved, it is important to discuss what the identification of technological choice can help to illustrate and how it can be used as an archaeological tool.

3.8.1 Individual Identity

Sinclair (2000: 196-212) demonstrated how the choice of lithic raw materials can allow expression of techniques, skill and knowledge in the creation of individual identities. There is no reason to suppose that such competition could not be present in ceramic technology; adeptness with clay preparation, forming and even firing and decorating are all areas where there could be expression of individual skill. For expressions of individuality it is necessary for these attributes to be visible. Despite ceramic technology generally being a conservative craft, areas where individual skills could be demonstrated, such as shapes, firing, finishing and decoration, would be visible and open to influence (Gosselain 2000); forming techniques would perhaps be less obvious (see above, Chapter 3.6).

3.8.2 Social/Cultural Boundaries or Groupings

A lot of work has been undertaken to attempt to identify where technical styles can be found that reflect boundaries within society, as if technical style is somehow related to identity, whilst exercising due care to avoid linking technical skills with ethnicity (Karimali 2005: 189). Sackett (1990: 33) suggests that the limited range of techniques that potters use is due to the technical choices dictated by the social grouping but that these boundaries can often be revised and changed through time. Stark *et al.* (1998: 212) argue that utilitarian artefacts reflect the technical styles best, as they are more sensitive to cultural boundaries (see also Stark 1999: 42-3), whereas pottery that has more elaborate, decorative styles is more susceptible to outside influence and stylistic variation as this does not alter the fabrication process (Dietler and Herbich 1998: 237-8; Gosselain 1992: 582-3, 2000: 190-1). Hitchcock *et al.* (1998: 47-8) were able to establish a link between technical systems that are a result of material conditions in the Kalahari Desert. San technology reflects a subsistence system and situation rather than social or ethnic boundaries. These boundaries are not rigid and are subject to conditions, such as food shortages or drought. Chilton (1998: 159-60) drew similar conclusions among Algonquin and Iroquois Native Americans, finding that ceramic technology was related to subsistence type organised along tribal lines, even though there was clear evidence for the knowledge of other technologies and subsistence systems. Livingstone-Smith (2000: 36) found that several factors including function, environment, identity, social status, learning patterns, distribution networks and settlement patterns could not individually account for technical variation. What she did conclude, however, was that years of interaction and intermarriage had resulted in a mixing of technical styles and language that, amongst other things, created a regional style

limited only by distance to other social groupings. It must be remembered that Livingstone-Smith's work was limited to clay processing, which does not rely on motor skills to any great degree, unlike shaping that is more reliant on motor skills and is, therefore, more resistant to change.

Gosselain (1998: 99-104) is rather more positive; because of learning systems and motor skills, ceramic technical systems are largely unconscious and are learned at a very young age and organised along social boundaries. They manifest social boundaries but, as they are embedded in technical systems, there is not a conscious choice to display them. This is somewhat problematic; if a decision is unconscious, if people are unaware of a decision, can it then be considered a choice? (van der Leeuw 1993: 259)? If a person does something without consciously making a choice between at least two options, they cannot be said to be making a 'choice'. Instead it is better to refer to an unconscious 'action'. Whilst this might sound somewhat pedantic, it is something that is very important when distinguishing between a choice and an unconscious action. If it is an unconscious action, as a result of learning patterns, then whilst it may reflect learning patterns and perhaps social boundaries, it is not a conscious expression of them. However, if it is a deliberate choice, as an expression of technical style in the absence of a techno-mechanical factor, then it becomes a symbol to emphasise social boundaries. Furthermore, it has implications for expressing divisions and as a mechanism for transmitting information. Sackett (1990: 35) saw unconscious choice as being expressed by conforming to and perpetuating isochrestic options, which were imposed by technological traditions.

Household ceramic production systems, where young potters learn their craft, are usually organised by a nuclear family, these systems, Gosselain (1998: 101) notes, rarely cross linguistic boundaries and are usually localised, with only a few exceptions (Gosselain 2000: 207; Livingstone-Smith 2000: 34-6). Household ceramic production helps to keep technical systems localised and linguistically linked. This does not, however, sufficiently explain exogamous potters. Herbich (1987: 201-2), however, noted that with the Luo of Kenya it is the daughters-in-law instructed by the mothers-in-law that maintain a local style of potting; the newly married women do not maintain any of their original traditions of potting. Ironically, among the Luo it is entirely 'foreign' women who are responsible for the preservation of traditional styles of potting. This does not necessarily contradict Loney's (2007) conclusions regarding motor skills. The female potters are taught forming skills by their mothers-in-law;

hence, their first exposure to motor skills is within the society they have married into. In Las Animas in Peru, Hosler (1996: 80) found that when marriage occurred between communities of differing potting traditions, the potters who moved into a new community continued to use the system they had initially learned. She did not have sufficient data to comment on what happened to children of these marriages as potting as a craft was in its first generation of potters in the community. Gosselain (1998: 102) found that, even among exogamous potters, they tended to adopt the local ceramic style, but he did find some areas where there was an adaptation to what can be regarded as more efficient methodologies. These new methodologies, however, did not require learning new motor habits. The techniques of shaping vessels are more resistant to change because they do rely on motor habits (see Loney 2007). Gosselain further argues that because shaping techniques are more personalized and are not often symbolically charged, they tend to be co-related with spatial, all-encompassing social ties (Gosselain 2000: 193).

Livingstone-Smith (2000: 33) was unable to link technical variations with social status or linguistic groupings in northern Cameroon but did find a link between technical style and regional identity. She found that potters move within very small spatial areas and argued that if there is movement of potters, it must be considered to be within social boundaries at an inter-village rather than inter-regional or ethnic scale (2000: 34). In some instances technological choices and technical styles can be used to indicate social groupings; Mahias (1993: 170-3) found that amongst Indian potters technical features do correspond to social groupings or sub-castes. These technical features are used by sub-castes to define themselves and express their identity to other groupings. In these examples, however, it is technology, such as wheel size rather than motor skills which expresses the boundaries. Miller (1985) noted that in central India the technique of shaping the pot rather than the pot itself reflected social boundaries. Amongst Kalinga potters in the Philippines only a weak association was found between kin groups and decorative syntax; however, a closer one was found between decorative syntax and the age of the potter (Longacre 1991: 104-5). It has, however, been well attested that decorative styles are more prone to change than those that require motor skills (see Gosselain 2000 and above Chapter 3.6). Also in the earliest metalworking in Western Europe, the transfer of skills and knowhow also depended on apprenticeship and the transmission of specialist knowledge which tended to be along kinship lines (Roberts 2008: 364).

Goodby (1998: 162) contends that, although technological patterning may be able to indicate social boundaries, it does not tell us how these boundaries functioned, were perceived or organised, or if the boundaries are marked by material culture exactly where they are situated. Where possible, the findings from examinations of technological style need to be complemented by studies in other areas of technology. Unfortunately prehistoric archaeology does not lend itself easily to this. Hegmon (1998: 271-2) warns that we may be searching for boundaries that did not exist and that social and ethnic boundaries are a construct of our present. Furthermore, she suggests that archaeologists are more focussed on recognising where a boundary between two groups can be noticed rather than understanding what makes them different. Hegmon's concern is shared by Gosselain (1995, 1998) and Goodby (1998). They noted that technical styles were not organised along what we may consider to be traditional boundaries, such as language or geography for example. They found that they did not match with existing tribal boundaries which were recorded for colonial administration (Gosselain: 1995, 1998) or as a response to the encroachment of European colonialism (Goodby 1998).

3.8.3 Networks of Interaction

Kiriatzi (in press) argues that a wide distribution of Neolithic clay paste preparation techniques could be related to networks of human interaction, mobility and/or broad marriage networks and that this transmitted technical knowledge was a consequence, rather than a deliberate action, which signalled and maintained social identity in time and space. Washburn (1983) and Cullen (1985a, 1985b) found a regional style of decoration amongst sites in the north-eastern Peloponnese, which was spread by the movement of people, perhaps through exogamy. Spatial discontinuities of technological traditions can inform on the movement of people and ideas over wide geographical areas (Karimali 2005: 189). Dobres and Hoffman (1994: 234-6) used areas of lithic debitage on Magdalenian sites, which are considered training areas (Pigeot 1990: 126-42), access to pigment recipes in Palaeolithic art (Leroi and Allain 1979) and changes in Mediaeval-Early Modern architecture in England (Johnson 1993) to outline how variability in and control of technical knowledge can assist in the creation of social hierarchies and social arrangements.

3.8.4 Other

Paynter and McGuire (1991: 16) suggest that variation and choice can be a method of resistance against elites, both in the creation of separate cultures and as an expression of resistance. Neff (1992: 155-61) argues that technological choice (or differential persistence) and learning patterns play a crucial role in the evolution of ceramic technology. Technical style has been used in the absence of evidence of trade and imitation as a mechanism to demonstrate interaction between Early Bronze Age communities in the northern Black Sea region (Bauer 2008: 89-104). Dobres and Hoffman (1994) demonstrated how technological choice has also been used to examine the role of gender in technologies. Karkanas and Efstratiou (2009: 955-967) used recipes for clay floors at Neolithic Makri to suggest social change. Dietler and Herbich (1994: 468-9) found that the choice of vessel is not indicative of ethnic boundaries but tends instead to be more aligned with local potting communities, regardless of ethnicity or tribal boundaries. This reaffirms the idea that technical style and learning patterns, rather than forms and decorations, are closely aligned along social boundaries.

3.9 Conclusions

This review of technological theory has shown how active the field is and what a useful role it can fulfil in archaeological research. Whilst this has focussed largely on ceramic traditions, one cannot ignore other traditions of technical skills that also rely heavily on motor skills, such as lithic production (Apel 2008: 91-111; Karimali 2005: 180-214) and metal working (Roberts 2008: 366). This review has revealed how assumptions about the impact of technical and environmental constraints can be overestimated and has demonstrated how these can be overcome. It has highlighted the importance of social constraints that tend to have a more conservative influence on technological choice. It considered social factors which can maintain conservatism and arrest the development or the uptake of newer technology and what could be considered more efficient technologies. The identification of choice itself is not just the recognition of differing options; the options must be examined in a situation where they cannot be explained away as responses to technical or environmental constraints. The strength of an examination of technological choice and technical systems is their relative resistance to change due to learning patterns. Technological choice has made useful contributions to the

identification of individual expression, social organisation and networks of interaction. It has also helped to identify social boundaries but has had limited success in explaining where they are situated and how they may have been organised.

The strength of technical systems in an examination of social boundaries is that motor skills and repeated actions tend to become unconscious and are consequences of the parameters of social groupings rather than deliberate expressions of them. Furthermore, they can be visible as 'material constraints or socio-religious' duties (Mahias 1993: 177). They tend to be stronger markers of cultural identity than decorative styles, which can be more receptive to short-term influences. Gosselain's (2000: 191-2) tripartite categorization of ceramic change, which relies on the interaction between potters and consumers or with other potters, can be a useful way not only to trace differing varieties of ceramic change but also to aid the identification and mapping of networks of interaction and social relationships. The assemblages from Kouphovouno provide an ideal sample for the application of technological theory. The temporal sequence of C Sondage will allow a chronological study of technological choice at the site, as the main architectural phase in the later phases of the sequence provides a contrast with the midden in the earlier phases (see Chapter 4). This will be supplemented with a similar study of other contexts in order to give a fuller spatial picture across the site. Finally, a wider regional study across the Peloponnese is necessary to trace potential networks of interaction.

4. C SONDAGE EXCAVATION

This chapter is an introduction to Kouphovouno and an outline of the excavation of Trench C Sondage from Kouphovouno. The ceramic material from this trench forms the basis of this thesis and therefore, a thorough account of the excavation is necessary to put the ceramics in context. Also it is important to indicate the different phases of activity as they help to frame changes in proportions of the attributes noted on the pottery. The excavation sequence is outlined below in detail and is followed by an in depth discussion of the archaeological features found therein. Due to the limited area of C Sondage there are concerns over how representative it is of Neolithic activity at Kouphovouno. A detailed look at other Neolithic sites across Greece, the Balkans and the Near East is used to gain a fuller picture of the features identified at Kouphovouno. Finally, due to the unavailability of 14C dates, the excavation sequence is phased to give a rough working chronology for the site.

4.1 Kouphovouno: Site Location and History

The first written reference to Kouphovouno is an attempt to link some marble figurines and marble vessels, found in the 'vicinity of Sparta' and thought to be Final Neolithic in date, to the site (Wolters 1891), although their provenance and date are not certain (Cavanagh *et al.* 2004: 53-4). The site was excavated in 1941 by the German archaeologist von Vacano who found material from the Middle Neolithic to Early Helladic II. The finds were taken to Germany where some were lost, but the remainder were returned to Sparta after the war and were published by Renard (1989). Waterhouse and Hope Simpson (1960: 73-4) noted its importance as a Neolithic site in Laconia. The Laconia Survey on the east of the valley (Cavanagh *et al.* 2004) and the Laconia Rural sites survey (Cavanagh *et al.* 2005) did not locate any other sites to challenge this view. Between 1999 and 2006 a joint project between the British School in Athens and L'École Française d'Athènes (The Kouphovouno Project) undertook a broad scientific study at the site. The aim was to investigate the beginnings of complex societies in the Aegean world, to refine the chronology of the early prehistoric period in Laconia and to reconstruct the ancient environment using both intensive survey and targeted excavation. Over the course of one intensive survey season (1999) and five excavation seasons

(2001-3 & 2005-6), a good understanding of all periods of occupation at the site was achieved, although, as always, more remains to be done.

Kouphovouno is situated three kilometres south-west of the modern settlement of Sparta in a *graben* between the Taygetos and Parnon Mountains on fertile Holocene alluvial sediments, about 200m from Lower Pleistocene lacustrine talus deposits on the eastern side of the Taygetos Mountains (Figure 4.1 and 4.2). It is a tell or magoula site measuring an estimated four to five hectares in size (Cavanagh *et al.* 2007: 11). The western side of the valley is well watered, benefitting from the run-off of the Taygetos Mountains. It is situated in an olive grove and appears as a low rise (five metres maximum) in an undulating landscape. The site is about 100m south of the current route of the Parori River, whose course in antiquity cannot be placed with certainty (James and Kousoulakou in Cavanagh *et al.* 2004: 56). Geological cores recorded anthropogenic deposits ranging from .55m to over 4m in depth (Mee 2001: 2). The summit of this low hill allows good visibility of the surrounding area. Evidence for occupation has been found on the site from the Middle Neolithic through to Roman times. It is the Middle Neolithic material that constitutes the main occupation on the site with some Late and Final Neolithic material found also. There is a significant amount of Early and Middle Helladic activity at the site with a number of stone built platforms and burials. Finally, the western side of the magoula has substantial evidence of Roman occupation where the ground was augmented, probably terraced before a villa or farmstead was built. This sits directly on Middle Neolithic deposits (Cavanagh *et al.* 2007: 11-101).

4.2 C Sondage: Introduction

C Sondage (Area C Sounding) was located in the eastern half of Area C on the brow of the low hill which forms the site at Kouphovouno (Figure 4.3 & 4.4). A geological core (C1) taken in the area during the 1999 season indicated a series of strata rich in anthropogenic material to a depth of 2.65m (Cavanagh *et al.* 2004b: 68). Area C also produced good survey results (Cavanagh *et al.* 2004b: 78) for Middle Neolithic activity. With these considerations in mind this location was selected for a sondage because it had the greatest potential to get substantial archaeological strata and associated ceramics aiming at refining our understanding of Middle Neolithic dating and changes, architectural and ceramic, through time. It was also

hoped, if possible, to identify the earliest occupation on the site. The area of C Sondage was four square metres, which represented 0.01% of the site as identified by the 1999 survey (Mee 2001: 03).

The nature of this type of excavation created its own problems; because we did not get a spatial picture of many of the contexts, interpretation was often difficult and sometimes impossible, which will become apparent later in this chapter. The sondage has a limited spatial scope, therefore, it can sometimes be difficult to rationalise how much this type of excavation is representative of an entire site. Still, the nature and constraints on research excavations are such that in essence each excavation is a sampling exercise. Another problem was that we did not have the full extent of the contexts because their limits were larger than those of the sondage and often they were only partially excavated. This meant that exact area shapes or volumes of each context could not be worked out; neither was it always possible to describe the overall shape of the context in plan or section. A sondage provides stratigraphic information and a temporal sequence, although with limited interpretation, which would take several seasons of a spatial excavation to uncover. It is, therefore, a useful and extremely informative type of excavation to undertake. The best way to present the stratigraphy in the sondage is to outline the sequence of activity that created the tell rather than the sequence of excavation. This approach will give an outline of the stratigraphic formation of the whole archaeological deposit, which will lead to clearer understanding of the phasing of the strata (Figures 4.5-4.8). The dimensions given are length representing north–south and width being east–west, unless stated otherwise.

4.3 Excavation Sequence

4.3.1 Pit (C0849, 0847, 0837), Deep Excavation (0860, 0853, 0854, 0858, 0859)

The natural lacustrine clays and silts were formed into a low hill before any visible human activity on the site. This natural clay was labelled 0856 and was a layer of very compacted clay, grey-yellow in colour, with no stone inclusions. Stratified above this was 0846, a light brown yellow hued silty clay, which was natural sediment; it was excavated to a depth of 0.10m and found it to be sterile of archaeological finds. The first anthropogenic activity in the sondage is located in the south-east corner against the eastern baulk, where there was a rather substantial pit (0849) with steep sides and an irregularly shaped but, slightly dished base

(Figure 4.5). It measured 0.67m length, the width was indeterminable because it ran into the baulk and the maximum depth was 0.57m. It was cut into 0846 and 0845. No western limit was found for the context, it appears to have been truncated by 0860 (see below). The basal fill was 0847, a mid-dark brown, compacted clay with charcoal inclusions. It measured 0.67m length by 0.35m width with a maximum depth of 0.07m. Above 0847 lay 0837, a grey to mid-brown deposit of moderately compacted clay with some charcoal and stone inclusions. It measured 1m length by 0.38m width with a maximum depth of 0.30m. 0837 lay over 0834 and was grey, mid-brown loose silty clay. It had frequent occurrences of oxidised clay and charcoal flecking. It measured 1.10m length and 0.35m width with a maximum depth of 0.24m. Its shape suggests a sizeable pit which has been cut into the natural soil and its association with architectural features suggests a storage function. Nevertheless, no material of particularly different character was noted to support this argument; in fact it contained very few finds.

Subsequently in the western area of the sondage there was a deep cut, 0860, made through natural sediments (Figure 4.7, 4.8 4.11). This created a bank that stood 3.55 m in height and ran through the full extent (2m) of the sondage, continuing into the southern and northern baulks. The top ledge of this bank was excavated (through 0846) to a depth of 0.10m to provide a safe platform for work at depth. It was a light brown silty clay. 0860 was also cut into 0856, which was also a natural sediment of grey–yellow compacted clay covering the entirety of the base of the trench (2m length by 0.9m width). Whilst it is possible that 0860 was formed by natural processes it is extremely unlikely that soft natural sediments could have formed a bank of such steep profile (>85°) without it being eroded to a more gentle angle of repose. The conclusion that 0860 was made by human agency is, therefore, inescapable. The basal fill of 0860 was 0855 a light brown, loose sandy clay. It measured 2m length by 1.30m width with a maximum depth of 0.33m. The fill seems to have been hill-wash but it did contain some anthropogenic material; some sherds of pottery, bone and mud-brick fragments.

Above this lay 0854 which was a much more substantial context (Figure 4.7). It was a very mixed deposit of grey-dark brown, loose, silty clay with a yellow hue. It had occasional inclusions of oxidised clay and frequent charcoal flecking. It measured 2m length by 1.10m width and was maximum 0.65m deep. There was a great deal of anthropogenic material recovered from this context: ceramics, bone, chipped stone and ground stone. Above 0854 lay 0853 composed of very mixed silty clay, light brown in colour but with curious 'veins' of grey

silty material throughout. The two materials were so mixed it was impossible to label them separately. The context measured 2m by 1.3m with a maximum depth of 1.6m. The 'veins' of grey silty material varied in dimensions from several centimetres to less than one centimetre. A small amount of ceramics and bone, compared with the contexts above and below it and given its relatively large volume, was recovered from the context. The ceramics were mostly small in size (less than 2cms) and quite eroded. The yellow material was largely sterile but the grey material contained specks of oxidised clay and charcoal. 0853 is quite similar in texture colour and composition to 0846 and appears to be re-deposited natural soil that became mixed with some anthropogenic material, sealing the lower contexts (Figure 4.8). Subsequent to this 0859, a light brown to yellow compacted silty clay, was deposited. It measured 2m length, 0.9m width and 0.85m depth. It too was similar to 0846 and appears to be a layer of natural slump from the side of 0846 on top of 0853. It contained no artefacts.

4.3.2 Re-cut and Infilling of Deep Excavation 0860 (0848, 0824, 0850, 0858)

0858 was cut into 0853 and 0859 (Figure 4.8). It measures 2m length by 1m width with a maximum depth of 1.25m. The basal fill was 0850, a mixed deposit of pale yellow grey hued clay, with frequent charcoal flecking and some oxidised clay. There were also large numbers of water-rolled and angular limestone rocks measuring up to 0.20m in diameter. It was very rich in ceramics, bone and chipped stone. 0848 lay above 0850 (Figure 4.8, 4.11). It had a very mixed composition of yellow silty clay, with a grey hue with frequent lumps of oxidised clay and charcoal flecking. There were fewer angular and rounded stone inclusions than were noticed in 0850. It measured 2m length by 1.50m width with a maximum depth of 0.67m. It contained a lot of Middle Neolithic pottery, bone and chipped stone as well as a polished stone, ground stone, some bone tools and a quartz pendant. As with 0850 it appeared to be a layer of material deposited in a random fashion, indicating that it was perhaps a dump of debris to back-fill a feature or raise the ground level. 0848 was overlain by 0824, a deposit of densely compacted yellow-light brown clay, with few charcoal inclusions. Its maximum dimensions were 2m length by 1.50m width with a maximum depth in its eastern half of 0.12m and a minimum of 0.08m. The material is similar to 0846. It sloped quite steeply towards the west and inclined gently towards the south-west corner (Figure 4.6, 4.7, 4.8 & 4.11). This context covered the entire area of the trench. There was a significant quantity of ceramics and bone recovered from it together with some chipped stone and some ground stone artefacts. It would seem that 0824 is a layer that was deposited to seal off 0848; the thinness of the deposit (4cm on average) is an indicator of this.

4.3.3 Lower Architectural (Foundation) Deposits (0835, 0836, 0838, 0839, 0843, 0844)

0835 rested immediately above 0824. It was an irregularly shaped deposit of mostly angular and rounded stones mixed with a lot of ceramics, bone and chipped stone (Figure 4.8). It measures 1.4m length and 1.10m width with a maximum depth of 0.07m. Above it was 0836 a deposit of very compacted yellow–light brown clay with pebble inclusions, roughly rectangular in shape. 0836 measured 0.94m length by 0.30m width with a depth of 0.04m. 0838 lay above 0836; it was similar in composition to 0835 and measured 0.90m length by 0.30m width with a maximum depth of 0.04m. All three contexts were located in the same area against the southern baulk of the sondage. The constituent materials in each context were very randomly sorted. 0844 was stratigraphically above 0835 (Figure 4.8, 4.11 & 4.12). It consisted of mid-brown clay with a grey hue, containing a moderate amount of charcoal inclusions and rounded stones. It measured 2m length and 1.30m width with a maximum depth of 0.20m. As with 0824 it sloped into the south-west corner. A large quantity of finds was recovered from this context. The pot sherds were quite random in their distribution, some lay flat on the surface, while others were often vertical in the fill. 0844 combined with 0835, 0836 and 0838 appear to have been deposits of debris. The purpose of their deposition in this area was probably to level what had previously been an area of uneven surfaces.

0839 lay immediately above 0844 (Figure 4.8 4.11 & 4.12). It was a loosely compacted yellow–light brown deposit of clay, with some stone and moderate charcoal inclusions. It measured 2m length by 1.38m width and was 0.18m deep. As with 0844 it showed a very random distribution of materials throughout the fill, which indicated that it was either a disturbed layer or a dump of anthropogenic material. Above it was a small context: 0843, consisting of yellow compact clay, measuring 1.20m length, 0.50m width and 0.12m depth. It was visible in the north-western area of the sondage. No evidence of architecture was apparent in 0839 or any of the underlying layers, suggesting that like them it was another layer to build the area up to a level surface with the surrounding hilltop in preparation for building activity. An examination of the southern section (Figure 4.8) clearly demonstrates that 0835, 0839 and 0844 all combine to produce a relatively flat area and the context above it, 0825, is where the architectural evidence begins.

4.3.4 *Lower Postholes (0820-1, 0822-2, 0830-1, 0831-2), Hearth? (0826-7) and Associated Contexts (0819, 0825 and 0828)*

0825 consisted of light brown clay with reddish-black mottling evident throughout. It was rich in charcoal and contained many rounded stones (Figure 4.7, 4.8, 4.11 & 4.12). It measured 2m length by 1.80m width with a maximum depth of 0.40m. It appears to be foundation packing for a floor of a structure. A series of two sets of two post holes each were found within the fill (Figure 4.13): 0829-30 was a posthole measuring 0.23m in diameter and 0.10m deep and incorporated some packing stones and 0831-2 measuring 0.13m in diameter, although deeper (0.20m), again surrounded by packing stones. The two postholes were aligned across the sondage from south-east to north-west. Some 0.20m higher in the profile of 0825 this pattern was repeated: 0822-3 measured 0.15m in diameter and 0.15m in depth and 0820-1 measured 0.12m in diameter and was 0.7m in depth, it too used packing stones. They were, however, associated with 0828, a linear arrangement of angular and rounded stones (max 0.23 m) that ran south-east to north-west across the sondage (Figure 4.14). It measured 0.60m length by 0.40m width and 0.14m depth. Its arrangement seems to suggest that 0820-1 was part of a wall socle but 0828 does not seem substantial enough to be a wall foundation or have any load bearing potential. As with the earlier postholes, packing stones were also present in 0820-23. These two postholes run on the same alignment as the previously mentioned two postholes and were generally in the same place within the sondage.

An area of intensely oxidised clay, 0827, lay above 0825. It was red-orange in colour measuring 0.35 m length by 0.20 m width with a depth of 0.06m (Figure 4.6, 4.12, 4.17). It was oval in shape and was situated in the corner of the western and southern baulks. It was immediately below a context (0826) of charcoal rich clay, measuring 0.85m length by 0.28m width and was 0.07m in depth. The two contexts, 0826 and 0827 would appear to be a hearth, with 0827 being severely oxidised by the fire that led to the creation of 0826 (Figure 4.6, 4.12 & 4.17). 0818/0819 lay above 0826 (Figure 4.6, 4.8, 4.12 & 4.17). It was a very irregular spread centred in the south-western area of the sondage and consisted of a series of striations of clay, light–mid brown in colour. At least seven layers were noted in section but they were impossible to pick out individually and are categorised as one context. It measured 0.80m length by 0.35m width and was a maximum of 0.07m depth. Each individual stratum ranged in thickness from about 0.5cm to 1.5cm. 0818/0819 appears to have been a series of beaten clay floors; it contained a little pottery and some bone.

4.3.5 Upper Postholes (0814-5, 0816-7) Foundation Deposits and (0811, 0812, 0813)

Above 0825 lay 0812, a spread of mixed yellow-light brown clay with orange and red speckling (Figure 4.8 & 4.11). It was compacted clay with frequent charcoal inclusions. It measures 2m length by 1.70m width with a maximum depth of 0.10m. It would appear to be a levelled surface of occupation and building debris to make a floor foundation. There were two postholes cut into it (Figure 4.15 & 4.16): 0814-5, whose diameter was 0.15 m with a depth of 0.10m and 0816-7, which was a little more substantial measuring 0.15m in diameter by 0.12m in depth, both had packing stones. The postholes were located in the same place as the previously mentioned postholes (0820-3 and 0829-32), had the same orientation and, give or take a few centimetres, were directly above each other. 0813 was located between the two postholes. It was a linear deposit running south-east to north–west. It contained light brown clay with some charcoal. It measured 0.80m length by 0.20m width by 0.05m depth. It is difficult to offer an interpretation for this material, perhaps decayed plaster or daub. Its location between the two postholes suggests it is possibly some sort of walling material. Immediately above 0812 lay 0811, a stratum of mid brown-yellow clay with a number of pebbles, rounded stones, oxidised clay fragments and charcoal flecking included within it (Figure 4.7, 4.8 & 4.11). It measured 2m length by 1.40m width with a maximum depth of 0.08m. 0811 is interpreted as a deposit that was levelled in antiquity as a foundation layer.

4.3.6 Foundation Deposits (803, 808, 810, 811), Cobbled Surface (807) Burnt Floors (801-2) and Pit (804, 806, 857)

0810 was deposited stratigraphically above 0811; it was a deposit of white–grey silty clay, with moderate amounts of charcoal and a few rounded stone inclusions. It measured 2m length by 1.80m width and 0.09m depth (Figure 4.6, 4.7, 4.8, 4.12 & 4.17). It lay immediately below 0808, a compacted mid-brown–yellow hued deposit of silty clay with moderate charcoal inclusions (Figure 4.6, 4.7, 4.9 4.11, 4.12 and 4.17). 0808 measured 2m length by 1m width and was 0.05m depth. Above it lay 0803 a light brown–grey deposit of moderately compacted clay and occasional rounded stone and oxidised clay inclusions. It measured 2m length and 0.90m width with a total depth of 0.04m (Figure 4.6, 4.7, 4.8 & 4.17). Contexts (0810, 0808 and 0803) seem to be sub-floor layers and are largely disturbed with no features evident within them. The pottery recovered from them was not lying flat, which led to the conclusion that they were disturbed deposits of building and occupation debris, possibly to level the area for the later floor surface (0801–2) to be laid. Above it 0807 was located in the south-western corner of the sondage, a deposit of loose clay with frequent rounded inclusions and some

charcoal flecking (Figure 4.18). The stones are regularly sized and water rounded, while they are also arranged in a fashion which creates a relatively flat surface. It measures 0.25m length, 0.35m width, with a maximum depth of 0.07m. Its location meant that it was not possible to investigate its entire dimensions but it appears to be some type of cobbled surface. In Area C Context 1724 is a similar arrangement of rounded stones, regularly sorted and suspended in a matrix of fine pale brown clay covering an area which measured 0.40m east-west by 0.65m north–south (Whitley *et al.* 2007: 24-27). They were found in association with foundation walls and a door pivot. The association of 1724 with architecture and the relatively flat nature of the feature suggest it served as a working platform, the same could apply for 0807 but nothing was found in association with either to suggest what they were used for.

0802 was a very red orange hued deposit of silty clay (Figure 4.6, 4.7 & 4.17). It contained some rounded stones and charcoal flecking. It was semicircular in shape and ran into the western baulk. It measured 1.40m length, 0.80m width and 0.05m depth. It appeared to be a floor surface that had been exposed to intense burning, hence the deep orange colouration. Above it is 0805 (Figure 4.7 & 4.17), a purple coloured deposit of clay which gave the impression of a fibrous material within it. It contains occasional amounts of charcoal. It measured 0.30m length by 0.18m width with a maximum depth of 0.07m. This seems to be either walling or roofing utilising a fibrous substance. The type of fibre was not identifiable, although it might be straw. It is unclear if this is a destruction deposit or the result of levelling the area but the oxidisation of 0802 does indicate that it was subjected to fire. 0801 lay above both deposits (Figure 4.7 & 4.17). It too was very orange-red in colour, composed of silty clay, with some charcoal flecking, moderate inclusions of pebbles, rounded stones, oxidised clay fragments and charcoal flecking. It measured 1.27m length by 0.70m width with a depth of 0.06m.

A small pit (0857) was cut into the eastern baulk (Figure 4.5). This pit seems to have been clay lined (0806) and was filled with 0804, a mid-brown silty clay measuring 0.38m by 0.27m and 0.21m deep. It contained some Early Helladic pottery. The final two contexts were labelled 0800 and 0809. They were a cleaning layer which consisted of all the loose material which had been dragged in when the trench was backfilled after the 2002 season. It was decided not to include material from the excavations conducted in the 2001 and 2002 seasons. The rationale for this was that it amounted to a depth of about 0.20m and was little more than the

topsoil layers, which it can be assumed would contain material mixed through ploughing. Furthermore, any archaeological features would have been ploughed out.

4.4 Discussion

4.4.1 Deep excavation 0860 and Associated Contexts

The feature 0860, 0855, 0854 and 0853 is very interesting; the particularly deep cutting made into the natural sediment is somewhat perplexing. The case for it being a midden or a dump cannot be conclusively argued one way or the other without a wider area being investigated at the site, although it does seem to be an excessive depth to excavate in order to create such a feature. The cut is too deep to be a terrace and the hill at Kouphovouno has a gentle slope not in need of terracing. The suggestion of a fortification is tenuous and hard to argue for or against with only a two metre section examined. The suggested fortifications at Sesklo are walls not ditches and their defensive function is still debated (Theocharis 1973: 65; Kotsakis 1996: 49-52; Andreou *et al.* 2001: 263; Kotsakis: 1996: 49-52, Runnells *et al.* 2009). It does not appear to be a well either; there is a water course just north of the site, its course in antiquity is unclear (Cavanagh *et al.* 2004: 56). Also, excavating for a well on the highest part of the mound is not very practical as the feature does not reach the water table and there is no mottling of the clay colour to indicate fluctuation in the water table.

A deep ditch was found at Sesklo but Kotsakis (1996: 52) and Grammenos (1996: 43) suggest it was to delimit an area and was not defensive. At Servia, Heurtley (1939: 45) found an Early Neolithic ditch 2.35m deep (Figure 4.19, Feature A1). At Makriyalos (Papa and Besios 1999: 181-2) found three phases of ditches (Alpha - Gamma): Ditch Alpha was 3.50m deep (Figure 4.20 and 4.21) close to the depth of 0860. These were U shaped and enclosed an area of 28 hectares. At Otzaki wide ditches were noted dating from the Early Neolithic period onward (Andreou *et al.* 2001: 274). Similarly, at Soufli Magoula, the settlement is enclosed by a V shaped ditch (Theocharis 1973: 65-6). Other ditches were found at Argissa and Arapi (Gallis 1996a: 65) both, however, date to the Late Neolithic period. Several Middle Neolithic ditches were recorded at Paliambela but they are not very deep, although one (Ditch 1) is just under 2 metres deep (Kontogiorgos 2007: 136-141 & 159-168) (Figure 4.22). Jacobsen (1981: 314) suggests drainage as a function for the ditches. Perlès (2001: 175) argues that their function could have been practical; controlling stock and affording some degree of protection to herds

and/or flocks as well as harvested crops from wild animals. At Nea Nikomedeia several Early and Late Neolithic ditches were found, all were shallow and most likely are delimiting ditches (Pyke 1996: 52). Perlès (2001: 175), however, was unconvinced of this function because the ditches are located in one area and there is no evidence that they surround the site but Perlès does not allow for other delimiting features, like fences or buildings working in tandem with the ditch.

At Kouphovouno there is only one 2 metre section of the feature and it is not even clear that it is a ditch, nor is it 'V' shaped; but it is evidence that deep excavations were undertaken. Also it curves slightly westward at its northern extent, which could be an indication that like Makriyialos it could at one stage have been one of a series of pits. When, however, it is compared to the Makriyialos pits it is a lot more substantial but the area excavated is too small for this suggestion to be anymore than speculation. Its relationship to other early phases of activity in the area has not been determined, therefore, it is not known if it is an enclosing ditch around an earlier smaller settlement or if it is similar to the ones at Otzaki, where one of the ditches ran through the middle of the settlement (Andreou *et al* 2001: 274). The ditches at Makriyalos I and II date from the Late Neolithic phase. Papa and Besios (1999: 182) mention the use of a ditch for refuse dumping. This could help to explain some of the in-filling of 0860 and 0858 (0854, 0848 and 0850 respectively) but not the cutting of it. The stratigraphic matrix (Figure 4.24) indicates two phases of activity in this area, the primary feature: 0860, 0855, 0854 and 0853, followed by a second phase: 0858, 0850, 0848 and 0824. This does not mean that the two features are linked by function but such a link is quite possible, given the nature of the fills of each cut. At Paliambela-Kolindrou some ditches, not all, were filled in rapidly as a continuous process (Kontogiorgos 2007: 166-8, 192). Halstead (2006: 16) interprets this to indicate that they were short term barriers or symbolic features but at Kouphovouno the feature is considerably deeper than that at Paliambela and despite the rapid infilling 0860 is perhaps too substantial to be a temporary or symbolic boundary marker.

At Makriyialos there were several pits which were described as 'borrow pits' and sometimes domestic pits (Halstead 2007: 39; Pappa and Besios 1999: 183-5) but despite the lower contexts being filled with refuse material it seems that the feature is too large to be a domestic pit. Hayden and Cannon (1983: 144) noted that in the Mayan highlands and other areas too, the practice of excavating pits to bury refuse was rarely practiced and that they instead made opportunistic use of pits excavated for other purposes, indicating an economy of effort. The re-

cutting (0858) of 0860 after slumping and subsequent continued deposition (0848, 0850) are suggestive that it was used to dispose of domestic refuse, which the slumping (0853) had sealed prematurely. An alternative argument for its existence is that it could initially have been a borrow pit, perhaps for potting clay and the subsequent deposition of anthropogenic material was an opportunistic reuse of an abandoned resource. It is a rich deposit of clay and the straight side on the east is consistent with systematic removal of clay but the re-cutting does not lend support to this argument.

Another possibility is that initially it could have been a basement feature of a house. Basements have been suggested at Servia where the house is post built and the floor is laid on tree trunks (Grammenos 1996: 43) and at Makriyialos where Papa and Besios (1999: 183-5) suggest they could have been used as cellars. One at Makriyialos measured 2 metres below the surface. Both Macedonian examples, however, date to the Late Neolithic period. Steel (2004: 69) mentions the use of semi subterranean houses during the Cypriot Neolithic with excavations to a depth of 6 metres at Vryssi. Their use as a basement would allow a large degree of security for produce from wild animals and against theft, while underground storage would help maintain a regular cooler and constant temperature. Furthermore, it is plausible that on a tell where there was a strict adherence to location of houses, expansion would be problematic. Basements would provide a ready solution to the constraints of space.

At Promachonas-Topolniča a large deeply cut feature with pisé walls was found (Koukouli-Chrysanthaki *et al.* 2005: 95-6). The excavators speculated that it had a ritual function due to the large quantities of animal crania, animal horns, animal bones, ceramics, clay figurines and stone tools also deposited. The forming process seems to have been similar to Kouphovouno, in large sequential deposits. The features 0858 & 0860 hint at reuse and suggest that 0860 might have been filled up with three deposition layers: 0855, 0854, 0853 and natural slumping (0859). It was excavated again (0858) but this time not so deep. 0855 by its position at the base of 0860 and the nature of the fill indicates that surface water was allowed to drain into the feature. This indicates that either it was open to the elements or that there was no mechanism to encourage water away from it. There is no evidence of silting in 0858, which suggests that it was either covered, pointing to a roof or a floor over it, or was refilled soon after it was opened before any silts could run into it. The fact that there are two distinct fills implies that there were two episodes of infilling, however, they are both quite substantial deposits and sealed immediately after the event (0824) and the area was then built over. This indicates that

the infilling of 0858 was a rushed and deliberate event to allow the construction of houses immediately over it.

The narrow scope of C Sondage has made interpretation of this feature difficult. Its overall size and shape does not indicate that 0860 is a ditch, although many are found on other sites and the recutting of it after slumping, supports the idea that it may have been a delimiting feature. It may be a borrow pit, as the natural clay is very workable and the sides are cut relatively straight. It is, however, much larger than any other recorded. It is plausible that it may have been a house basement but the episodic infilling does not support this argument. The interpretations offered here are ambiguous but some observations can be made. Firstly, the cutting of it indicates a significant investment in labour, probably communal. Secondly, the recutting of suggests it held some significance, perhaps as a boundary marker and its cutting was not transitory. Finally, it's infilling, sealing and the subsequent reuse of the space could imply the expansion of the settlement at Kouphovouno.

4.4.2 Architectural Strata

Change in the Use of Space

The sealing of the feature 0858 by 0824 and the subsequent re-use of the area presents an interesting change to the use of space in the area. The depositional episodes in the earlier part of the sondage, while often large scale in the amount of material deposited, do not have any indications of this deposition taking place over a long period of time; the deposits are, on the whole, homogeneous. This indicates that the depositions took place in a relatively short period of time in a limited number of events, with no time for silting up to take place between depositional episodes. This is indicative of a determined effort to change the nature of the features perhaps as a precursor to an expanded settlement. The problem with this interpretation is that the re-cutting of 0858 after the slumping (0853 & 0859) and before the deposition of more anthropogenic material (0848 & 0850). This suggests a determined effort to keep the feature open. Nevertheless, at a later date, a change in settlement practises may have necessitated the filling in and sealing of 0858. This could represent an expansion of the settlement, a need to use spaces that had previously been on the periphery of the settlement but now were within the fringes of a settlement area, hence necessitating the filling in of features

and the re-ordering of settlement boundaries. A similar phenomenon was observed in Serbia at Selevac (Tringham and Krstić 1990: 118-9), where pits were filled in, sealed and architecture was built over them. This phase of activity at Selevac happened at a time of a change in the settlement pattern, which was a horizontal displacement across the site and a change in construction methodology. The reasons for this change are related to social and economic factors. Unfortunately, the limited scale of the sondage prevents the observation of a similar pattern at Kouphovouno.

Building Materials and Organisation of Space

The postholes offer a very useful insight into the building activity on the site. There are three sets of two postholes. As there are only two reference points it would be speculative to suggest that their alignment is linear or circular. The question of whether the postholes are internal features or exterior wall features of a structure is quite central to understanding the architecture and contexts in the sondage. The post holes are rather shallow (.13m on average in depth and only .17m on average in diameter). It must be remembered that they could have been truncated by later activity on the site and initially could have been deeper than they appear. They do not seem to be substantial enough to be load bearing supports of a structure. The exterior walls of Middle Neolithic buildings are generally socle walls with rubble foundations, utilising pisé or mud brick for the superstructure. Examples of this building style were found in Macedonia at Servia (Grammenos 1996: 43), in Thessaly at Sesklo (Kotsakis 1996: 52) and Achilleion (Gimbutas 1996: 64) and in the Argolid at Lerna (Caskey 1956: 157-8). The site of Nea Makri in Attica demonstrates a different style of building (Pantelidou - Gofa 1996: 69-71); it uses postholes and woven wattle walls but they exist in tandem with mud brick built houses. A later (phase IIA) example of house using postholes was found at Achilleion with an external hearth (Winn *et al.* 1989: 36-8); there was a second phase of building but not immediately over the first. At Otzaki the mud brick walls sit directly on the ground (Gallis 1996a: 63) with no stone foundation. The practice during the Middle Neolithic seems to have been to use available materials for construction (Demoule and Perlès 1993: 370); there is plenty of stone in the vicinity of Kouphovouno being in the lee of the Taygetos mountains. The occurrence of mud brick fragments frequently throughout the sondage indicates its use consistently over time at Kouphovouno.

The use of postholes as roof supports would be a logical suggestion but these postholes are not very large suggesting they may not be loading bearing. We do not know how large the rooms were and if roof supports were needed. Some houses at Nea Makri are only 3 metres in width; the span of a single beam of wood (Pantelidou Gofa 1996: 71). Other structures uncovered at Kouphovouno do not seem to be very large; measuring roughly 1-1.5m by 2-3m (Figure 4.23) and so would not be in need of internal roof supports. There is evidence of internal buttresses from Thessaly: at Tsangli and Otzaki (Gallis 1996a: 63) and in the Argolid at Lerna (Caskey 1956: 156-7). This is a more plausible system of roof supports than the posts. The posthole's function seems to be as internal division within a structure; such a system would not need the uprights to be of high load bearing capacity. The distance apart is close enough, average 1.10m, that a light screening could be suspended between them. Inside the structures exposed at Kouphovouno, however, there is no indication of a division of space neither is there an indication of the use of internal posts. These structures are stratigraphically later than those in the sondage which could possibly indicate a development in architectural styles which did not use postholes.

Spatial Continuity

The layers 0801, 0802 and 0818/0819 are clay floors; in the case of 0818/0819 a series of at least seven successive layers was noted, similar to the pattern noted at Prodromos, Gediki, Elateia and Nea Nikiomedeia (Perlès 2001: 191), as well as Late Neolithic Makri in Thrace (Karkanas and Efstratiou 2009: 964-3). It is unclear how often the layers were renewed but they do indicate some degree of continuity. The upper surfaces (0801 and 0802) are much thicker than 0819. The two phases of activity are separated by .15m minimum of stratigraphy and the layers are immediately above each other, which, like the postholes, not only suggest continuity of building practice but also of spatial use. There are parallel examples of this from Lerna (Caskey 1956: 157), Servia (Grammenos 1996: 43) and elsewhere (see Perlès 2001: 175). The successive rebuilding of structures in the same place is another phenomenon that is attested at Kouphovouno, with parallels throughout the Greek mainland; at Lerna (Caskey 1956: 156-7), Sesklo A (Kotsakis 1996: 52) and at Otzaki (Gallis 1996a: 63) (See Chapter 2.2.3). Achilleion, however, does show changes to the orientation of the structures through time (Gallis 1996:65). This activity suggests some degree of continuity of occupation on the site. The phases of the postholes are separated by .12m (0814-7 to 0820-23) and .16m (0820-23 to 0829-32) of occupation debris. There is little indication of floor surfaces between each

successive posthole sequence. This does not mean that they did not exist. They could have been disturbed through levelling of the area. While the repeated posthole arrangement does not necessarily indicate continuous occupation it does demonstrate the continued use of the same style of construction within exactly the same area. It also suggests some restrictions on building; either because of the pressures of limited space within the settlement or some attachment to a specific area (for a detailed discussion of this see Chapter 2.2.3).

4.4.3 Accumulation Rates Seasonal Occupation and Depositional Processes

Rate of Accumulation and Seasonal Occupation

Measuring accumulation rates of debris on a tell is problematic. It is necessary to firstly establish if a site is occupied permanently or seasonally. Milner (2005: 34) examined whether it was possible to trace permanency of occupation on a site through seasonal flora and fauna remains but concluded that a large sample was needed and there is no certain evidence that animals were butchered on site. Halstead (2005: 38-49) doubts if mandibles, useful for seasonal dating, would be transported from a butchering site to an occupation site but agrees that seasonal activity is not a clear indicator of continuous occupation. At Ovcharovo, in north-west Bulgaria, Bailey (1997: 47) attempted to trace evidence of abandonment and reoccupation using successive rebuilding of houses to denote abandonment and re-plastering of walls and ovens to denote shorter term abandonment. The above methods, while they attest repeated seasonal activity and continued reuse of existing sites and structures, cannot be tied into a time frame. Furthermore, it is questionable whether the repairs undertaken by re-plastering are indicative of a period of abandonment rather than just routine maintenance.

The possibility of seasonal or even longer abandonment could seriously hamper estimation of the accumulation rate and there is evidence for the continued growth of tells after abandonment (Rosen 1986: 12-13). The rate of accumulation would be affected by rebuilding due to disrepair or complete demolition of existing structures, as would ordinary occupation debris and even windblown dust (Rosen 1986: 12). The rate of erosion would negatively influence the rate of debris accumulation, especially if the site is in an abandonment phase but bioturbation and using debris for fertilizer will affect it too (Rosen 1986: 115-6). The rate of erosion has been estimated (Rosen 1986: 31-46) but that of accumulation has not been successfully attempted, though pedological examinations have been able to pick up phases of abandonment (Davidson 1976: 264). At Kouphovouno neither indication of seasonal

occupation, nor much evidence of silting have, as yet, been found. Although, the slumping (0859) in C Sondage could be an indication of abandonment and the recutting of the ditch (0858) being an indication of reoccupation and a re-delimiting of an area.

Depositional Processes

The deposits of ceramics seem to be secondary deposits. This practice is not limited to Kouphovouno and has been found at Franchthi Cave (Vitelli 1993: 31, 44) and Knossos (Tomkins 2007: 175). In addition, the practice of clearing floor surfaces before the destruction of houses, as found at Knossos (Evans 1994: 07; Tomkins 2007: 175-6, 190), would reduce the chances of finding primary deposited material. Research on tell sites tends to focus on structures and architectural elements. Due to this bias areas in which primary deposition occurs tend not to be found. This problem is not helped by patterns of waste disposal. Whilst instances of vessel breakage and immediate deposition are rare (Tomkins 2007: 176), there are four different types of disposal of sherds identified by Deal (1985: 253-63): provisional discard or the 'intentional storage of damaged or fragmented items for future disposal or reuse', compound (plot) maintenance, dumping and loss. The first two can be considered primary deposition; the third can be either primary or secondary deposition. These processes can cause two main problems for ceramic analysis. Firstly, secondary deposits make the identification of individual deposition episodes all but impossible and secondly, it reduces the chances of finding joining sherds as they can get separated from their parent pot. In C Sondage, the instances of joins are low, only 63 sherds from the whole assemblage, this is suggestive of disturbance or reworking of deposits (Deal 1985: 249-63). It is probable that primary deposition of broken material took place away from immediate domestic areas and that this material was then deposited in C Sondage, in the manner described above (Chapter 4.3).

Only a few ground stone tools are found in the sondage; only one stone axe was recovered and a limited number of other stone tools. This suggests that stone tools were deposited differently or not as many were in use. There was a wide variety of materials found; common occurrences of obsidian, some honey flint, occasional jasper and greenstone encompassing a range of tools. Preliminary results of the faunal analysis have found that the main domesticated animals are present in the sondage with limited evidence of wild fauna and no evident changes through time (Cantuel and Gardeisen pers. comm.). To date the botanical evidence is limited to the later contexts of the deposit (0801-0844). The botanical evidence is relatively low and

suggests low level rubbish deposits and post-depositional mixing of the contexts with clean soil, which is in agreement with the archaeological evidence for the use of the space. Emmer wheat is the most frequent with some barley present as well as bitter vetch, peas, free threshing wheat and limited lentils, which are consistent with domestic activities. As yet no wild resources have been found (Bogaard pers. comm.).

Despite 0853 and 0854 being similar secondary deposits of anthropogenic material, there are differences between them. Firstly, the soil 'matrix' within which the ceramics are incorporated differ radically. Of these the soil in 0853 bears a similarity to that in 0846 whereas 0854 is much different (see Chapter 4.3.1 above for more detailed description). This could indicate that both deposits are coming from different areas of the site. Also, in all the deep deposits of anthropogenic material (0848, 0850, 0853, 0854); there was no indication of concentrations of debris. In each case the material was distributed quite evenly throughout the entire context. This reconfirms that it is secondary deposition of refuse material and not individual episodes. It also strengthens the argument that the filling up of 0858 and 0860 were deliberate actions conducted over a short period of time with the specific aim of filling up the immediate area in preparation for building on it. The specific reason, however, for the infilling of the deep excavation cannot be specifically determined. It may have been the opportunistic use of a hole to dispose of refuse from elsewhere but the immediate reuse of the space suggests that the infilling was deliberate with the intention of building over it.

4.5 Chronology and Phasing

Despite 4.35m of stratified anthropogenic material in C Sondage, the time period it represents may be much shorter than it would seem. Only 1.35m indicates architectural activity similar to what we would expect on a tell site: repeated building and levelling over a sustained period of time. There is no accurate way to measure the rate of accumulation of anthropogenic material over a period of time in C Sondage. At best it is possible to establish the phasing of each sequence of activity, which can in time be combined with radiocarbon dating (Figure 4.24 for Stratigraphic Matrix and Figure 4.25 for a brief synopsis of the contexts and their phasing). Whether that activity is separated by a short or long period of time, is not relevant to the question of phasing as each action represents a conscious decision to engage in activity that

altered the archaeological record. In C Sondage thirteen phases were evident and at least six of these have architectural features (Figure 4.25).

The pit 0849 filled with 0834, 0837 and 0847 was the earliest phase of activity identified in C Sondage (**Phase I**). It was truncated by the excavation of 0860 and subsequent infilling with 0853, 0854, 0855, this makes up the second phase (**Phase II**). The re-cutting of 0858 and subsequent infilling (0848, 0858, 0850) is another phase of activity (**Phase III**), before the deep excavation appears to have been sealed by 0824 (**Phase IV**). This was followed by 0835, 0836, 0839, 0838 and 0844, constituting **Phase V**. The sixth phase of activity is 0829-32, which appears to represent the first phase of a structure being constructed (**Phase VI**). 0820-23 constitutes a second phase of postholes (**Phase VII**), even though the building style and location are the same as phase five. The eighth phase (**Phase VIII**) of activity is 0819; it cannot be determined what length of time passed between the deposition of each layer of clay but at least seven layers of clay have been counted in this context. They cannot be linked to the postholes which are located close to them but are sequentially above them and, therefore, represent a separate phase. The foundation deposits (0812) and the third phase of the postholes (0814-7) defines the ninth phase (**Phase IX**) of activity. They are 16cm above the second phase of postholes (0820-23). **Phase X** is a series of foundation deposits (0811, 0810, 0803, and 0808) and an associated cobbled surface (0807). 0802 represents the eleventh phase (**Phase XI**) of activity, with the twelfth phase (**Phase XII**) being 0801. The small pit (0857, 0804 and 0806) is the final phase of activity in the sondage (**Phase XIII**). The activity in C Sondage can be condensed into two phase groupings: **Phase Grouping 1** (Phases I-IV) which indicates the use of space, perhaps a as boundary marker but later as a midden and **Phase Grouping II** (Phases V-XII) indicating the use of space for settlement and containing many architectural elements. Phase XIII was not included because it contained later Early Helladic material.

4.6 Conclusions

C Sondage, although spatially limited, has given a clear insight into the processes of site formation, use and development during Middle Neolithic Kouphovouno and hints at the possibility of abandonment and resettlement. The features in the lower sections of the sondage are somewhat problematic in understanding both their shape and function, as the evidence is

often ambiguous. Nonetheless, they do provide an insight into the consumption of ceramics and their disposal practices. They additionally give an indication of a changing role of space at Kouphovouno and probably the expansion of the settlement and perhaps, methods used to overcome the constraints of space. It would appear that at Kouphovouno not only is there continuation of structures on the same area as at other sites in Thessaly but also continuity in architectural style. There are also indications of continuity of the use of space and the possible division of space throughout at least three successive generations of one building. It has demonstrated that although there are problems of interpretation with such spatially limited excavations, they can be very informative. Despite the depth of material from the site, the actual phases to which occupation can be certainly ascribed constitute less than half the sequence. The picture built up of the site is one with a large degree of architectural activity and occupational continuity. The architectural features and building practices evident in the sondage all show similarities with sites in the Argolid, Attica, Thessaly, Macedonia and even Early Neolithic Knossos.

Kouphovouno has been classified as the most important Neolithic Site in Laconia by Waterhouse and Hope Simpson (1960: 74) and its importance was reaffirmed by survey (Cavanagh *et al.*: 2004; Mee 2001: 05). Middle Neolithic sites are elusive in Laconia (See Chapter 2.2.2); the majority are Late and Final Neolithic (Mee 2001: 06; Cavanagh *et al.* 2002: 122), the nearest known large Middle Neolithic nucleated site is Asea in Arcadia (Forsén 1996). The occurrence of obsidian, honey flint and jasper at the site shows that there was some degree of contact with other sites (Renfrew 1972: 442-3). The evidence from C Sondage has demonstrated that Kouphovouno, despite seeming geographically remote from the more intensively populated regions of Greece like Thessaly and the Argolid, is by no means culturally isolated. In this light C Sondage is a useful sample as a microcosm of Kouphovouno for analysis. It provides a long coherent, sequence of ceramics, with variation in the use of space, which can be used within the framework of the contextual data, as discussed above, to study technological features of the ceramics as well as production, use and discard, to develop a multi dimensional picture of the fabrication and use of ceramics at Kouphovouno. The following chapters constitute analysis of ceramics and will attempt to determine aspects of this shared cultural affinity with respect to ceramics. They will also try to understand the scale and nature of interaction between the disparate communities in the Peloponnese during the Middle Neolithic period.

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5. TRENCH C SONDAGE: CERAMIC ANALYSIS

This chapter includes a detailed analysis of the ceramics from Trench C Sondage. Initially, the assemblage is characterised in terms of ware, fabric grouping, identifiable shapes and, finally, decoration. Following this, more detailed analysis is conducted under several headings: Construction, Decoration, Shapes, Production Rates and Functions. The examination was performed using non-invasive surface feature analysis with the intention of elucidating evidence for technological choice at various stages of the production sequence. In this respect, particular attention was paid to forming techniques of pedestal base bowls and collar jars as, in most cases, their construction is a composite of two pieces of ceramics, leaving scope for variation in the process of attachment. In all cases chronological changes to each attribute were considered. Aspects of ceramic use and production rates are also considered with a view to understanding both the scale of production and the role of ceramics at Kouphovouno.

5.1 Methodology

Initial analysis of the ceramics from C Sondage took place during the excavation seasons of the Kouphovouno Project in 2003, 2005 and 2006. In all cases the ceramics were recorded by context. The initial analysis consisted of weighing and counting the total number of sherds. Thereafter the sherds were divided into coarse and fine wares and the total weight and the numbers of sherds in each category were recorded. Sherds, whose wall thicknesses were greater than 8mm, were considered coarse wares, in order to remain consistent with the system already employed by Mee (2007: 220 n4) at the site. This measurement is arbitrary; the purpose of this exercise was to get a general feeling for the proportions of sherds in coarse and fine categories. Petrographic analysis will be done to determine fabric groupings; some macroscopic work was undertaken and the results are presented below. Coarse wares weigh more than fine wares, so direct comparisons of weights can be misleading (Orton *et al.* 1993: 169). Likewise, the fragmentation pattern is not standard across the assemblage; therefore sherd numbers can be equally unreliable. By recording both weights and numbers, data from both can be compared to create a more balanced view of sherd proportions. The numbers of

painted and unpainted sherds were also recorded; painted and monochrome sherds were not separated for this exercise because, since painted sherds come from vessels which have both painted and monochrome decoration, this information could be misleading. Instances of scribble burnish were counted separately. The presentation of this data is broken into two main groupings: Phases I-IV (Phase Grouping 1) and Phases V-XII (Phase Grouping 2), which indicates different uses of space in the area (see Chapter 4.5). It was decided not to attempt to examine the pottery by the individual phases identified in Chapter 4, as the small amounts of sherds in each phase would make it hard to extrapolate meaningful data from them. The amounts and weights of sherds in these two groupings are largely similar, which allows a broader, more general analysis of the changes in the proportions of sherds chronologically in C Sondage. Additionally, comparisons can be made between two phases when the function of the area changed from deposition of refuse (Phase Grouping 1) to architectural activity (Phase Grouping 2).

More detailed analysis was undertaken during the summers of 2006, 2007 and 2008 during which time the catalogue was formulated (see Appendix 1); examples from the catalogue are used to illustrate the features discussed in each section. This analysis consisted of surface feature analysis; no invasive or destructive analysis was undertaken at this stage. Diagnostic features were recorded in four main categories: rim (R), handle (H), base (B) and body (S). Where possible, the type of vessel in each category was noted as well. These categories were based on the categorisations of Phelps (2004). The ware type, whether coarse or fine, was also noted. Petrographic analysis of fabrics was limited due to unforeseen circumstances; nevertheless, broad fabric categorisation was undertaken using visual analysis with a x10 hand lens. Random samples were taken from contexts excavated in 2003 (contexts 0800-0844) but care was taken to ensure that all the main phases from Phase Grouping 2 were included. This analysis is preliminary and will be extended to the entire assemblage from C Sondage and refined using microscopy at a later date (see Chapter 8.2).

The colour of the surface of the sherd and the core were recorded using a Munsell Soil Colour Chart. Variations in surface and core colour were recorded due to use-wear and firing atmospheres. Any joins between sherds were noted as was any evidence of use-wear or construction. Evidence for these attributes was based on close examination of the surface of each sherd. This analysis concentrated on two main categories: damage to the fabric by use or visible residues deposited on the sherds. With both categories care was taken to ensure that

post-depositional factors could not have been responsible for them. The identification of variation and choice in the fabrication process is central to this thesis; therefore, particular attention was paid to areas where they could be noted. Construction attributes that were recorded concentrated on evidence for building techniques, manipulation of fabrics and final finishing of the vessels. A central aim of this analysis was to record attributes that were socially determined rather than influenced by mechanical and environmental constraints. In order to achieve this, aspects of the construction techniques used for pedestal bowls and collar jars were given particular attention. Where possible the relationships of attachment type to pedestal heights and also to fabric type were considered (Appendix 2, Tables 1 and 2). With collar jars, attachment types were compared against vessel diameters, which can give an indication of vessels size (Appendix 3, Table 1). Collar jar attachments were also compared with fabric types (Appendix 3, Table 2). Finally, both pedestal attachments and collar jar attachments were compared with firing practises to consider if there was a relationship between both as part of an overall potting tradition (Appendix 2, Table 3 and Appendix 3, Table 3).

Examination of both use-wear and construction techniques became self informing and where variation was noted it focussed attention on particular attributes and in some cases caused a re-checking of previously analysed sherds. Decoration was recorded in three main categorisations: Undecorated, Applied or Incised, and Painted. Painted decoration referred to instances of pattern painted decoration, monochrome, and scribble burnish (Phelps 2004: 59). In each case a detailed description of the decorative syntax, using terminology developed by Holmberg (1944), Vitelli (1993) and Phelps (2004), was employed. The colour of the paint was recorded using a Munsell Soil Colour Chart. Finally, the dimensions of the sherd were taken and, where possible, the rim diameter was measured using a rim diameter chart.

It was not possible to catalogue each individual diagnostic sherd; therefore, only sherds, which illustrated clear examples of the attributes discussed in this chapter, were selected to be catalogued. In all cases, at least one sherd which demonstrated these attributes was selected, but, where possible, a range of examples were selected from each context. Each distinguishable vessel shape and attribute was counted in all contexts and these data form the basis of the quantitative analysis undertaken in this thesis. There was a concern that counting both bases and rims could bias the sample by including sherds from the same vessel, thus overestimating proportions of shapes (Orton *et al* 1993: 172). Furthermore, rims give a better

indication of vessels shapes than bases. In order to avoid misidentification, proportions of each shape were calculated using rims only. In the instances where there were joins between sherds, care was taken not to double count any sherds from the same vessel. Finally, the sherds found in the Middle Helladic pit (804, 806; see Chapter 4.3.6) were discounted because of contamination from later deposits.

The final week of the 2008 study season was set aside to photograph all the catalogued sherds, to prepare more drawings and to carry out further quantification work. Unfortunately due to a shortage of staff and resources at the Sparta Ephoria it was not possible to work on the material at that time. Further attempts made through the autumn of 2008 and 2009 were also unsuccessful; however, it is hoped that at a later date it might be possible to undertake these important tasks. In this chapter, some catalogued sherds have photographs, referred to as Catalogue No. ##, Figure No ##. In other cases, examples from other sites discussed in Chapter 6 were used to highlight examples at Kouphovouno.

5.2 Initial Analysis

5.2.1 Wares

A total of 14,544 sherds were recovered from C Sondage, which weighed 1397.1 kilograms. Fine wares dominate the assemblage; representing 92% by number and 73% of the total by weight (Figure 5.1 and 5.2). These are similar to the overall figures found by Mee (2007: 204) in his examination of the sherds from the 2003 season (Phases V-XIII), which indicated that fine wares represented 93% by number and 76% by weight. This proportional representation is borne out across the rest of Area C (Mee 2007: 204), with fine wares always in larger proportions. When the different uses of the area of C Sondage are considered (Phase Grouping One and Phase Grouping Two), there is only a slight change in proportions. Phase Grouping One had 6825 sherds which weighed 657.75kg. The proportions are 91% fine wares by number and 70% by weight (Figures 5.1 & 5.2). In Phase Grouping 2, which contained 7719 sherds weighing 739.37kg, the proportions change to 92% by number and 75% by weight (Figure 5.1 & 5.2).

5.2.2 *Fabric Groupings*

All results outlined here relating to fabric composition are preliminary and need to be confirmed by petrographic analysis. This analysis was conducted on a random sample of material from the 2003 season and undertaken by Ian Whitbread, who very kindly made his data available to me (Whitbread pers.comm.). He established a number of fabric groupings using a hand held (x10) lens, which this brief description is based on. Data relating to proportions of fabric groupings outlined here is based on weights. As a consequence of time constraints, no attempt was made to link fabrics with shapes. This work will be undertaken at a later date. The fabrics tended to reflect the local geology and were rich in schist, calcite and quartz inclusions. These indicate that the clay sources were local (Whitbread in Whitley *et al.* 2007 26-7). One sherd was identified whose fabric was not local. It was white in colour and contained gold mica. Furthermore, the 'pellet' decoration seen on this sherd was unique at the site (Catalogue No. 301, Figure 164). In total 22 fabric groupings were noted during the preliminary analysis, with proportions based solely on weight (Figures. 5.3a-b and 5.4). The contexts selected are all from the architectural phases of C Sondage (Phase Grouping 2) and were grouped into the relevant phases as outlined in Chapter 4 (Figure 5.3b). They were selected to get a sample that covered as wide a chronological range as possible. Where there are coarse and fine varieties both are combined, otherwise the sample groupings would be too small to be meaningful. The entire sample weight that was examined was 18.06kg or 2990 sherds. Of this sample, 11.42kg were from Phase V, with 6.54kg from Phase X and 0.17kg from Phase XI.

Orange Medium Sand Ware (OMSW) is present in all contexts and constitutes 48% by weight of the entire sample (Figure 5.4). In Phase V OMSW is the more dominant fabric grouping at 38%. In Phase X it comprises 71% of the total and finally in Phase XI it accounts for 95% (See Figure 5.3b). OMSW is characterised by a reddish yellow colour, with well sorted angular inclusions of limestone, phyllite and schist in a medium sand matrix. There is no evidence of surface treatment. Black Coarse Ware (BCW) is also found in each phase grouping, but it only accounts for 3% of the total weight of the sample. It is a very dark grey, with moderately sorted sub-angular inclusions with no evidence of surface treatment. In Phase V it accounts for 4%, in Phase X it accounts for 2% and in Phase XI it accounts for 5%. Orange Medium Limestone Orange Peel Ware (OMLOPW) accounts for 10% of the overall sherd sample. It declines from 13% in Phase V to 8% in Phase X. OMLOPW consists of a yellowish red surface colour, sometimes with a grey core with occasional poorly sorted

limestone and schist inclusions. The orange-peel description refers to the pitted nature of the surface of each sherd. This is almost always on the inside, probably due to use-wear (Chapter 5.7.2) and is predominantly associated with basins (Basins Chapter 5.5.3). Another common fabric group is Red Fine Ware (RFW), which is red in colour, with fine sand and medium sorted inclusions and a smoothed surface. It constitutes 6% of the total. It decreases from 8% in Phase V to 2% in Phase XI. Orange Fine Ware (OFW) constitutes 6% of the overall assemblage. It is reddish yellow in colour, with well sorted fine sand with rare inclusions. It is often decorated with scribble burnish. It decreases from 9% to 4% between Phase V and XI. Grey Dark Fine Ware (GDFW), accounts for 5% of the total. Finally, Slinky Ware (SLFW) is a fine, very smooth clay with few unidentified inclusions, usually painted with red monochrome with linear bands of patterned paint on it. It accounts for 5% of the total assemblage, representing 5% of Phase V and 2.5% of Phase XI.

A clear pattern emerges, one of a strong decline in the range of fabric groupings. In Phase V there are 18 fabric groupings, while in Phase X there are 11 fabric groupings and, finally, in Phase XI, there are only two. Concurrently, the size of the proportions of fabric groupings also decline. This suggests a decline in the range of recipes for paste preparation and the increasing dominance of a few fabric groupings. It may indicate a reduction in the number of potting traditions but this needs to be confirmed by further analysis and comparison with earlier phases in C Sondage and other aspects of the *chaîne opératoire*. Furthermore, there are significant differences between the sample sizes which could skew the data, the sample with the largest number of fabric groupings (Phase V) has the largest sample and vice versa with Phase XI.

5.2.3 Shapes

The fragmented nature of the assemblage meant that complete vessels were not recovered and only one profile could be reconstructed. Nevertheless there were sufficient diagnostic sherds of large enough size to partially reconstruct many of the shapes. The different shapes recorded in the assemblage are discussed in detail later in this chapter. The majority of shapes can be generally classified as jars and bowls, based simply on whether the rim was open or closed (Phelps: 2004: 27). Bowls (convex flared and convex plain) are consistently the most common shape and are found in significantly larger proportions than jars, accounting for 45% of the total number of identifiable shapes, whereas jar shapes (collar and piriform) account for 30%

(Figure 5.5). Mee (2007: 204-5; Rice 1987: 224-6 and Youni 2004: 14-16) used aspects of the design of Middle Neolithic ceramics to suggest function, such as seal-ability, pour-ability and balance as evidence for storage vessels, as well as open, highly decorated shapes as evidence of serving or consumption vessels. Function and intended use can be determined by practices of consumption and are important factors at the design stage for a vessel. They, therefore, can be used for such a basic classification of shapes, although it should be acknowledged that vessels are often put to uses they were not designed for (Rice 1987: 207-43). Between the two different phase groupings there is a slight change in proportions; the proportions of bowls decrease from 47% to 43%, whereas jars decrease slightly from 31% to 28% (Figure 5.5). Using then, Mee's (2007: 204-5) criteria for storage and consumption outlined above, consumption vessels dominate the assemblage, followed by storage vessels.

Cooking pots, with their distinctive fabric, shape and colour (Vitelli 1993a: 213-5) are proportionately the lowest of the three categories accounting for 9%. There is an increase in the proportions of cooking wares between the architectural phases but they still remain below 10% of the total assemblage. Basins are ambiguous; they have wide open shapes but coarse fabrics and could have been used as serving vessels or as storage vessels. They account for 16% overall and increase significantly between the two phase groupings from 11% to 19%. Individual shapes are discussed in more detail in Section 5.5.

5.2.4 Decoration

The analysis of decoration was conducted by counts only (Figure 5.6). Within the pottery sample 51% is painted, which is a downward adjustment from the 65% recorded by Mee (2007: 205) for the 2003 excavation contexts (800-0844). In Phase Grouping 1, 54% of the pottery is painted, while in Phase Grouping 2, this drops to 47% (Figure 5.6). This is a decrease of 7% between the two phase groupings.

5.2.5 Summary/Discussion

The above exercise was used to demonstrate general proportions in the assemblage and to assess possible temporal trends. Fine wares are always found in the highest proportions; there is a trend, however, which sees fine wares increase their representation slightly by number of sherds, although it is more noticeable by weight. A wide range of fabric groupings were recorded macroscopically, although towards the end of the C Sondage excavation sequence this range narrows and OMSW, which was found in each sampled context, is the dominant

fabric grouping. Petrographic examination will be necessary to fully characterise and investigate these preliminary macroscopic fabrics and explore the suggested patterns more fully. The proportions of identified shapes also show interesting trends; cooking wares remain at 9-10% of the total, which although small for utilitarian shapes with a short use-life, is still a significant proportion. Open consumption shapes are found in the largest proportions, but their proportionate representation declines between the two phase groupings. Set alongside this there is an increase in basins whose function as storage or serving vessels is unclear (see below). In tandem with this there is a slight decline (7%) in the amount of painted sherds through C Sondage. Overall there is a temporal pattern of increasing fine wares but a decreasing range of fabric groupings. This is set against a decrease in open shapes and decorated pottery. This trend tends to suggest that through time there is a move towards storage/utilitarian pottery away from consumption shapes. These features are discussed in more detail later in this chapter.

5.3 Construction/Forming Evidence

Middle Neolithic pottery is handmade, yet the potters were able to form elegant shapes with thin walls. A number of the sherds from C Sondage displayed evidence of the construction methods used at varying stages during the manufacture of the ceramics (Figure 5.7). As would be expected, coarser sherds displayed considerably more construction evidence because they tended not to have had the wall thinned by scraping, which, along with burnishing and smoothing, can obliterate evidence of forming techniques (Rice 1987: 124). This is not an absolute, however; some of the fine sherds do have traces of working on them. Using surface feature analysis it was attempted to, firstly, indentify how the pots were made and, then, to elucidate whether it is possible to identify variation in construction methods used by potters. This variation, which cannot be explained by mechanical or other environmental constraints, is a valuable means of identifying socio-technical choices in fabrication methods at each stage of the production sequence.

5.3.1 Vessel Building: Coiling/Slab Building and Pressing

Coiling or slab building appears to be the method used to make pottery in the Greek Neolithic (Björk 1995: 97; Vitelli 1993: 96-7, 118, 135-6; Youni 1996: 60-1). No indications of moulds have been found as yet in Neolithic Greece, although 'invisible' objects, such as broken

ceramics, holes in the ground and organic materials could have been used as moulds (Rice 1987: 125). At Nea Nikomedeia both coiling and pinching were noted with two differing styles of coiling identified (Youni 1996: 61). At Kouphovouno no indication of a mould has been found nor do any shapes have seams typical of mould building, there is also no indication of rilling associated with wheel-made pottery in the assemblage. There was some evidence of coiling/slab building found in the assemblage from C Sondage (Figure 5.7, Catalogue Nos. 24, 308 & 383; Figures 6.19). In Phase Grouping 1, 19 sherds had visible evidence of slab/coil building; 31 sherds in Phase Grouping 2 had similar evidence (Figure 5.7). Collar jars demonstrate some evidence of coiling at the junction of the neck and body, but this is most likely because they are composite shapes (see Collar Jar Attachments, Chapter 5.3.2.2). Another indicator of coil/slab building is the presence of marks where the fabric has been pressed; this is useful both to shape the vessel and to remove any air pockets, which could compromise the integrity of the vessel wall. We have very clear indications of this from the sherds in C Sondage (Catalogue Nos. 24 & 271). 37 sherds have evidence of finger or 'press' marks resulting from this manipulation of the fabric, generally found on coarser fabrics, whose walls were not thinned. None of the bases had any mat impressions, which Youni (1996: 61) argues are indicative of large vessels and rotating of the vessel whilst it is being formed. The vessels from Kouphovouno are not very large and so this technique might not have been necessary.

5.3.2 Finishing: Dragging/Scraping

Dragging marks are distinguished from scraping largely by the fact that scraping has a wide flat linear mark that measures up to 7-8 mm in width (Catalogue Nos. 17 & 18; Figures 6.21a-b), whereas dragging marks are usually only 1 mm in width (Catalogue No. 39). Dragging marks are caused by pulling large grits from the fabric across the vessel surface when the vessel is being wiped or scraped (Vitelli 1993a: 7). At Kouphovouno the dragging marks are more often horizontal than vertical but have been found to cross over each other at oblique and right angles (Catalogue Nos. 39, 75, 486 & 487). Dragging marks are predominantly on the unburnished insides of vessels and are most prevalent on thinner walled vessels (Figures 6.20a-b). They have also been noted on the inside of closed vessels like collar neck jars. There is an increase in the numbers of dragging marks through both Phase Groupings of C Sondage, rising from 21 to 26 examples (Figure 5.7).

Scraping is a technique to thin the walls of the vessels and to get a uniform thickness, and is also used to drag up the sides of handmade vessels (Rice 1987: 125). Vitelli (1993a: 8) suggests that the wide troughs may be from burnishing but it seems unlikely given the quality of the finish on some pottery; also there are unburnished sherds that have been scraped. Evidence of scraping increases slightly from 26 to 32 examples between both phase groupings in C Sondage, but more examples of scraping are found than of dragging marks (Figure 5.7). It is not possible to identify what was used to do the scraping, but any object with a sharp edge and flat plane would suffice, such as a piece of obsidian or even a reworked sherd similar to those found in C Sondage (Chapter 2.5.3 and below Chapter 5.5.4). Only two examples were noted which had cross scraping (Catalogue Nos. 508, 533).

5.3.3 Pedestal Base, Collar Jars and Everted Rim Bowl Attachments

Pedestal bases, collar jars and everted rim bowls proved to be very informative about the variations of construction methodologies used for Middle Neolithic vessels. Collar jars, everted rim bowls (Figure 2.6) and shapes with pedestal bases (Figure 2.9-12) tend to be composite shapes and, therefore, require the attachment of two pieces together to form the desired shape. This provides a line of weakness where the shapes tend to fracture. Vitelli (1993a: 136) suggested that at Franchthi Cave such fractures were due to the two pieces of each vessel being joined when the fabrics were leather hard; fortunately for this study, this also appears to be the case at Kouphovouno. The resulting breaks have revealed useful information about Middle Neolithic potting practices, most notably the variety of attachment practices.

5.3.3.1 Pedestal Bases

They are found on a variety of shapes, both closed and open shapes (Phelps (2004: 55). They can be found in a range of sizes, which are directly related to the size of the bowl they are attached to (Appendix 2, Table 1). Usually pedestal bases are painted in monochrome paint only on the outside, but occasionally the inside is painted as well. There were no examples of the fenestrated variety or of reverse punctuate found in C Sondage. In rare instances there were examples with no decoration whatsoever; this does not seem to be because the paint has worn off. In C Sondage a total of nine pedestal attachment styles were recorded, which are briefly described below.

Type 1; Flat: Straight pressing of the body and base together without any aid. This method leaves a very flat attachment scar with no indication of preparation of the body or the base. The flat attachment, whilst it does not have any attachment aid, could gain support from the large surface area that is gripping the bowl (Figure 5.8, 6.25a-d; Catalogue No. 317).

Type 2; Shaped Outside, Clay Added Outside: The pedestal was shaped with the top of the outer side rounded and smoothed. When it is attached to the bowl a subsidiary piece of clay was added to the outside. This often creates a small 'v'-shaped void on the outer third between the pedestal base and bowl. There was no indication of clay being added to the inside, only some blending of the pedestal bases into the bowl base (Figure 5.9; 6.26 a-e; Catalogue Nos. 315 & 316).

Type 3; Shaped Inside, Clay Added Inside: Almost the opposite of Type 2. The pedestal was shaped with the top of the inner side being smoothed and rounded. When it was attached to the bowl, a subsidiary piece of clay was added to the inside. This sometimes created a 'v'-shaped void on the inner third between the pedestal and the bowl (Figure 5.10, 6.27a-b; Catalogue No. 77).

Type 4; Shaped Both Sides or Rolled, Clay Added Both Sides: Somewhat related to Types 2 and 3, although not as common. This type of attachment is quite distinctive because the top of the pedestal base has been rolled. In most cases it is shaped on both sides. From a mechanical point of view this is, perhaps, the weakest of the support types listed here, as it lessens the amount of contact and, therefore, grip that the pedestal base has on the bowl. It is strengthened, however, by addition of subsidiary clay to both sides of the top of the pedestal (Figure 5.11, 6.28a-b; Catalogue No. 73).

Type 5; Flat, Clay Added Both Sides: This attachment bears elements of Types 1 and 4, except that the pedestal is unworked. The flat attachment has been shown to be sufficient to support an attachment on its own (See Type 1), so the extra clay is an interesting addition (Figure 5.12, 6.29a-b; Catalogue No. 130).

Type 6; Flat, Clay Added Outside: This is a relatively rare type, although it is important because it is a variation of Types 5 and 7. The attachment is added flat, with no working on

the top of the pedestal but supporting clay is added on the outside. As with Types 5 and 7 this extra clay must be regarded as surplus to necessity (Figure 5.13, 6.30a-b; Catalogue No. 229).

Type 7; Flat, Clay Added Inside: This is a relatively rare type. The attachment is added flat, with no working on the top of the pedestal but supporting clay is added on the inside (Figure 5.14, 6.31a-c; Catalogue No. 403).

Type 8; Whole/High Quality Flat Finish: This type is a little ambiguous. It appears to be a single piece where no seam can be determined between the bowl and the pedestal, although in most cases the pedestals are so small (1-2cms) that they could be drawn from the bowl fabric itself. These attachments are most likely to be Type 1 attachments, which have been finished to a much higher quality. This makes the seam between them and the bowl undetectable. If this is the case, then the quality of the finish could indicate that it warrants its own attachment type (Figure 5.15, 6.32a-b; Catalogue No. 13).

Type 9; Dashing: There is only one example of dashing (see Catalogue No. 605). There is a series of short dashed lines on the pedestal top each measuring about 1cm in length. This would have been a very useful method of ensuring extra purchase/grip for the pedestal base onto the bowl (Figure 5.16).

5.3.3.1.1 Discussion

Several examples of each attachment type were found attached to the bases of bowls. Considering the simple task of attaching a pedestal base to a bowl, the wide range of attachment types is surprising. No mechanical purpose could be found to explain this wide range of attachment methodologies. It was expected that larger pedestal bowls would need extra support to hold the two pieces together. This assumption was tested by analysing the pedestal bases whose maximum height was preserved. Pedestal height was used instead of diameter as a measure, because more examples which were intact to the entire pedestal height were preserved than those which could be used to determine the diameter. Unfortunately the sample size for this exercise was limited to 26 examples from those catalogued (Appendix 2, Table 1). Type 1 attachments ranged from 21-45mm (average 30mm), Type 2 attachments range from 11mm to 70mm (average 32mm), Types 4 ranged from 20 to 42mm (average 28mm) and Type 5 ranged from 21-32mm (average 27mm). There was insufficient data to

comment on the other attachment types. This range of attachment heights demonstrated that no direct link could be established between pedestal height and pedestal attachment type, and additionally that there was no great variety in the average pedestal height. Furthermore, it suggests that the vessel shape was not a determining factor in the choice of pedestal attachment. There was no noticeable correlation between either the ware types used to make the pedestal bases or the type of attachment used (Appendix, 2 Table 2). Attachment types 1-8 are found in fine and coarse fabrics. There is, however, a clear preference for fine fabrics, with 78% of all attachments being made in fine wares. It was not possible at this stage to undertake work to link fabric grouping with attachment types; this will be undertaken at a later date (see Chapter 8.2). Both pedestal height and fabric type indicate that no bias could be found which affected the choices available to potters when they were making the attachments, and that factors which could influence the choice of attachment type were not based on readily identifiable mechanical features.

The attachment would theoretically ensure a very good bond with the bowl, although Type 4 does present an obvious zone of weakness because of the minimum contact between base and bowl. Some attachments join the bowl at different angles, but this depends largely on the curvature of the base of the bowl. The variety of attachments indicates a wide variety of ways to deal with the problem of supporting and strengthening the attachments. Inexperienced potter's difficulties in working with clay (Vitelli 2007: 96-7) or experimentation with attachment types do not offer a suitable explanation for all the variation. However, some cases where there are few examples of each attachment type, such as Type 9 may indicate experimentation. In most cases, examples of each attachment type exist through several archaeological strata; therefore, their longevity points to traditions of attachment types rather than experimentation.

5.3.3.1.2 Frequencies

Type 1, Type 2 and Type 3 constitute the majority out of a total of 205 instances of identified attachment types (Figure 5.17). They are found in much larger ratios than the other attachment types. Type 1 is by far the most common attachment type making up 43% of the total attachments found in C Sondage. The attachment types are found throughout C Sondage and are often found together in the same context. There are changes in the proportion of attachment types found between the two Phase Groupings (Figure 5.17). Type 1 is the most common attachment type accounting for 48% initially, but there is a significant reduction, to

39%, in Phase Grouping 2. Types 3, 5 and 7 also demonstrate a reduction in Phase Grouping 2, whereas Type 2 attachments increase dramatically from 14% to 31%. The number of Types 4, 6 and 8 attachments increase, although the numbers of each in both phase groupings is relatively small. Type 9 is absent in Phase Grouping 2, but as mentioned earlier, only one example was found in the entire assemblage. Overall Types 1 and 2 dominate the assemblage, accounting for 63% in Phase Grouping 1 and 71% in Phase Grouping 2 between them.

The co-existence of the main types of attachment in the different phases of C Sondage, especially from the same context, does not indicate any degree of evolution from one type to another. This, along with the existence of other types of pedestal attachments whose existence cannot be explained by mechanical or environmental constraints, indicates that throughout C Sondage there is a variety of attachment styles in existence, which may indicate differing traditions, more specifically motor traditions of fabricating pottery. To find them all in one place can be interpreted in two ways, but does not necessarily preclude that these interpretations had a role in how the sherds were deposited in C Sondage. Firstly, intra-site exchange of ceramics or their contents would explain how differing traditions can exist spatially at the same time. Secondly, communal dumping of households would contribute to give a similar pattern, especially as the deposits seem to be secondary deposits, which have been moved around (see Chapter 4.4.3).

5.3.3.1.3 Groupings

One cannot equate each different style of attachment with individual potting traditions without considering other aspects of the *châine opératoire*. If one were to suggest that each attachment type indicates a separate potting tradition, then there are at least nine traditions making pedestal bowls represented in C Sondage. Each attachment type can be grouped in such a way as to reflect a different conceptualisation of how the pedestal is attached to the bowl.

Group A: Attachments which have not shaped the pedestal: Types 1, 5, 6, 7, possibly Type 8.
Group B: Attachments which have the top of the pedestal shaped: Types 2, 3 and 4.
Group C. Attachments in which the pedestals have been modified: Type 9.
Group D. Whole: Type 8. This grouping is ambiguous for reasons outlined above.

This demonstrates that there is a range of conceptualisations, by which the pedestal and the bowl could be attached, and could arguably indicate four broader traditions, which may be

further sub-divided into nine attachment styles (Figure 5.18). Throughout C Sondage Groups A and B dominate the assemblage, of which Group A is the most common, representing 56% of the total identifiable attachments, and Type B representing 41%. Group C is represented by only one example and Group D equates to 2% of the overall. This indicates the dominance of two main concepts of how attachments are connected to the bowls. When the Phase Groupings are considered, it shows that Group A dominates Phase Grouping 1 with 63% of the total, with Group B making up 35% and Groups C and D making up the remaining 2% (1% each). In Phase Grouping 2, Group A decreases to 50%, Group B represents 46% and Group D equates to 4%, with Group C absent. Although there are two main categories of attachment types which dominate the assemblage, there is a clear indication of a change in the proportions between them. Pedestals from Group A averaged 26.5mm in height, whereas those of Group B averaged 49mm. There was insufficient data to consider Groups C and D. This suggests that there may be a mechanical relationship between pedestal height, which is relevant to the size of the vessel and the conceptualisation of the attachment. A look at the range of pedestal heights for individual attachment groups (Appendix 2 Table 1) suggests that, while there may be a tendency for pedestal attachment groupings with particular heights, this is not an absolute. Furthermore, no clear relationship could be noted between coarse and fine ware and the attachment group.

5.3.3.2 Collar Jar Attachments

Collar jars can also be composite vessels and, as with pedestal bowls; it was possible to identify variety in their construction methodology. The range of attachment types was not as broad as those of pedestal bowls; also the incidence of each type is much lower. Collar jars, as discussed below, tend to fall into two sizes, one significantly larger than the other.

Type 1; Folded: This is where there is evidence of the collar being folded outward and back down upon itself. This can sometimes be confused with Type 4 (see below). Very often there are indications of where the folded fabric is blended poorly into the vessel at the bottom of the collar joint on the outside (Figure 5.21, 6.38a-c; Catalogue No. 103).

Type 2; Coil Attached: One of the two commonest of the attachment types (Catalogue No. 81). On Type 2 attachments, the collar is made separately from the body and is then fitted onto the body. The edges of the collar are then blended into the fabric of the body. This can be done

at the collar, but in some instances it extends down the outside of the vessel shoulder for a few millimetres. In some instances the collar and rim were not recovered together with the body, but from the distinctive scar left on the shoulder of the body it was possible to reconstruct the attachment type (Figure 5.34, 6.39a-b; Catalogue No. 88).

Type 3; Single Pieces: Type 3 is generally, but not exclusively, limited to the smaller vessels. They are constructed by drawing up the fabric from the bowl and usually have a thin wall. This can be identified similarly by the breakage patterns on the sherds because they are single pieces that tend not to break at the neck (Figure 5.35, 6.40a-d; Catalogue No. 33).

Type 4; Slab Joined: Constructed by joining two slabs of fabric together which creates an oblique seam running roughly diagonally across the wall of a collar. There is some ambiguity with this attachment; it bears a similarity to Type 1, in that the seam runs across the attachment. On Type 4 attachments, however, the central seam does not run as close to the rim as on a Type 1 attachment. Also, it tends to run from one side to the other at an oblique angle. It can also be confused with Type 2 in its use of two elements to form the collar (Figure 5.36, 6.41a-b; Catalogue No. 68).

5.3.3.2.1 Discussion

A general observation of collar heights, which was not recorded, did not indicate a relationship between collar jar attachments and size, but diameters and attachment types were compared and recorded where possible (Appendix 3 Table 1). The sample size for this exercise was small, only 35 examples were examined but a pattern does emerge. It showed that 16 Type 1 attachments range from 100mm to 200mm (average 140mm). The 9 Type 2 ranged from 80mm to 220mm (average 151mm). Only 3 Type 3 could be examined, they ranged from 80mm to 140mm (average 116mm). Finally, of the 7 Type 4 ranges 100mm to 180mm (average 137mm) were observed. Types 1 and 2 have the widest range of diameters and Type 3 has the shortest. Furthermore, Type 3 has the smallest average size. This is a curious occurrence because Types 1, 2 and 4 all require the addition of extra clay, whose extra weight could have contributed to the slumping noted by Vitelli (2007: 97) at Lerna. Type 3 attachments would be the strongest mechanically, given that they eliminate a zone of weakness along the attachment, yet they have the smallest diameter on average. This seems to indicate that the weight of each attachment type was not a concern when fabricating each attachment type. A small sampling exercise compared ware types with collar attachments and

indicated that the majority of attachments are made in fine wares, with 13% being made in coarse fabrics (Appendix 3 Table 2). Apart from Type 3 attachments being mechanically sturdier, and a possible attempt to reduce weight and prevent slumping, no attachment types bring any obvious advantages to the collar jars indicating, therefore, that the type of collar neck attachment, as with pedestal bases, is a matter of choice as opposed to being a mechanical constraint.

5.3.3.2.2 Frequencies

Based on 144 recognisable attachments, Types 1, 2 and 4 are present throughout almost all phases of C Sondage. Types 1 and 4 are the most common, making up 31% of the total each; Type 2 is almost as common at 30%, while Type 3 is the lowest at 8% (Figure 5.23). Compared with pedestal base frequencies, the distribution of attachment types is more evenly spread and there are some changes in the proportions of attachments between both phase groupings. In Phase Grouping 1, which contained 44 attachments, Type 4 is the most common at 29%, but it is only slightly more common than Types 1 and 2 (Figure 5.23), which are 27.5% and 25.5% respectively, with Type 3 representing 18%. In Phase Grouping 2, which contained 100 attachments, these proportions change slightly; Type 1 becomes more common at 33%; Types 2 and 4 represent 31% and 32% respectively; whilst Type 3 equates to only 4%. Only three everted rim bowls were found. They were attached using Collar Jar Type 2 in Phase Grouping 1 (Catalogue No. 158: 449), but the attachment type used is unclear in Phase Grouping 2. The numbers are too low to make any further comment.

The range of attachment types from C Sondage suggests that, as with pedestal bases, the presence of differing attachment methodologies exists longer than the lifetime of one generation and is, therefore, indicative of contemporary forming traditions at Kouphovouno. In both cases the majority of attachments are found in a series of contexts which, given the nature of C Sondage, indicates that there is no temporal development. Also, from this point of view, it is interesting to note that both the pedestal base and collar jar attachment types all seem to be fully formed. While the ceramics represent a temporal sequence, it is still not clear if the earliest occupation at Kouphovouno has been recorded. Nevertheless, it is plausible that forming traditions arrived fully formed at Kouphovouno which could have important implications for investigating the Initial Neolithic settlement of Laconia (see Chapter. 7.1 and 7.9).

5.3.4 Firing Practices

As discussed in Chapter 2.5.3, finding a firing installation, such as a kiln, pit or evidence of bonfire firing on the site would have been unlikely. The excavation at Kouphovouno did not turn up any indication of an installation for firing pottery. None of the sherds examined gave any indication of belonging to Vitelli's (1993a: 184-5; 1997: 21-40) supposed 'mobile' kilns (see Chapter 2.5.3). Looking at the sherds themselves does give some insight into firing practises. Only one with a firing/stacking circle could be identified (see Catalogue No. 93), suggesting stacking was not common, also none of the rim sherds at Kouphovouno showed signs of stacking. Vitelli (1993a: 200) suggests that individual fires inside bowls, prior to a vessel being stacked in them, would oxidise the bowls' centre and would prevent the tell-tale stacking circle from firing and, consequently, explain why so few are found at Kouphovouno. More plausibly, the oxidation on the outsides and light reduction on the insides of some vessels is suggestive of upside down firing (Whitbread in Whitley *et al.* 2007: 27). As stacking can be a feature of both kiln and bonfire firing, the presence or absence of stacking circles does not give a clear indication of either, but the absence of both does suggest that pots were fired in small lots.

Only three sherds which could clearly be described as wasters were found in the entire assemblage. They show evidence of over-firing and were quite misshapen (see Catalogue No. 38, 291, 549) but as discussed in Chapter 2.5.3, not all wasters are easily recognisable. The low number and isolated examples would rule out the possibility that the sherds were over-fired in the destruction of a house. It would be erroneous to assume that there were no misfired pots in existence. Earlier (Chapter 2.5.3) it was discussed whether firing may have taken place away from the site. If this was the case then the few warped/misfired sherds were actively being brought onto the site, although in situations of low intensity production strategies sherds tend to be mixed with domestic refuse (Costin 2001: 280); therefore, one would expect an amount of misfired sherds in domestic refuse deposits, but just three sherds from the entire assemblage seems too few a number for this to be the case. This raises two possibilities: first that they were brought onto the site as waste material to be used as foundation deposits or to assist drainage, for example. This is doubtful because of the low quantities found in C Sondage. Otherwise, it is perfectly plausible that, although they may not have been perfectly formed, they could still have been functional. One may speculate that these vessels, because of their poor quality, would not have been used in public or as mechanisms for social dialogue.

On the other hand, if pottery was a highly valued commodity as suggested by the reuse and mending of some ceramics (Vitelli 1993a: 216), then to waste a functional pot that was damaged does not seem sensible. It is possible, therefore, that misfired pottery made its way into domestic contexts for utilitarian purposes. Some, not all, could still be used as storage or consumption vessels, for example, but with perhaps a reduced social role.

Instances of fire-clouding are rare; only 8 sherds from the entire assemblage have indications of fire-clouding (Catalogue No. 282). Fire-clouding can be an indication of an inconsistent firing atmosphere and can occur in both kilns and, more commonly, in bonfires. It is caused by a 'hot spot', where there is a spike in the available oxygen of the firing atmosphere, sometimes resulting from a gust of wind (Rice 1987: 109). It can also be due to the use of the finished ceramics (see Use Wear: Chapter 5.7). The low numbers of fire clouded sherds from Kouphovouno suggests that firing atmospheres were well controlled, and is suggestive also of the use of kilns, but this can be done in bonfires too. The assemblage displayed a variety of firing atmospheres, from highly oxidised (Catalogue No. 139) to entirely reduced fabrics (Catalogue No. 494). Sherd thickness was compared against core colours of all catalogued sherds, but no clear relationship could be established between wall thickness and firing atmosphere (Appendix 5). Sherds with a wall thickness of less than 5mm had both reduced and oxidised cores, as do sherds with a wall thickness of between 5 and 10 mm and over 15mm. The range of firing atmospheres also suggests that achieving such results is an action of choice; that they were well aware of the effects of firing atmospheres and deliberately set out to achieve them.

As it stands the evidence seems to suggest that firing took place off site with some misfired sherds making their way onto site, either as functional vessels or as debris. Also there is no conclusive proof whether firing was conducted in bonfires or in kilns. Further work on this is necessary (see Chapter 8.2). The evidence indicates that Middle Neolithic potters at Kouphovouno were able to produce well fired highly oxidised ceramics but, as Youni (1996: 69) and Sillar (2000: 47) have shown, these attributes, which rely on high temperatures and maintaining consistent atmospheres, can be achieved in bonfires, indicating that kilns need not necessarily have been in use at this time.

5.3.4.1 Pedestal Bases and Collar Jars: Firing Atmospheres

A sample of both pedestal attachments and collar jars were examined (100 Pedestal Bases and 83 Collar Jars) to see if there was any relationship between the attachment type and the firing atmosphere. The aim of this was to see if a pattern emerged which linked pedestal attachments with particular firing practises. The surface colour of sherds that were not painted and the core colour were recorded with a Munsell soil colour chart, using the colour names rather than the notation (Appendix 2 Table 3 and Appendix 3 Table 3). The aim was to place the attachments in broad categories, which would give a crude indication of whether they were fired in oxidising, reducing atmospheres or a combination of both.

Pedestal base Type 1 predominantly has light red, oxidised cores with similar colouration on the surface. There is no indication of changes to this throughout the assemblage. Type 2 attachments have more variety in the colours of the cores and include one example with a reduced core (Catalogue No. 84). In each case the surface colour is consistent with the core colour. Type 3 is similar to Type 2, but Type 4 does indicate greater variability having both oxidised and reduced cores and, in some cases, variation between the core colour and the surface colour (Catalogue No. 143). This pattern of variation in core and surface colour continues with Types 5 and 6. Type 7 also had both reduced cores and oxidised cores, but there was insufficient data to comment on the surface colour. Type 8 attachments, although limited in number, showed a range of core colours of the attachments as well as a variety between core colour and surface colour. Having only one example of Type 9 attachment does not allow comment. This has shown that Types 1-3 are all oxidised and that core colour and surface colour were more or less similar. Types 4-8 did demonstrate some variety in firing atmospheres, with both oxidised and reduced cores present within the same attachment type, while more generally there is variety between the core and the surface. Broadly speaking, there is a relationship between pedestal attachment, sherd thickness and core colour; almost all sherds with reduced cores have a sherd thickness of over 5mm with two exceptions: Catalogue 184 Attachment 5, which is 4mm thick and Catalogue No. 293 Attachment Type 8, which is 4mm, but this pattern is based on only 13 examples, which may be too small a number for this pattern to be meaningful.

Type 1 collar jar attachments had both oxidised and reduced cores, but the surface colour matched those of the core in each instance (Appendix 3 Table 3). Types 2 and 3 attachments had almost all their cores oxidised, but occasional examples were reduced. In almost all cases

the core and surface were the same colour. Type 4 attachments had a more substantial number of lightly reduced cores; there was no discrepancy between core and surface colour. The pattern of firing atmospheres for collar jars indicates that core colours and surface colours are consistently fired to the same colour. In each category the cores are predominantly oxidised with occasional examples of reduced cores. The few reduced examples that were noted came from sherds with a thickness of 5mm or more, suggesting a relationship between sherd thickness, collar attachment type and firing atmosphere, but there was no identifiable relationship between firing atmospheres and collar jar attachment types in the sherds from C Sondage.

Middle Neolithic potters, it is clear, were very competent at firing being well able to achieve and regulate desired firing atmospheres. We have no indication as yet of the exact method they used to fire such well made pottery, but it was, more than likely, fired in bonfires as opposed to kilns. Direct evidence of either method has not yet been found and indirect evidence is somewhat ambiguous. If production is organized on a household scale, as it appears to be (see Chapter 7.5), then attention to detail for each pot may allow the production of highly fired objects. The choices they made relating to the finish of their pottery would seem to have been influenced, in some part, by the functions of the pottery, such as highly oxidised pedestal bowls used for display or consumption, and reduced atmospheres for cooking wares (see Chapter 5.7). They could produce the desired effects repeatedly throughout the entire time span of C Sondage. The low number of misfired shapes could be slightly misleading; however, since there must have been higher incidences of misfiring, but the limited evidence we have for misfired sherds could be influenced by other factors relating to the discard of ceramics and the location of firing. There is some suggestion of a pattern in the firing of some pedestal bases attachments (Types 1-3), but the others show no pattern between attachment type and firing atmosphere. Likewise, collar jars show no clear relationship between firing atmospheres and particular attachment types, but there is a clear indication of consistency between core and surface colour.

5.3.5 Construction/Forming Techniques: A Summary

In almost all cases the number of sherds with construction evidence is low, but there are indications in the forming techniques, firing practises and quality of the finishing of the ceramics that the potters were highly skilled. Although there is variation between both phase groupings, the numbers are too low for any meaningful statistical pattern to be noticeable.

There is sufficient variability in all aspects of the fabrication process to demonstrate the existence of choice that is not influenced by mechanical or environmental limitations, and perhaps one can tentatively consider different traditions of ceramic manufacture. This analysis has been carried out without recourse to scientific techniques. Chapter 8.2 deals with how scientific resources can be used to identify further where choice is situated in the production sequence.

5.4 Decoration

As mentioned above, 50% of the pottery from the assemblage is painted (Figure 5.6). The proportion increases by 7% from Phase Grouping 1 to 2. It is found on both fine and coarse fabrics. There are occasional examples of incised or plastic decoration. The painted decoration from C Sondage can roughly be divided into three categories: monochrome, patterned and scribble burnish.

5.4.1 Monochrome

Monochrome decoration is ever present and is often found on shapes that could be deemed utilitarian, such as storage vessels or husking trays. There are two differing colours noted: red and brown, or various shades of both, the effect of which seems to have been determined by how thickly the paint was applied (Phelps 2004: 57). In some cases it was applied in places where one would not expect to see decoration, such as the underside of pedestal based bowls (Catalogue No. 309). Monochrome is also applied to the underside of convex bowls that have elaborate decoration on the more visible upper side (Catalogue No. 498). The monochrome would appear, therefore, not to be a significant form of decoration and would appear to have functioned to tone the fabric or to smooth the surface. Occasionally there are incidences where there is both red and brown monochrome on the same vessel (Catalogue No. 368, Figure 6.53a-b). The borders, however, of both paint colours are very clear and sharp, this effect was noticeable on some examples of scribble burnished vessels too.

5.4.2 Pattern Decorated

Generally the motifs were variations of geometric shapes of varying complexity and of linear designs with lines of varying thickness, and occasionally some wavy lines. They were located in zones ordered by the fields imposed by the shapes of the vessels as recorded by Phelps

(2004: 57-9). Due to the fragmented nature of the assemblage the entire decorative pattern could not be appreciated. Only one decorated vessel profile could be reconstructed from the entire assemblage (Catalogue No. 447). There were isolated examples of what appear to be berry-like motifs (Catalogue No. 43). There was no sizeable change in the proportions of pattern decorated sherds throughout C Sondage (Figure 5.6). Unfortunately, because no complete vessels were preserved, it was not possible at this juncture to undertake a broad stylistic examination of the decorative syntax used in C Sondage. The fragmented nature of the deposit limited the study to broad categorization of the types of decoration used. However, it was possible to undertake a small study of one particular motif, which will be discussed below.

5.4.2.1 Rim Pendants and Vertical Lines

An examination of the decoration is problematic; in order to conduct studies, such as design element analysis (Friedrich 1970: 332-43; Rice 1987: 257-64; Redman 1977), or symmetry analysis (Rice 1987: 263; Washburn 1983: 138-64), whole profiles that have preserved whole motifs and decorative syntax are necessary in some number. Unfortunately, no complete vessels were recovered from C Sondage; the fragmented nature of the deposit meant that getting any complete motifs would prove difficult. One particular type of motif does have some potential for analysis. Rim pendants, a name first coined by Phelps (2004: 57), are relatively small motifs, which increases the chances of recovering a complete motif or even a series of them. Furthermore, as rim pendants are limited to the rims of vessels, it greatly increases the chances of being able to identify the shape of the vessel where the rim pendants are present. Also, the presence of a rim helps to give an orientation to the motif, which is not always possible on body sherds. Finally, they are always located in the same place and are usually part of a repeated structured arrangement in tandem with bands of monochrome of the same colour on the insides of convex flared bowls. An examination of a single motif is a very narrow study to conduct, but, considering the fragmented nature of the assemblage, it represents the most promising method to undertake a decorative analysis of the pottery from the assemblage. There are three variations of the motif in this area of the convex flared bowls:

Rim Pendants: These are inverted solid triangles, which terminate at a band of monochrome, or above it, leaving an area undecorated (Catalogue No. 47, Figure 230).

Elongated Rim Pendants: These are similar to rim pendants but have a tail, which runs either to the monochrome band below or can extend into it or in some instances just extends a little below the bottom of the rim pendant. The tail extends both vertically from the base or can extend diagonally to the left. The triangles vary in shape and size, some becoming quite thin and elongated (Catalogue No. 69, Figure 202).

Vertical Lines: A series of short vertical lines that terminate at the monochrome. The vertical lines can vary in number and thickness. They are not exactly the same as the rim pendants but their arrangement on the vessels is in a similar location on convex bowls and it is found in a similar arrangement with monochrome decoration. The fact that they are ordered the same way, are present on the same shapes, interact with other decoration in the same way and are present on convex bowls suggest that they are related (Catalogue No. 9, Figure 255).

For this study it was possible to examine 314 sherds. As well as rim pendants and vertical lines, some of the bowls are decorated with just monochrome and others have scribble burnish, but with these latter two decorative styles the arrangement is different. It covers all the bowl and is not formatted in particular zones, as the three styles above are. More than half of the bowls (51%) are decorated with monochrome, while rim pendants and elongated rim pendants are present in 22% each of the total. Vertical lines are attested in 4% of the overall sample and only 1% are decorated with scribble burnish (Figure 5.24). In Phase Grouping 1, which contained 151 sherds with this type of decoration, monochrome dominates with 58% of the total, followed by rim pendants at 27% and elongated rim pendants representing 13%, whilst scribble burnish represents 1% of the total (Figure 5.24). In Phase Grouping 2, which contained 164 of these sherds the proportions change (Figure 5.24). Monochrome is reduced to 53% of the total, rim pendants also decrease to 22%. Elongated rim pendants increase their representation to 17%. Vertical lines, absent in Phase Grouping 1, account for 9% and scribble burnish remains constant at 1%.

For the purposes of this examination monochrome and scribble burnish examples will be excluded because they do not reflect the same arrangement as rim pendants, elongated rim pendants or vertical lines. This leaves a sample of 137 sherds between both phase groupings, of which 61 are in Phase Grouping 1 and 76 are in Phase Grouping 2. In Phase Grouping 1 rim pendants account for 67% (41 sherds) of the total, whereas elongated rim pendants account for 33% (20 sherds) (Figure 5.25). In Phase Grouping 2 these proportions change; rim pendants

decrease to 46% (35 sherds), elongated rim pendants increase to 36% (27 sherds), whereas vertical lines account for 18% (14 sherds) (Figure 5.25). Two major observations can be made here. Firstly, that the proportions of rim pendants are significantly reduced and elongated rim pendants increase slightly between the two phase groupings. More importantly, vertical lines, absent in Phase Grouping 1, constitute a sizeable proportion of the total rim pendants in Phase Grouping 2. This is a significant change in the assemblage and one of two indicators of decorative development in the motif through the lifetime of C Sondage (see also Scribble Burnish Chapter 5.4.3). It is plausible that the vertical lines developed out of the elongated rim pendants, but the sudden appearance of vertical lines at the same time that the use of the area changed is also notable. One suggestion is that the material for the foundation layers of the architectural phases came from elsewhere on the magoula and that linear vertical lines are the preferred motif where that pottery is taken from, a different midden perhaps, suggesting that there were intra-site preferences for decorative styles.

All three differing styles are found not only on convex flared bowls but also on collar jars (Catalogue No. 42, 163, 222; Figure 112). Additionally, collar jars with rim pendants tend to be in the earlier phases of C Sondage. Usually convex flared bowls are accompanied by vertical or diagonal lines on the outside, varying in thickness and number. Sometimes there are incidences of crossing lines; no exact pattern was noticeable (Catalogue No. 95; Figure 45 and Catalogue No. 115; Figure 51). Björk (1995: 129) makes a distinction between decorated and undecorated ceramics at Early Neolithic Achilleion, arguing that the decoration marks some degree of social differentiation in the existence of decorated and undecorated instances of the same vessel shape. This certainly is plausible as decoration can be used as a medium for the transmission of social information. The three motifs are limited to the two vessel shapes and appear on no other shape throughout the assemblage. Such a specific field of expression is not without significance. It is interesting to note that the shapes on which the motifs are found seem to have two differing functions; collar jars have design attributes that suggest they were used for storage, whereas convex flared bowls would be more suited to display, serving or consumption (Mee 2007: 204). This indicates two very different situations, whereby the decoration is 'experienced'. It is limited to very visible zones on the vessels; the convex flaring of the bowls reveals some of the inside, whereas on the collar jars it is limited to the outside, which would allow it to be visible, should the jar be sealed. This suggests that the decoration was designed to be seen, although in two very different contexts. Can the contexts be linked? Rice (1987: 269) warns about taking a simplistic view of the relationship of

decoration and the transmission of social information, because the relationship between the two is not always clear. On the other hand collar jars, because of their limited capacity, might represent smaller manageable quantities for storage, which are easily transportable; also they are generally well decorated. Due to its highly decorative nature Middle Neolithic Urfirnis ware has been considered as a vehicle for social dialogue (Vitelli 1999: 194-5). Furthermore, as shapes tend to be open display vessels, they have also been considered to have had a role in the sharing of food or possibly to have been used for competitive feasting (Halstead 1995: 11-22; Valamoti 2007: 225; Vitelli 1999: 194-5). The incidence of rim pendants and vertical lines on both these vessel shapes could relate to the use of ceramics as social technology in the deliberate transmission of information at varying stages in the storage (collar jars) and consumption of food (convex flared bowls), perhaps a mechanism for the signalling/flagging of the 'provider' during the transfer and consumption of food products.

5.4.3 Scribble Burnish

Scribble Burnish decoration is achieved by painted thin lines being burnished vigorously while still wet, causing the paint to take on a wavy pattern, which Tomkins (2007: 186) attributes to an attempt to replicate wood grain in ceramic vessels that are believed to be based on wooden shapes. Scribble burnish, like patterned decoration, is not found on 'utilitarian' shapes, such as large storage jars or gouged bowls. There is no clear correlation between scribble burnish and vessel shapes. It is found both on open bowls (Catalogue Nos. 16, 64) and collar jars (Catalogue Nos. 76, 135), a pattern also noted by Phelps (2004: 59) across the Peloponnese. It is also found both on the exterior and interiors of vessels (Catalogue Nos. 76, 135). Scribble burnish was present in almost every context. In total 1050 sherds were scribble burnished, which accounted for 14% of the painted sherds (Figure 5.26). In Phase Grouping 1, 336 scribble burnished sherds account for 11% of the decorated sherds. In Phase Grouping 2, there are 343 sherds, which represent a slight increase to 17% of decorated sherds (Figure 5.26). There was a clear preference for canonical scribble burnish (93%) in the overall assemblage (Figure 5.27). In Phase Grouping 1, canonical scribble burnish accounts for 95% or 319 sherds out of 336 sherds over Acanonical but this proportion decreases slightly to 312 out of 343 sherds or 91% in Phase Grouping 2 (Figure 5.27). There are isolated examples of curious expressions of the Acanonical style, which include a double lined 'squiggle' (Catalogue No. 376) and other vertical representations of it (Catalogue No. 423). Tomkins' view (2007: 186), that scribble burnish is an attempt to replicate wood grain in ceramic vessels, which are believed to be based on wooden shapes, is plausible, but the existence of

Acanonical scribble burnish, especially the more unusual examples, such as the vertical representations, is an inexplicable and, seemingly increasing, departure from this convention.

5.4.4 Incised and Applied Decoration

There were occasional incidences of incised decoration, often around the neck of collar jars (Catalogue Nos. 60, 174). Another isolated example had rope working on the edge of the rim (Catalogue No. 373), while a third constituted some rouletting on a highly burnished body sherd (Catalogue No. 352). There was also one incidence of pinching on a handle (Catalogue No. 179). There was slightly more plastic decoration than incised, but it was also not very common and was limited to welts, both rounded and elongated. The vessels concerned were usually painted too (Catalogue Nos. 249, 355). The decoration was not limited to any specific part of the vessel, being found on the body and handles of pottery. The incidence of incised and plastic decoration was not in any way sufficient in quantity or pattern to allow much further comment. There were some incidences of small spurs, sometimes on the rim and occasionally close to the rim (Catalogue No. 527). They were predominantly on the open shapes, which were flimsy. Their function might not have been purely decorative; the angle of the spur is somewhat suggestive of a grip for tying a cover to the vessel. They are delicate attachments and so it is doubtful if they would be able to withstand much stress from being tied. They are applied to the vessel wall even though their small size indicates that it would be possible to draw up the necessary fabric to mould them from the vessel wall, which would have made them stronger. These spurs, therefore, probably are decorative rather than functional.

5.4.5 Decoration: A Summary

The decoration of the sherds from C Sondage gives a sense of the high quality of craftsmanship in Middle Neolithic ceramics. Half the overall assemblage is painted, with a trend showing an increase in painted sherds through the life of C Sondage. Unfortunately the fragmented nature of the deposit restricted analysis of the patterned decoration. Nonetheless the rim pendants, elongated rim pendants and vertical line motifs were informative, and they not only indicate a development of the motif through the life of C Sondage but also suggest that decoration could indeed have played a role in social discourse during the Middle Neolithic Period. Finally, both scribble burnish and Acanonical scribble burnish were present with scribble burnish being more common but with a slight increase in the proportion of Acanonical scribble burnish through C Sondage. Both pattern decoration and scribble burnish

decoration do indicate temporal changes through C Sondage, both proportionately and in motif development. Plastic decoration was noted throughout the sondage, demonstrating a range of styles, but interestingly (cf Chapter 6.2.6 and 6.6.8) there were no indications of fenestrations or 'Reverse Punctuate' on pedestal bowl bases.

5.5 Shapes

The fragmented nature of the assemblage meant that we did not recover any complete vessels and only one profile could be reconstructed (Catalogue Nos. 36 & 70 Figure 215). Nevertheless there were sufficient diagnostic sherds of large enough size to reconstruct many of the shapes (See Figures 5.9). A number of different shapes were recorded. There were 1106 individual shapes from the entire assemblage, which can roughly be divided into three categories that are essentially decided on the evidence from the rim type: open shapes, closed shapes and other shapes. Despite reservations about assigning functional names to the shapes and the problems it can cause by alluding to certain specific uses for ceramics, it is possible to some degree to do so without biasing the description. Therefore, Phelps' (2004: 27) system, which was also used by Mee (2007: 204), will be used and the assemblage will be discussed where possible in categories of bowls, jars and other shapes.

5.5.1 Open Bowls

Phelps' (2004: 48) bowl shapes, both convex flared and convex plain bowls account for 486 or 44.5% of the total assemblage of recognisable shapes (convex and plain bowls) (Figure 5.5). Open bowls account for 47% of the recognisable shapes or 197 sherds in Phase Grouping 1, but in Phase Grouping 2 this reduces to 43%, but the sherd numbers increase to 302. A division into bowl depths was not possible because of the fragmented nature of the assemblage. Convex flared bowls are by far the most common of the bowl types in the assemblage, accounting for 30% of the overall shapes: 335 sherds. The proportion of convex flared bowls does indicate a significant decline from 34% to 27% between Phase Groupings 1 to 2; whereas convex plain bowls, which account for 135 sherds, increase slightly from 13% to 15.5% over the same period (Figure 5.5). The decoration is usually pattern painted in geometric motifs but frequently there is some decoration on the inside of the rim (see Decoration, Chapters 5.2 & 5.4). In some instances there are open shapes that are very highly

decorated on their insides and painted with monochrome on their outsides. This indicates that visibility of decoration may have been an important aspect of the vessel's function. Mee (2004: 205-7) suggests that bowls were used as serving and consumption vessels. Based on the estimated volume of whole or almost completely whole vessels at Kouphovouno, and using Henrickson and McDonald's (1983: 638-9) method, he found that 60% of them had sufficient capacity to serve more than one individual and, therefore, could be used either to feed family units or perhaps to share food more widely in a society. Unfortunately the ceramics from C Sondage were too fragmented to undertake this exercise.

5.5.2 Collar Jars

Collar jars account for 18% or 186 of the recognisable shapes from C Sondage (Figure 5.9). In Phase Grouping 1 they account for 17.5% (71 sherds), which decrease slightly to 16% (115 sherds) in Phase Grouping 2 (See Figure 5.9). Collar jars are found in two distinct sizes: tall and short. This depends on the height of the collar, which seems proportionate to the jar size; short collar jars have a collar that is less than 25mm based on Phelps' (2004: 51) classification. He suggests that smaller collar jars may have had a different function to larger ones. Overall tall collar jars account for 132 or 70% of the total collar jars in C Sondage (Figure 5.28). Phelps (2004: 52) noted a chronological change towards smaller collar jars throughout the Middle Neolithic, but this does not seem to be the case at Kouphovouno. In Phase Grouping 1, tall collar jars account for 53 or 71% (Figure 5.28) of the total number and, similarly, 79 or 70% in Phase Grouping 2 (Figure 5.28), indicating relative stability throughout the life of C Sondage. They are decorated with paint, both monochrome and patterned decoration (as described above in Chapter 5.2.4.1). The presence of a narrow mouth does suggest that they could have been stoppered or sealed (Mee 2007: 204), but with the smaller jars it is unclear how stable a tied cover might have been on them, as there is little for them to grip. Furthermore, none of the jars show any indication of string wear patterns, but such evidence would be extremely difficult to perceive. Everted rim bowls, which would have served this purpose better and allowed a more secure grip (Mee 2007: 205), are rare; only four were noted in the entire assemblage.

5.5.3 Piriform Jars, Basins and Askoi

Piriform jars were difficult to distinguish in C Sondage. The 'S' profile makes them difficult to recognize and they can be easily mistaken for wide-rimmed bowls. The piriform shape has a lower centre of gravity and a closed neck, thereby making them more stable and facilitating

pouring, so they are arguably suited to liquids (Mee 2007: 204-5). In total 144 sherds were found which accounts for 13% of the overall shapes in C Sondage, although, they do decrease from 13.5% (59 sherds) to 12% (85 sherds) across the two phase groupings. Basins are so called because they are large open shapes with wide mouths and sometimes a squared rim, distinct from other bowls mentioned above. They are decorated only with monochrome. They account for 175 sherds or 15.5% of the overall assemblage from C Sondage (Figure 5.9). They increase from 11% or 42 sherds in Phase Grouping 1, to 18% or 133 sherds in Phase Grouping 2. This is a sizeable increase through C Sondage. These vessels are almost exclusively made with Orange Medium Limestone Orange Peel Ware (OMLOPW). The nature of this fabric seems to suggest that the pitting was caused by use-wear (see Chapter 5.7.2). It is indeterminate from the shape and the fabric whether this vessel shape was used for the storage, preparation or consumption of food. One example of an askos was noted (Catalogue Nos. 369, 370, 371).

5.5.4 Cooking Vessels

Cooking vessels from C Sondage are identified by their coarse fabric and distinctive shape. Urem-Kotsou *et al.* (2002: 116) caution against the reliance on fabric type to identify cooking as a function of ceramics; as at Makriyialos, shapes suitable for cooking are found in a range of fabrics. At Kouphovouno vessels identified as cooking pots have several technological features which indicate their use as cooking vessels: the fabric, the closed globular shape and the presence of lugs. Vitelli (1993a: 214) claims that the Middle Neolithic cooking vessels have lugs so that they could be lifted from a fire using a stick. This is somewhat implausible because the vessels, being heavier when full, would be unstable and perhaps prone to falling from the stick's grip. From observations of the pottery, it was noticed that the lugs on the sides seem to be situated in such a way as to fit between the middle and third fingers, enabling a very confident grip on the vessel, perhaps providing better control should the contents be poured out. This does not rule out the use of a forked stick should the need arise. This 'Cooking Ware' accounts for 97 sherds or 8% of shapes (Figure 5.9). They are found in almost all phases of C Sondage. In Phase Grouping 1, they account for 31 sherds or 7.5%, but in Phase Grouping 2, they increase slightly to 66 sherds or 9%. The proportion of cooking wares is an interesting statistic; as, being a utilitarian shape with an estimated use-life of 1-2 years (Foster: 1970; Mills 1989: 139; Short 1996: 465), one would expect them to be found in high proportions. Mills (1989: 139) conducted a survey of ethnographic data of use-lives of pottery. She found that on average cooking ware accounted for 16% of an assemblage containing

cooking pots, storage and consumption vessels. The ceramics from C Sondage fall short of this rate by some way. While acknowledging that other factors, such as selective disposal of sherds, could influence these proportions, this seems highly unlikely as there is no indication of a selective disposal pattern for ceramics in the Neolithic, although it is possible for misfired sherds and wasters. Instead this may indicate that the methods for the preparation of food during the period did not rely heavily on using ceramics over fire. One possible explanation for the temporal increase in sherds with heating traces and cooking ware could be that ceramics came to be used more to prepare food, reflecting either changing tastes in food production or that cooking ware demonstrated its potential, and so became more commonly used. Still, the 1.5% increase indicates that this growing preference for cooking vessels is minimal to say the least.

5.5.5 Gouged Bowls

These shapes tend to be deep globular bowls, made in a coarse fabric often with a pedestal base. The outside is painted in monochrome and the insides are deeply scored (Phelps 2004: 53). Four very distinctive sherds were noted from C Sondage, all were made from coarse fabric and two were very coarse fabric (Catalogue Nos. 309, 559, 607, 629, Figure 171, 280). The insides of these sherds were scored in a cross hatched manner. The hatches varied in width, from 5mm apart to 10mm. The scoring was several millimetres deep but was quite worn in some cases. At Kouphovouno it is cross hatched, whereas Phelps' (2004: 53) examples are arranged horizontally on the side walls, with those on the base being perpendicular to them. The outside of one of the coarsest sherds was painted with red monochrome and one of the sherds was attached to a pedestal (Catalogue No. 559). Curiously this sherd had also been painted and, unlike most other pedestal bowls, the underside of the bowl was painted. Even though there are only four sherds, each comes from a different context (844 850, 853, 854), 3 of which belong to Phase Grouping 1.

The function of these bowls has often been speculated on. Holmberg (1944: 44-6) suggested they may have been used for boiling water because the extra surface area would expose more water to heat; this seems unlikely, however, as no evidence of heat has been found on their outside and the thick walls would not be efficient convectors of heat. Phelps (2004: 53) suggests they are husking trays, that the rough gouges were used to de-husk cereals. However, the shape of the bowl limits the internal space for working and could trap grains (Vitelli

1993a: 185-7). Also, the wear patterns are always on the base and never on the sides. It seems unlikely that they were used to de-husk cereals. Furthermore, glume wheat found on Neolithic sites does not need to be de-husked (Valamoti 2007: 97). Vitelli (1993: 185-7) has suggested they may have been used as beehives, a view shared by Alram–Stern (2003: 160-1). The scoring would be beneficial to the attachment of the honeycombs to the wall. This function was suggested by Jones *et al.* (1973: 398-414) for Kalathoi found at the 4th Century BC Vari House and there is evidence of the use of beeswax at least from the late Middle Neolithic period (Decavallas 2007: 51-2). Crane (1983: 45-77) found that there are examples of hives using combing or etching from Kashmir and Crete but that it is not always necessary for hives to have this. Furthermore, the pedestal base is unnecessary for the function of a beehive. The wear patterns suggest that the bowls were subjected to some degree of abrasive action, which Vitelli (1993: 185-7) suggests could be from rigorous cleaning. However, on the sherds from Franchthi cave and Asea, it is concentrated on the base and one would expect that, if it were beeswax, then it would be extant across the whole of the bowl and not limited to the base. The wear patterns appear to be the result of rubbing something across them, rather than a grinding action or perhaps a 'sloshing' action for liquids. As it stands their function is unclear.

5.5.6 Other

There were two instances of ladles or dippers found: a long elegant thin handle, which was painted with a central linear band of monochrome and a curved end (Catalogue No. 500). An additional sherd that was rounded with several holes in it is suspected to be a strainer (Catalogue No. 484). Another curious shape was a squared dish (Catalogue No. 450). It was rectangular in shape, shallow sided, and the tops of the walls were pinched. It was painted in monochrome and had wavy linear lines painted on the outside. Similar squared dishes were found at Franchthi Cave (Vitelli 1993a: 372 Figure 28u; 438 Figure 61b). The open shape suggests it had a role as a display item but it is not very well finished. A flat low tray found at Late Neolithic Makriyialos has been suggested to have been used for baking (Urem-Kotsou & Kotsakis 2007: 237), but the example from C Sondage is morphologically different and there is no indication of any evidence of heat effects, although neither of these rule out this function.

5.5.7 Lugs, Handles and Spurs

Other shapes, although small in quantity were found in the C Sondage. A number of lugs were noted with a variance in the way they were attached to the vessel. Some were scored, whereas some were just pressed onto the vessel and others were applied with subsidiary supporting

clay. There were two types: un-perforated lugs with concave undersides to assist lifting (Catalogue 235, 238, 242), tubular ones and one cylindrical foot, which was heavily misfired (Catalogue No. 291). There were a number of perforated horizontal and more often vertical lugs too. The holes would appear to be a clear indication that they were for tying covers onto the pottery but none of them had any evidence of string wear. There are some instances of handles: flattened, strap and rounded handles in coarse, medium and fine fabrics. In some instances there are handle scars on the vessel walls. The handles and lugs have a variety of decoration; some are unpainted but the majority have monochrome, the same as the vessels they are attached to. Occasionally there is plastic decoration and sometimes pinched decoration. Spurs have been discussed in detail in Chapter 5.4.4.

5.5.8 Summary

Overall the proportions of each vessel shape remain stable throughout C Sondage. Open consumption shapes are always the most common, with storage shapes and cooking shapes following respectively. The proportions do change between the phase groupings with storage shapes and cooking vessels increasing their representations slightly. There are also noticeable changes between the proportions of different shapes in each category but overall the assemblage does not indicate any major changes. The shapes are very uniform in quality and size and give a clear indication of the technical proficiency of the potters.

5.6 Production/Consumption Rates

Conscious of the important role that weighing of sherds has for quantification; all sherds above 1cm² were recovered and care was taken to sieve each context completely. In total 139.712 kilograms of coarse and fine sherds were recovered from C Sondage, which totalled 14,544 individual sherds; of these, 204 sherds or 1.3kg are Early Helladic. Vitelli (1993a: 210) estimated that one Early Neolithic pot weighed an average of 1kg at Franchthi Cave, which gave a production rate of 150-175 pots per year during the Middle Neolithic Period (Chapter 2.5.2). This approach was applied to Kouphovouno by Mee (2007: 202) on the excavated material from C Sondage in 2003, which amounted to 75kg. He used Vitelli's formula of one pot weighing one kilogram. Working off the assumption that C Sondage represented 0.01% of the total surface area of the site and that the Middle Neolithic deposits averaged 130cm across the site, this gave a total production of 750,000 pots. Mee then divided it to span 3-400 years

of the Middle Neolithic and calculated that the annual production rate was between 1,875-2,500 vessels per annum. Yiouni (1996: 184) calculated that the recovery rate at Nea Nikomedeia was roughly 25-30% of the total from each vessel. When applied to Kouphovouno it indicates a production rate of 6,250-10,000 vessels per annum.

When this is extended to the whole of C Sondage it indicates a total production of 1,390,000 pots from Kouphovouno, or 3475-4633 per year. When Youni's adjustment is applied it suggests an annual production rate of 11,583-18,532 pots per year. This calculation assumes that Middle Neolithic levels are consistently 435cm across the site, which is unlikely as the geological cores suggested that the average depth was 171cm and only one core (C2) was measured at 436cm (Cavanagh *et al.* 2004: 8-71). Therefore, 139.712kg or 14,544 is more than likely not a fair reflection of what .01% of the site would amount to and Mee's estimates based on a smaller sample is probably closer to being correct.

5.6.1 Problems with Methods for Estimation of Production Rates

There are problems with these methods of estimating ceramic production rates. Vitelli's system assumes 100% recovery rates for pottery, whereas Youni's 25-30%, although somewhat speculative, is probably the more accurate of the two. Secondly, both Vitelli and Youni assume that production rates across the sites are both temporally and spatially constant (Tomkins 2001: 250-1). Youni's estimate is based on average vessel surface area survival rate, whereas Vitelli's is based on weight. Considering the fluctuations of weight of coarse and fine sherds, one cannot use a value based on surface area to adjust a calculation based on weight. These two methods rely on too many assumptions and the results are too variable for this data to be useful for the estimation of production rates. Nevertheless, estimating ceramic production rates does have some merit for comparisons of fabric types and shapes used (Tomkins 2001: 264-5, and see also Section 5.2.1). Ultimately, however, it is doubtful if it is possible to fully understand production rates or consumption rates of ceramics and such exercises may demonstrate their potential primarily in comparative rather than absolute terms.

5.7 Functions/Use of Ceramics

The examination of the pottery from C Sondage to identify functions of the pottery was not limited to an observation of the shapes. Whilst some ceramics are specifically designed for a

use, which is sometimes apparent from their shape, this is not always an absolute, and throughout its life a vessel can have many uses (Youni 2004: 14). This indicates that, as well as using shape as an indicator, it is essential to examine each sherd to see if any indication of use-wear, general wear and tear, or the adverse effects of the environment gives any indication of the function they had. Finally, other, not so obvious, more implied functions of ceramics will be considered. Cooking wares and gouged bowls have been discussed above already (see Shapes Chapter 5.5). The occurrence of sherds with use wear is limited but despite this it was possible to find a great deal of information about the functions of ceramics during the Middle Neolithic period at Kouphovouno.

5.7.1 Evidence of Heat Effects

There is a degree of variation in the ways that the effects of heat are manifested on the sherds. One must be careful not to exclusively associate heat with cooking: lamps, for example, would also produce evidence of heat on ceramics and they could also be used in the processing of other materials. The sherds were also examined to see if the evidence of heat effects could be attributed to post depositional factors. Because the breaks in the sherds did not have any evidence of sooting or the application of intense heat it was possible to rule out post depositional factors. Evidence of exposure to heat has been found on bowls, basins and jars. There appeared to be several categories of heat effects on the sherds, which are discussed in detail below (Appendix 4 Table 1).

Heat Affected

'Heat affected' refers to an area of a vessel that has been subjected to intense heat or scorched. It is usually heavily reduced, which is different to the overall colour of the fabric on the sherd (Catalogue Nos. 436, 549; Figure 6.75). It is often localized, usually on the base. It is found predominantly on coarse fabrics. The reduced area also seems to penetrate deep into the fabric of the vessels. It is mostly found on the outside of a sherd but in some instances it is found on the inside. It is plausible that it was caused during firing, but its location predominantly on bases suggests it may have been related to use. This type of heat action seems to have been mostly found on bowls, of which the majority are carinated, although it was also noted on piriform jars (Catalogue Nos. 282, 451) (Appendix 4 Table 2). The location of the reduction is consistent with these vessels being subjected to a very intense heat and not to flames. This suggests that these vessels were placed on a low fire for a long period of time or were perhaps repeatedly exposed to low fires. Interestingly, this type of heat effect was noted on sherds

which were decorated, both with monochrome as well as with patterned decoration (Catalogue Nos. 192, 549, 648). The examples which have painted decoration tend, for the most part, to be made in fine fabrics.

Sooting

Sherds with this type of heat effect tended to have a heavy layer of sooted material, which can be found on both the inside and the outside of a vessel and is usually heavily deposited (Catalogue No. 330 Figure 73; Figures 6.76a-c). In some instances it is accompanied by evidence for the application of intense heat to the vessel (Catalogue No. 549). It is found on piriform jars both outside and inside but it is also found on bowls and basins (Appendix 4 Table 3). It tends to be found mostly on coarse fabrics and not to be found on decorated vessels. Tomkins (2007: 184) found sooting evidence on Early Neolithic Knossos vessels and concluded that it was indicative of the use of heated stones being placed inside them. He identified the vessels as deep, wide-rimmed bowls with a coarse and very dull grey fabric (Tomkins 2007: 184). He argued that indirect heating, by placing heated stones in the vessel, could have been practiced in the Early and Middle Neolithic as a continuation of an Aceramic Neolithic practice of indirect heating using non-ceramic containers, which could produce the effect of residue from the fuel used to heat the stone being deposited in the pots. Certainly the wide rims would have facilitated easy transfer of heated stones and deep bowls would have still given capacity for food displaced by the stones. The sooting noted by Tomkins is consistent with that at Kouphovouno; unfortunately few rim sherds were found in the C Sondage assemblage, which would have allowed an estimation of the size of the vessels.

It is also conceivable that some type of combustible material was placed inside the vessel. One sherd which does have an intense deposition of sooted material also has a small ridge or node (Catalogue No. 170). Unfortunately it is a body sherd and it is impossible to determine the exact shape or the location of the node in relation to the sooting. One explanation is that it was perhaps part of a brazier, which was used to separate fuel from the object being heated. Sherds with these staining patterns do not appear to be lamps: the carbonised deposits are in layers and do not have the consistency of gum or oil that Vitelli (1993: 214-5) found at Franchthi Cave; neither are there scraping marks like those found at Franchthi Cave. Two sherds (Catalogue No. 2), both basins, appear to have very distinct rings of sooting, each about 10cm in thickness around them, but they are not intensely sooted. The ring runs around the bowl

about 3-4cm below the rim and is about 1 cm thick. It is too specific to be a result of firing, but determining a use which causes this type of heat effect is difficult.

Fire-clouding

Some sherds demonstrated irregular patterns of exposure to heat, leaving patterns of both reduced and oxidised areas on the vessel, both on the outside (Catalogue No. 167; Figure 6.77) and on the inside (Catalogue No. 159). This pattern is found on collar jars and piriform jars, as well as bowls and basins, and even on pedestal bases (Appendix 4 Table 4). It seems to be predominantly on the insides of vessels but is also found on the outside in fewer instances. It is found on both decorated and undecorated sherds. It cannot be said for certain whether this is a result of the method of firing the pottery or if it is a result of being exposed to fire during its use-life (Youni 2004: 12-13, n54). Examination of the cores proved inconclusive, although the existence of clouding on the insides of some examples does not seem to be restricted to particular shapes and does strengthen the view that it was caused during the firing process. Furthermore, there are occasional instances of misfired pieces, suggesting that there were some inconsistencies in the firing practices. Instances of clouding are rare, and similar in number to the instances of misfired sherds. Finally, there is no pattern in the location of the clouding on different shapes, which seems to indicate that it was a result of firing and not use-wear. Vitelli (1993a: 203) argued that there was a clear improvement in firing technology throughout the Middle Neolithic period at Franchthi Cave, with evidence of better paint adhesion and less fire clouding. The low frequency of fire clouding, which declines through the lifetime of C Sondage, seems to indicate that this trend is found at Kouphovouno, although admittedly the overall sample is very low (Appendix 4 Table 1).

Discussion

Both heat-affected and sooted sherds can be linked confidently to the use of pottery in association with heat. There are consistencies in the location of the evidence on the vessel, the shapes and the fabric types. Any fire clouding on the sherds seems to be due to firing rather than use-wear. Open bowls are more commonly associated with direct placement over fire, whereas jars tend to be associated more with sooting, but the instances of each are few. This association is not, however, exclusive and there are examples of jars that have been affected by heat, and bowls with sooting on them. From the examples outlined above different practices can be discerned:

a) Direct application of heat to vessels, mainly open carinated painted bowls (Scorching)
b) Sooting on the outside of a vessel, piriform jars
c) Sooting on the inside of a vessel, piriform jars
d) Sooting to a localised area of basins

Two other types of heat application were noted:
e) Presence of a node for a brazier associated with heavily sooted material
f) Fire clouded, not limited to any shape in particular.

Even excluding fire clouding as a result of firing, there is a wide variety of methods by which heat is applied to ceramics. This could be an indication of the use of different types of heat and shapes in the preparation of particular foods, although there is no reason not to suggest that it may have served some other domestic task; that heat and ceramics need not necessarily be associated with food preparation. Of particular note are the decorated carinated bowls whose bases have been exposed to intense heat (Catalogue No. 162 & 549, Figure 74). These vessels seem to have the most evidence of heat on their bases. A decorated or carinated vessel with a fine fabric would not be expected to be exposed to intense heat because of the adverse effect it has on the decoration and the possible effect of thermal stress on vessel integrity. Also, the angles on the carinated bowls present zones of weakness that make them increasingly vulnerable to thermal shock (Vitelli 1993: 214). Similarly at Nea Nikomedeia (Yiouni 1996: 186-8) and Makriyialos (Urem-Kotsou *et al.* 2002: 112) occurrences of fine fabrics with evidence of exposure to heat were noted but it was not regarded as a widespread practice and they appear to be in much lesser quantities than cooking wares. To put a decorated vessel in a position that would compromise its integrity and the decoration is not an obvious action. This raises the question of whether these highly decorated bowls were as highly valued as Vitelli (1993: 216) suggested.

The numbers of sherds with evidence of use in association with heat is low; only 117 were noted in the entire assemblage (Appendix 4 Table 1). Nonetheless a pattern was noted. From Phase Grouping 1 to 2 there is an overall increase of 9% for sooted sherds and also 9% for heat affected sherds. At the same time the proportions of cooking ware increase slightly. Allowing for the fact that numbers in each case are low, this trend would seem to suggest that whilst there is a ware (cooking ware) found in slightly increasing proportions, which has the mechanical features we would associate with exposure to intense heat, at the same time there

is evidence of an increase in the use of other ceramics over fire that do not share these characteristics.

This evidence, although based on low frequencies, seems to indicate that the use of a variety of ceramics with heat continues throughout the life of C Sondage. The variety of heat effects could indicate that differing types of heat might have produced differing effects; for example, indirect boiling produced a slower more controllable heat but one that needed constant attention, whereas direct heat is more dependent on the temperature within the fire and also does not require constant attention. It follows, therefore, that we may be looking at several differing methods of cooking food. It is not necessary that one or the other must be chosen, but there was a range of methods to apply heat in varying intensity to process differing foods to suit, for example, differing needs, palatability or taste. Food does not necessarily need ceramics to be processed; different methods of food preparation have been outlined earlier (Chapter 2.5.3). Nor is the application of heat essential for food processing as we may speculate; at Makriyialos, morphologically different Late Neolithic shapes suggest differing methods of processing food (Urem-Kotsou & Kotsakis 2007: 237). It is also important to note the increases in the quantities of cooking ware. These quantities of cooking ware initially existed in tandem with sherds which, despite having indications of exposure to heat, do not have mechanical properties often associated with cooking as described by Vitelli (1993a: 213-5). Between both phase groupings there is a slight increase in its representation at the same time as an increase in the number of sherds with heat effects.

5.7.2 Pitting

Some sherds have pit like holes in the fabric walls (see Catalogue Nos. 499, 379, Figure 88; Figure 6.78a-d). The holes vary in size from 1-3mm in diameter and are about the same in depth but are often irregular in shape. These holes are almost always on the inside of the vessel and rarely are visible in section or found on the outside. This indicates that they are not caused by post-depositional factors. The holes are not in-filled by paint, which suggests that the pits were made after painting. The rarity of holes from the outside of the vessel suggests that it was not lime spalling caused by firing. Furthermore, the paint remains on the edges of the pitting; spalling tends to remove the paint from a large area around the hole (Vitelli 1993: Plate 2). Therefore, it seems that the holes were made during the use-life of the vessels. Examination of the breakages has revealed that the holes are caused by the removal of calcite from the fabric wall. This would appear to be caused by a reaction between the contents of the

vessel and the calcite in the fabric wall, such as that from a weakly acidic solution, possibly a weak fermented beer or a citric acid from fruit or berries. Arnold (1985: 137) records a process whereby maize is soaked in an alkaline solution to make its protein digestible, which damages organic containers. Of the 325 sherds with pitting evidence 70% are coarse sherds (Catalogue Nos. 186, 254 Figure 56). Pitting is found predominantly on what Whitbread (pers. comm.) has termed Orange Medium Limestone Orange Peel Ware (OMLOPW) (See Fabric groupings above Chapter 5.2.2) (Catalogue Nos. 253, 256, 592). The pitting can be very intense (Catalogue 572) or accompanied by evidence of sooting (Catalogue 572, 534). It is found more commonly on decorated open bowls and basins, but has been noted on some jars (Catalogue No. 450, Appendix 4 Table 5). The proportion of pitting remains stable throughout the Sondage, with 50% of the total amount of pitted sherds being found in each phase grouping.

5.7.3 Scraping

Only two sherds have any indication of scrape marks, which are consistent with the bottom of the bowl being dredged (Catalogue Nos. 329, 332). These marks are different to the scrape marks used during the construction of the pots throughout the assemblage, in that they are narrower and are made post firing. These two sherds are body sherds in a coarse fabric with a dull grey colour and are undecorated, but one has evidence of fire clouding on the outside. The fabric type, colour and fire clouding indicate that it was exposed to fire; the scrape marks, therefore, would appear to be from dipping or scraping the bottom of a bowl, to scoop out a liquid for example. It is curious that only two sherds from the entire assemblage have these marks. This is an extremely low proportion, but it must be remembered that wooden spoons or wooden vessels could also have been used to scoop out foods from the pots; this would not necessarily leave any indication of such a use, rendering this type of activity archaeologically difficult to identify.

5.7.4 Storage

The evidence for and against the use of ceramics for storage has been discussed in detail elsewhere (Chapter 2.5.3). Any vessel, during its use-life, will at some stage probably be used to store something. In some cases it is possible to discern from indirect evidence that something has been stored in it. The pitting that has been discussed above (Chapter 5.7.2) indicates that, whether for processing consumption or storage, a mildly acidic product was placed in vessels from Kouphovouno but only a few of the sherds with pitting could be

confirmed as jars (Appendix 4 Table 5). Shapes which have mechanical properties suitable for storage, as outlined by Mee (2007: 204-5), account for 30% of the recognisable shapes in C Sondage and the proportions of them stay relatively constant, decreasing by 3% from Phase Grouping 1 to 2. Nonetheless, 30% is a significant proportion of an assemblage and it is consistent across the site (see Chapter 6.1.5). Mills (1989: 139) estimated that storage vessels have a use-life of 1.5 years and account on average for 9% of an assemblage; at Kouphovouno this is much higher, indicating perhaps the importance of storage primarily, but also perhaps of the storage of produce in smaller, manageable, but more numerous, containers which are easy to move.

Phelps (2004: 51) considers that the variation in size of collar jars might have meant differing functions but, apart from affecting the volume and arguably the quantity of what each held, it is difficult to suggest a different function for them. The volumes do not appear to be large but, as outlined elsewhere (Chapter 2.5.3), this might be a deliberate design to enhance food preservation and to aid in sharing. The collar jars are often decorated on the outside. This could represent yet another method of transmitting or reinforcing social information, especially with relation to competitive feasting (see Chapter 5.2.4.1). Collar jars and piriform jars are found throughout the entirety of C Sondage, but there are consistently more of the larger collar jars than the smaller (Figure 5.9). They are, however, represented in almost all the contexts but small collar jars increase slightly in proportion (3%) in Phase Grouping 2.

5.7.5 Consumption/Display

The highly decorative nature and elegant shapes of Middle Neolithic ceramics suggest a role as a mechanism for social dialogue (Vitelli 1999: 194-5), as part of communal sharing of food and the transmission of information between the group or groups (Valamoti 2007: 225). The shapes are mostly open, which fulfilled a display function, not only of the contents, but also of the decoration. These shapes are highly decorated and very well finished indicating an investment of time and labour (Tomkins 2007: 182). Hayden (2001: 57) suggested that prestige serving vessels played a significant role in competitive feasting. Junker (2001: 284-5) argued that high prestige ceramics and large highly 'aesthetically pleasing' cooking and serving vessels are often associated with competitive feasting in the archaeological record and notes that in the Philippines local communities imported Chinese porcelain for such occasions. Open bowl shapes account for 44.5% of the overall assemblage (Figure 5.9), which is lower than Mills' (1989: 139) estimate of 62%, but clearly the largest proportion of shapes in the

assemblage. Mee's estimation that 60% of these shapes were too large for individual helpings and are more suited to feeding larger groups or families would seem to indicate that the consumption of food was an event that more often than not was enacted among groups of people, as opposed to individual consumption, but larger bowls could be used for individual use. The size of the bowls, the visible decoration on the bowls and the elegance and decoration on the ladles, do suggest that the display and the decorative functions of these shapes are closely related and help to emphasise the point that food was a vehicle for the transmission of social information and that ceramics played a significant role in facilitating it (Chapter 2.6).

5.7.6 Reuse,-Reworking, Other

That sherds can have several different functions during their use-life is obvious: a vessel might begin life as a consumption vessel but end it as a storage vessel or vice versa. Even after breakage, ceramics can continue to be used in one way or another. Vitelli (1993: 215) considers that Early Neolithic pottery from Franchthi Cave, due to its rarity, was considered a valuable item and was sometimes mended. Likewise, Tomkins (2007: 182) found some sherds from Early Neolithic Knossos that had been repaired. No sherds from C Sondage have any indication of being repaired, but this does not rule out the practice at Kouphovouno.

At Achilleion, 'clay discs' were rather common; others were found at Franchthi Cave (Vitelli 1993: 208) and Nea Nikomedeia (Yiouni 1996: 184). Björk (1995: 129) noted that some of the broken sherds found were pierced with holes, but doubts that they were used as loom weights and speculated that they were pendants or had some amuletic function. A small number of broken sherds (perhaps two or more), which appear to fit this profile were found at Kouphovouno. One is rounded with a square hole and does seem to have string wear on the hole (Catalogue No. 218, Figure 109). It is, however, undecorated, which suggests that it could also be a weight. A second sherd has been re-worked so that the chevron decoration is symmetrical on its sub-rounded shape, but it is not perforated (Catalogue No. 578, Figure 226).

A few sherds have evidence of reworking; of clipping and deliberate rounding of their edges (Catalogue No. 579). They also seem to vary in size; most fit snugly between two fingers but one is much larger. Each sherd has a fine fabric; they are always highly fired and are sometimes decorated. The sherds are not perforated and there is no attempt to clip them with any particular bias towards decoration. It does not appear that they are pendants or any type of

ornament, but could have a more functional use. Due to their shape and the way they fit in the hand, they might perhaps be some type of scraper, either for scraping pottery or animal skins, for example. The reworked edges, however, remain quite sharp and there is no indication of them being worn down. The largest example is considerably bigger than the others and scraping would cause it to break due to stress (Catalogue No. 576). It is plausible that this sherd could possibly be some type of scoop or measure.

Finally, some of the pedestal bases have close, evenly spaced holes perforated from the outside inward. The fabrics are quite coarse and are usually undecorated (Catalogue No. 425, 605, Figure 260). Occasionally it has been possible to detect string wear on the holes on the sides closest to the body of the vessel. It seems, therefore, that they were created to allow for a cover to be applied and secured to the vessel. Vitelli (1993: 136) suggests that fenestrations and holes in the pedestal bases were to allow air to circulate during firing to completely oxidise the bases. This seems, however, to be implausible: air could be circulated into the bases by simply propping one side of the base with a stone or a waster. Furthermore, there are many examples of pedestal bases that are highly oxidised but have no indications of holes of this type. There are occasionally some completely reduced bases with holes in them (Catalogue No. 184).

Another two sherds have quite a rounded shape and are perforated, punctured not drilled, with several holes close to each other, measuring about 1-2mm in diameter (Catalogue No. 328, 484). Fragments like these have been found at a number of sites (Phelps 2004: 53) and would appear to be ladles or strainers. In C Sondage there is also a fragment of a very elegant painted ladle handle (Catalogue No. 500). Decavallas (2007: 148-57) has found traces of beeswax residue on a Late Middle Neolithic perforated sherd from Limenaria on Thasos. Whilst this does not specifically limit their use to beeswax, Decavallas lists a number of explanations for the beeswax being present, including helping to consolidate the ceramics, as a strainer and as part of the production process for honey. A role as cheese pots has also been suggested, but Decavallas (2007: 151) argues that the absence of milk lipids rules out this function. In the case of the sherds from Kouphovouno, their shape suggests that the vessels were small and more like a cupped base of a ladle or strainer, although they could theoretically be used to scoop out curds from the whey. There are occasionally other sherds with holes in the body drilled from the outside in; these holes are usually several millimetres in diameter. They are neither close to a rim or a base and there is no evidence of string wear (Catalogue No. 157,

537). The sherds are occasionally decorated. It is impossible to determine if these perforations are functional. It is possible that they may be holes for mending, to give string traction but the lack of string wear does not support this suggestion.

5.7.7 Functions/Use: A Summary

The data discussed above has clearly indicated that there is evidence for varied functions and uses of ceramics from C Sondage. It has drawn evidence of direct use of the ceramics from their design, and it has indicated implied hidden functions that are often archaeologically difficult to trace. It has also helped to establish that ceramics were used to fulfil these functions throughout the time span of C Sondage with no evidence of a change in function, although there were changes both in the proportions of some shapes and evidence of use. It has also indicated that in some instances there was a variety of ways in which pottery could be used, and sherds were remodelled for uses that they were not exclusively designed for. This varied use of ceramics indicates that they were not constrained by their design. It is also indicative that, even though the percentage of ceramics that were used in conjunction with heat is rather limited, nevertheless heat could be used in a variety of ways with pottery, some of which we must assume has to do with food processing. Storage accounted for a significant proportion of the ceramic assemblage. Storage vessels are small and mobile; with the decoration perhaps suggesting a degree of social messaging associated with the contents of the vessels, if not the vessel itself. The open consumption shapes and highly decorative nature of the ceramics indicate that display, perhaps as part of food sharing or competitive feasting practice was a significant function of the ceramics. The existence of reworked sherds, which seem to have been pendants and consumption vessels, indicates social interaction both on a personal and at a communal level.

As has been demonstrated above, there is wide scope for variation in the ceramic fabrication process at Kouphovouno. This variation is sustained throughout the life of the site, but it is in the attachment of pedestal bases and collar jars that choice is most clearly demonstrated, although there is significant variation in the firing atmospheres too. Likewise, there was a wide repertoire of motifs in use and evolution of the decorative syntax throughout C Sondage. The analysis of production rates has clearly highlighted the difficulties of applying a workable strategy to any assemblage, but has uses for comparative work within and between similarly recorded assemblages. It has also been shown that there is a wide range of uses that ceramics had at Kouphovouno. Interestingly, this chapter has demonstrated that the relationship

between the use of heat and ceramics is somewhat more complicated than first thought and, in some cases, that broken sherds are reused or reworked for secondary functions. Finally it has indicated that ceramics played a crucial role in the use of food as a mechanism for social interaction on a public and individual scale. It is now necessary to complement this study with a broader study from Kouphovouno and to put the site in a regional framework.

6. COMPARATIVE: KOUPHOVOUNO 1019 AND 2016; ASEA, AYIORYITIKA, CORINTH, LERNA AND FRANCHTHI CAVE

Having discussed the ceramic material from Trench C Sondage at Kouphovouno& it is necessary to gain a spatial picture of the site. This was achieved by examining ceramics from two contexts from different areas, both of which are well stratified. Analysis was then conducted at other major Middle Neolithic sites in the Peloponnese to give a regional picture. The present *chapter is divided into two parts. The first section* (Chapter 6.1-6.4) *examines ceramics from Kouphovouno. This analysis is conducted in the same detail and using the same methodologies as those used for C Sondage, described in Chapter 5. The second section* (Chapter 6.5-6.8) *examines material from other excavated Middle Neolithic sites in the Peloponnese: Asea, Ayioryitika, Corinth, Franchthi Cave and Lerna. Unfortunately, due to limited available time it was not possible to conduct analysis of other sites in as much detail as that at Kouphovouno.*

6.1 Kouphovouno: 1019 and 2016

As expressed in Chapter 4, C Sondage is limited in area and, therefore, cannot by itself be taken to represent the entire site at Kouphovouno. It must be complemented by comparisons with ceramics from other areas of the site to make the study more comprehensive. The ceramics from two other areas were examined in similar detail using the same methodology as outlined in Chapter 5 for the analysis of C Sondage.

6.1.1 Area C Context 1019

This context was located three metres west of C Sondage and appears to be a deposit with dense quantities of pottery and animal bone mixed with compacted light brown silty clay, inclusions of angular and rounded stones and frequent charcoal flecking (Figure 4.1). Some polished stone tools, chipped stone, bone tools and seashell were also found. This context was only investigated partially, in an area measuring 2m east–west and 1.50m north–south and to a maximum depth of 0.17m. No architectural features were noted in the context& but it was located immediately north of a structure, which had several phases of activity (Whitley *et al.*

2007: 24-5). Furthermore, no evidence for a cut was noted but as the entire context was not explored it this cannot be ruled out. The ceramics appear to have been quite eroded, which indicates that they were exposed for some time, suggesting that either the deposit was a refuse dump or, as it was located close to the surface of the site, that the erosion was more recent.

6.1.2 Area G Sondage Context 2016

Thirty metres south-west of C Sondage, in Area G, a second sondage (G Sondage) was excavated during the 2005 and 2006 seasons (Figure 4.1) (Whitley *et al.* 2007: 25-7). The aim was to produce a stratigraphic sequence from Area G that would overlap with the sequence established from C Sondage to provide a series starting in the lowest strata of C Sondage, with the earliest occupation found on the site in the Middle Neolithic and continuing through the Late Neolithic period as found in the upper contexts of G Sondage. It measured four square metres and provided a sequence of pottery from the Middle Neolithic through a transitional phase into the Late Neolithic Period.

Context 2016 was stratified 1.25m below the top of G Sondage beneath Late and Final Neolithic deposits. It measured 2m by 2m and was 0.25m thick. It consisted of dark yellowish clayey-silt. It was weakly compacted and contained moderate charcoal flecking and moderate angular and rounded stone inclusions. There were also a number of possible features, such as a post hole (C2017), a stone feature (C2020) and a possibly a hearth (C2018). The context contained dense quantities of Middle Neolithic pottery and occasional incidences of transitional Middle-Late Neolithic Pottery. It also contained polished stone tools, bone tools, chipped stone and a spindle whorl. No interpretation for 2016 could be offered, although the top was somewhat compacted, which hints at it being a surface. This is, however, a tenuous explanation.

6.2 1019 & 2016 Ceramics: Construction

6.2.1 Coarse and Fine Wares

From 1019, 1283 sherds were recovered that weighed a total of 18.7kgs. Of these, 85% of the total count were fine wares (Figure 6.1), accounting for 54% of the total weight (Figure 6.2). 4618 sherds were recovered from 2016, weighing 45.7kgs. Of this 88% by count were fine

wares (Figure 6.1), accounting for 69% of total weight (Figure 6.2). No attempt was made to examine fabric groupings from either assemblage.

6.2.2 Shaping Techniques

Due to 1019 containing large amounts of eroded pottery, identifying construction techniques was difficult. Overall, however, it was possible to identify slab building as well as evidence of manipulation by hand, such as pressing, scraping and dragging (Figure 6.3). The same attributes were noted in 2016 (Figure 6.3). A significantly larger number of each construction attribute, however, was noted in 2016 compared with 1019, even when allowances are made for the sample size, which could indicate that the style of finishing ceramics differed considerably between both areas.

6.2.3 Pedestal Base Attachments

Among the 25 pedestal bases in 1019, Attachment Types 1, 2, 3, 4 and 7 were found, of which Types 1 (28%), Type 2 (36%) and Type 3 (20%) are the most common (Figure 6.4). Two new attachment types (10 & 11, see below) were recorded in 1019. In 2016, 73 pedestal base attachments types were found, including types 1, 2, 3, 4, 6, 7, 10 and 11. Type 1 attachments were by far the most prevalent, being much more prevalent than any of the other types and account for 75% of the total. Type 6 is the second most common but it only accounts for 7% & with Types 2 and 3 accounting for 5% and 4 % respectively. There is one attachment type that is unique to 2016 (Type 12).

Type 10: Scored Base; (Figure 6.5) (Catalogue No 657, Figure 301). A track is scored on the bowl perpendicular to the attachment. Only one of this type was found in each context.

Type 11: Angled; (Figure 6.6). Angled attachments join the bowl and the pedestal at a steeper angle than is typical with Type 1 (Catalogue No. 637). It is similar to Type 1 but it requires different manipulation of the clay and conceptualisation of the attachment and the bowl. In some cases the pedestal is quite short and the angle quite steep in relation to the side of the bowl. Furthermore, the bowl base often runs beneath the bottom of the pedestal. This essentially changes the function of the pedestal; rather than supporting and elevating the bowl, the pedestal functions as a mechanism to stop it falling to one side. It should be noted that this is one of two attachment types that would be visible on a completed pot (see also Type 12). Only one example was found in 1019.

Type 12: Kinked (Figure 6.7). It is similar to Type 1 and 8, essentially a flat attachment but in the upper quarter of the pedestal, just below the attachment, the pedestal kinks slightly creating a ripple or bevel in the pedestal wall (see Catalogue No 716). It is complemented by a finger-made ridge along the inside of the base. This is exclusive to 2016, where only one example is found. Like Type 11 it would be visible on a completed pot.

Groupings
The attachments from 1019 and 2016 were grouped in a similar fashion to those in C Sondage, including two further groups (Figure 6.8):

Group E. Attachment types where the bowl has been modified (scored): Type 10.
Group F. The pedestal profile is manipulated to attach at a particular angle to the bowl. This is the only grouping that would be visible on a bowl: Types 11 and 12.

Very different patterns can be illustrated from the grouping of each attachment type. Group A dominates 2016 accounting for 85% of the attachment types, compared to 32% in 1019. Group B is the largest proportion in 1019, representing 60%; in 2016 it only accounts for 11%, Groups C and D are absent from both assemblages. Groups E and F are found in much smaller proportions. There were insufficient pedestal attachments that were preserved to full height in the sample studied to examine the relationship between pedestal type and vessel size. All of those recorded, except one, a Type 10 attachment (Catalogue No 725), were fine wares. All attachment types, except Type 10, had oxidised cores and the surface colour on each attachment matched the core colour but it must be remembered that the sample for each context was very small (Appendix 6 Table 1 & 2).

6.2.4 Collar Jar Attachments

Twenty six collar jar attachments were noted in 1019. Among these were noted all four types found in C Sondage were noted (Figure 6.9). All attachments catalogued were fine wares; surface and core colours matched and all were lightly oxidised but the instances of each were low (Appendix 7). There is a clear preference for Type 2 and Type 4 attachments, both of which account for 38% each, whereas Types 1 and 3 each represent 12% of the total number. All four collar jar attachment types found in C Sondage and 1019 were noted in 2016; in total 58 attachments were recorded. One other attachment type (Type 5: see below) was also noted. In 2016 the proportions of attachments differ from those of 1019. Type 2 coil attachments are

the most common & accounting for 34%, with Type 1, 4, 3 and 5 attachments for 29%, 21%, 9% and 7% respectively (Figure 6.9).

Type 5: This is similar to Type 2 but the area on the inside where the collar meets the shoulder of the pot is often poorly finished with nodules of clay paste left attached and not removed or blended into the fabric wall (Catalogue Nos 676 & 679). In some cases there is evidence of finger manipulation or pressing along the join. This may be sometimes confused with burnishing slobbers around the collar & or be associated with Type 2 but there is a clear choice not to complete Type 5 attachments to the same level of finish as Type 2.

6.2.5 Firing Practises

The firing technology used in both contexts showed the same high level of expertise as in C Sondage. There were examples of well fired, highly oxidised fabrics and completely reduced fabrics in both 1019 and 2016. Furthermore, there was a large degree of consistency between surface and core colour firing but no clear relationship could be established between wall thickness and firing atmosphere. Only one sherd was noted with fire clouding on its outside but seven misfired sherds were recorded (Figure 6.3; Catalogue No 654-5; Figure 314). In 2016 there were no examples of misfired pieces (Figure 6.3). There were a few examples of fire clouding but this seems more common on the inside of bowls (Figure 6.17).

6.2.6 1019 & 2016 Decoration

Painted sherds account for 68% (850 sherds) of the assemblage from 1019, although because the sherds were somewhat eroded the examination of the decoration was difficult (Figure 6.10). Painted sherds account for 71% (3269 sherds) of the total from 2016 (Figure 6.10). Scribble burnish accounts for 115 sherds, or 12%, of the painted pottery in 1019 (Figure 6.11); of this 8%, or 10 sherds, are Acanonical (Figure 6.12). In 2016, scribble burnish accounts for 23 or 7%of the painted sherds (Figure 6.11). Of this, canonical scribble burnish accounts for 114 or 93%, and Acanonical scribble burnish represents 43 or 15%, which is significantly higher than 1019 (Figure 6.12).

In 1019, 42 rim sherds of the convex flared bowls were decorated. Monochrome decoration is the most common accounting for 58%, followed by vertical lines, which account for 33%, with elongated rim pendants accounting for 7% and scribble burnish accounting for 2% of the

total (Figure 6.13). Leaving monochrome and scribble burnish out of the picture, rim pendants are absent, while elongated rim pendants account for 18%; vertical lines account for a sizeable proportion of the total 82% but this is only based on 14 sherds (Figure 6.14).

In 2016, 77 rim sherds from convex flared bowls were recorded. Of these sherds, monochrome accounted for 35%, with elongated rim pendants representing 32%, rim pendants representing 17% and vertical lines accounting_for 10%. In addition to these two motifs unique to 2016 were found chevrons (4%) and diagonal lines (4%) both arranged in the same way as the other motifs on convex flared bowls (Figure 6.13). When monochrome and scribble burnish are removed, it leaves a small sample of 46 sherds but there is noticeable variation in the proportions compared to 1019. Of these rim pendants account for 18%, elongated rim pendants account for 54%, vertical lines account_for 17%, and linear diagonal and chevrons account for 4% each of the total (Figure 6.14). In 1019 no instances of plastic or incised decoration were noted; only one fenestrated pedestal sherd was found. In 2016 there were 3 fenestrated fragments from pedestal bases noted (Catalogue No. 730) and no examples of 'reverse punctuate' decoration were_found.

6.3 1019 & 2016 Shapes

In total 191 recognisable shapes were found in 1019 (Figure 6.15). Open shapes (convex plain bowls (35%) and convex flared bowls (22%)) dominate the assemblage, accounting for 57% of the recognisable shapes. Storage shapes (collar jars) account for 26% of recognisable shapes, with basins accounting for 15% and cooking wares constituting less than 1% (one sherd), no piriform jars were recorded from 1019. Tall collar jars are found in significantly larger proportions than small collar jars, representing 96% of a total of 50 collar jar sherds (Figure 6.16). In 2016, 489 recognisable shapes were found. Open shapes account for 40%: convex plain bowls for 29% and convex flared bowls for 21% (Figure 6.15). Piriform jars are absent from the assemblage but the proportion of collar jars (29% of all recognisable shapes) alone equates to a similar proportion of storage jars found in C Sondage and 1019; of these 72% are tall collar jars (Figure 6.16). Cooking ware accounts for 9% or 44 sherds, with basins accounting for 12%. No gouged bowls were found in either 1019 or 2016.

6.4 Use Wear

There are heat affected sherds in 1019 (Figure 6.17; Catalogue No 648 & 651; Figure 306-307, 311) similar to C Sondage in the types of heat that the sherds were exposed to, the location of evidence and the low numbers of examples. As with C Sondage there is nothing to suggest that it has been caused by post depositional activity. Sooting is found both on the outside and the inside of sherds; two sherds have evidence of scorching but only one sherd has evidence of clouding. Evidence of pitting was recognised on 26 sherds. Four sherds have evidence of re-working, perhaps as scrapers but there is no evidence of use wear (Catalogue No 650; Figure 310). In 2016 sooting is found predominantly on the insides of sherds (Figure 6.17). The sooted residue is slightly different in texture to that found in C Sondage; it does not seem as fibrous and is finer grained. Generally the sooting is only found on pottery with a coarse grey fabric and with a reduced core (Catalogue No: 723-4). No sherds had any evidence of scorching. Fire-clouding is found on the inside of 3 sherds and on the outside of one, suggesting that it is more likely to be a result of firing than use wear. There are 79 sherds with evidence of pitting located in the same areas, predominantly the inside of the sherds, as in C Sondage and 1019 (Catalogue No 691, 703). Three sherds seemed to have been reworked into sherd discs but none of these showed any evidence of wear on their edges (Catalogue 696, 706). Finally, there is no evidence of scraping on the insides of bowls.

6.5 Other Peloponnesian Sites: Asea, Ayioryitika, Corinth, Franchthi Cave and Lerna

Having conducted surface feature analysis of the ceramics from Kouphovouno, it is necessary to put the site into its wider, regional context. Previous work by Washburn (1983) and Cullen (1985a & 1985b) on decorative structure and choice of decorative design on pottery from Franchthi Cave, Lerna, Corinth, Asea and Ayioryitika, as well as their implications for interaction amongst Middle Neolithic communities, has been described in Chapter 2.4.1. With this in mind, it was decided that an examination of the ceramics at the other Middle Neolithic sites would allow the identification of technical styles of ceramic fabrication there and the testing of both Washburn's and Cullen's conclusions regarding links between sites in the Peloponnese during the Middle Neolithic period. As discussed in Chapter 3.6, decorative styles, although they can be informative about interaction between sites, are quite susceptible

to change, whereas technical styles are more deeply embedded in society because of learning patterns and motor skills. They are less permeable to outside influence and so can be more informative about long-term interaction between sites and on the nature of that contact. A study of this kind would also allow comparisons of the use and re-use of ceramics at Kouphovouno and other sites. The constraints of time did not allow the examination of all the pottery from each site but as much pottery as possible from each site was studied.

6.5.1 Methodology

The analysis at the five sites was not as detailed as that undertaken at Kouphovouno. As will be outlined below, excavation procedures at these sites meant that not all the ceramics were kept and in some cases the assemblages were split, therefore, no meaningful attempt was made to quantify the ceramics because it was felt that this could be misleading. Where possible, however, numbers are given for some recorded attributes. Firstly, a brief background to each site will be outlined; secondly, the results of this analysis are discussed under a range of headings as in the case of Kouphovouno: Shaping, with particular attention to attachment types, Firing, Shapes, Decoration, Use-wear and Re-working. Finally, it should be noted that, due to the fact that Franchthi Cave, Corinth and Lerna had the largest assemblages of pottery, the discussion tends to focus on these sites; however, the attributes discussed were examined at all sites where possible. Furthermore, at Lerna and Franchthi Cave and Ayioryitika, the final sites examined in this thesis, variation in the rims of everted rim bowls was noted, also the manner in which lugs were formed. It was not possible to review all the material for this trait but everted rim bowls were rare at Kouphovouno; three examples were too few to allow comment (Chapter 5.3.3.2.2 & Figure 5.5).

6.5.2 Asea

Paleokastro Asea is located south of the modern town of Tripolis in Arcadia in a south-west to north-east oriented valley (Figure 2.4). The site is situated on an isolated low hill or promontory (54 metres above sea level) with a relatively flat plateau on its summit that slopes gently to the north. Evidence of many phases of occupation have been found on the hill and in the surrounding valley, mainly Prehistoric and Hellenistic (Forsen *et al.* 1996). It was excavated by Holmberg of the Swedish Institute of Archaeology at Athens in the late 1930s who published his findings in 1944 (Holmberg 1944). His records indicate very mixed and disturbed stratigraphy (Forsén 1996: 42). The Second World War prevented a deeper study of the finds, although he did manage to bring some fabric samples back to Gothenburg.

Unfortunately, all contextual evidence was lost during the war but the ceramics were transferred to the museum store rooms in Nafplion and in the Museum of Gothenburg University. Forsén (1996) re-examined the Asea archive and published additional material. The Swedish Institute's Asea Survey added more Middle Neolithic data to Holmberg's and Forsén's previous work (Alram-Stern 2003). The ceramics in the museum storerooms at Nafplion were examined in March of 2008. It was not possible to travel to Gothenburg to examine the sherds there.

6.5.3 Ayioryitika

Ayioryitika was excavated by Blegen in 1928. It is situated on a low alluvial terrace in the Tripolis basin east of the modern town of Tripolis (Figure 2.4). The findings of excavations at the site were published by Petrakis in 2002 (Petrakis 2002). Unfortunately during the war the material got mixed and all stratigraphic data was lost. There is evidence of occupation from Early Neolithic through to Final Neolithic (Petrakis 2002: 25). Architectural evidence at the site was scarce but Blegen managed to identify four phases of occupation as well as two, perhaps three, structures. The pottery from Ayioryitika is located in the Museum at Tripolis and in the teaching collection of the American School of Classical Studies at Athens; both were examined in March 2008. The pottery in the American School is quite eroded. This made surface features difficult to identify. In the Tripolis Museum collection most of the pots were repaired so it was difficult to see any evidence of attachment types.

6.5.4 Corinth

Corinth is located on the coast north of the Peloponnese (Figure 2.4). Excavations of Neolithic deposits at Corinth took place sporadically between 1896 and 1970 and were published by Weinberg (1937), Walker-Kosmopoulos (1948) Robinson & Weinberg (1960) and Lavezzi (1978). The Neolithic deposits from Corinth seem to have been heavily disturbed during the Classical and Roman periods. There were, however, some untouched deposits found on Temple Hill, on the site of the new museum, within the foundations of Temple K and from the Forum West Area. Unfortunately no architectural evidence was found. The material was studied in March 2008 and July 2009.

6.5.5 Franchthi Cave

Franchthi Cave is located in the Argolid peninsula on the shores of a small bay across from the modern village of Koilada overlooking the gulf of Argos (Figure 2.4). The site was excavated

from 1967-73 by a team led by Jacobsen (1969, 1973a, 1973b, 1981), who conducted a thorough investigation retaining all ceramics. This has been of great benefit to this study because, unlike Asea and Ayioryitika, what have been termed non-diagnostic and non-feature sherds were retained. These often contain useful construction data not always visible on completed vessels.

The site had an occupational history ranging from the Upper Palaeolithic to the Final Neolithic. The site comprises two distinct areas: the cave and the Paralia, which is located outside the mouth of the cave close to the shore. The cave was continuously occupied but the Paralia contained no material from Vitelli's (1993a: 33) FCP (Franchthi Ceramic Phase) 3 and 4. It was decided that, as the ceramic assemblage from Franchthi Cave was so large and time was limited, only a sample would be studied. Furthermore, there was not enough time to consider the ceramic phases in any great detail. With this in mind, a selection of sherds from both the cave and Paralia was examined in April 2008. The main focus was on Pit H, which was located in the mouth of the cave and more likely to contain a substantial amount of stratified material (Jacobsen 1969: 347-9). One random crate was examined from Pit H1 - 2 and another from Pit G. Finally, Pit Q4, 6 and some of Pit L from the upper terraces at the north of the Paralia were also studied (Jacobsen 1973: 52-57).

6.5.6 Lerna

Lerna is situated on a low rise close to the sea in the Gulf of Argos (Figure 2.4). It resembles what could be termed a tell site but it is the Bronze Age deposits at the site that are better known. The Neolithic material was found during a series of four soundings around the site. All phases of the Neolithic were noted and the Middle Neolithic phases consisted of a repeated series of eight phases of foundation walls and floors, as well as bothroi encircled by stones (Caskey 1956: 156-7; Vitelli 2007: 33-74). Vitelli believes that these deposits derive from the earlier phases of the Middle Neolithic and that activity 'contracts' in the later phases of the Middle Neolithic before the site was fully abandoned (Vitelli 2007: 129-31). Unfortunately, up to 90%, as estimated by Vitelli (2007: 75, 127), of the Neolithic ceramics from Lerna were discarded and those that remain were poorly preserved. The pottery from Lerna was examined in March and June of 2009. As with Franchthi Cave it was not possible to examine all the Lerna assemblage, therefore, a sample was studied. The 'Lots' studied were those with the most Middle Neolithic material, such as Area JA, consisting of cobbled surfaces, walls and a bothros, as well as Area JB, which had walls, a hearth and a bothros, finally the Central Area

which included surfaces, a burial, a bothros and pits (Vitelli 2007: 33-74). Where possible, 'Lots' that contained mixed material were avoided.

6.6 Ceramic Analysis

6.6.1 Fabrics

No attempt was made to undertake a systematic or in depth analysis of the fabrics. Petrographic and chemical analysis (Optical Emission Spectroscopy and Neutron Activation Analysis) was undertaken on sherds from all above mentioned sites. They indicate the possible exploitation of a range of sources across a broad catchment area around each site but the chemical data supports local production (Cullen 1985a: 243-70; Jones *et al.* 1986: 402, 409 n22). Furthermore, Vitelli (1993a: 209) suggests that there is sufficient variation between sites in shapes and construction techniques to conclude that the ceramics were produced locally. One sherd is of particular interest; it is from Corinth and has a white fabric and stippling (Figure 6.18). It is remarkably similar to one from C Sondage at Kouphovouno (Catalogue No: 218, Figure 164), which is suspected to be an import.

6.6.2 Forming Techniques

All the sites had evidence of coil building techniques (Figures 6.19a & 6.19b; see also Vitelli 2007: 92). Each site demonstrated features, such as pressing, scraping and dragging/wiping that are consistent with handmade pottery, although at Franchthi Cave there is variability in the way the scraping and dragging are done. Usually the marks are linear (Figures 6.20a-b) but there are several instances of crossing, oblique and multi-directional marks from scraping and dragging which vary in intensity (Figures 6.21a-b). Vitelli (1993a: 8) suggests that some of the deeper troughs could have been the result of heavy burnishing rather than scraping. One collar jar sherd from Corinth (C68-320) showed traces of burnishing while the clay was still very wet; the finish was very sloppy (Figure 6.22). This was an unusual occurrence at Corinth but was commented on at Lerna (Vitelli 2007: 93), where it is believed to have been a consequence of clay pastes being difficult to work with, or of inexperienced potters.

There are occasional differences in the finish of some rims from/of the same shapes. Usually they are well finished and melded back into the body of the vessel but there are examples where the rim has been folded but poorly melded into the fabric wall (Figures 6.23a-b). This style of finishing has been found on rims of several shapes and shows a variety of attention to

detail in finishing pottery at Franchthi Cave (Vitelli 1993a: 382 Figures 33a-e) and Lerna (Vitelli 2007: 280 Fig 48 a, b) (see also Figure 6.60). Vitelli (2007: 131) commented that the potters at Lerna did not appear to take much care to remove evidence of pinching and pressing of coil joins, whereas those at Franchthi Cave seem to be more particular. She noted that collar jars and pedestal bases at Lerna did not break in the same areas as those at Franchthi Cave and suggests that they were not as dry as at Franchthi Cave when collars, handles or pedestals were attached. Attaching collars while wet meant that the collars could slump and so extra clay was added to the insides, which causes sagging and cracks in the joins (Vitelli 2007: 93) (Figure 6.24). Occasional concentric rings on the outside of pots and the joins was taken by Vitelli (2007: 93) as further indication that they worked with wetter clay than at Franchthi Cave, either because the quality of the clay determined this or, as Vitelli speculates, the Lerna potters were not as skilful or as patient as at Franchthi Cave.

6.6.3 Pedestal Bases Attachments

As with the Kouphovouno material, particular attention was paid to the attachments of pedestals and collars. The small sample sizes from Asea, Ayioryitika and Corinth may bias the results of this analysis somewhat.

Type 1 was noted at Franchthi Cave (Figure 6.25a), Corinth (Figure 6.25b), Asea (Figure 6.25c), Lerna (Figure 6.25d) and Ayioryitika.

Type 2 was found at Franchthi Cave (Figure 6.26a), Ayioryitika (Figure 6.26b), Lerna (Figure 6.26c-d), Asea (Figure 6.26e) and Corinth.

Type 3 was found at Franchthi Cave (Figure 6.27a), Lerna (Figure 6.27b) and Ayioryitika.

Type 4 was found at Franchthi Cave (Figure 6.28a), Corinth and Lerna (Figure 6.28b). On some Type 4 examples from Franchthi Cave it is possible to see where the pedestal base is slightly curved/bevelled due to pressure of adding the subsidiary clay (See Figure 6.28a).

Type 5 is found at Franchthi Cave (Figure 6.29a) and Lerna (Figure 6.29b).

Type 6 is found at Franchthi Cave (Figure 6.30a) and Lerna (Figure 6.30b).

Type 7 is found at Franchthi Cave (Figure 6.31a), Corinth (Figure 6.31b), Ayioryitika and Lerna (Figure 6.31c).

Type 8 is found at Franchthi Cave (Figure 6.32a), Corinth (Figure 6.32b) and Asea.

Type 11 is found at Corinth (Figure 6.33) and Franchthi Cave, although it is not as pronounced as at Franchthi Cave.

Type 12 is found at Franchthi Cave (Figure 6.34a), Asea (Figure 6.34b) and Lerna (Figure 6.34c).

There were also two distinctive attachment types at Franchthi Cave that were not found elsewhere:

Type 13; Oblique: a variation on Type 3 (Figures 6.35 a&b). The subsidiary clay is pressed onto the pedestal base at an angle producing a 'wrinkle' in the seam between the clay and the pedestal at an angle to the pedestal. This is distinct to the more usual arrangement of a continuous seam that runs parallel to the pedestal found with other attachment types. The examples found seem to indicate that the clay is pressed in with a flat implement, which leaves the distinctive marks on the top of the pedestal.
Type 14; Flat, drawn up from the pedestal: only one example of this was found. The attachment is essentially flat but the supporting clay is drawn up from the pedestal thinning the pedestal wall (Figure 6.36 a&b).

Finally, one type of attachment is found only at Lerna and Franchthi Cave. This attachment type bears features found on Type 6 and Type 11 attachments.

Type 15; Flat, angled clay added outside. The attachment is connected to the body at a steep angle, similar to attachment Type 11; the top is flat and has additional clay on the outside, like attachment Type 6 (Figure 6.37a&b). The occurrence of a composite of the angled element, of a flat face and of clay added on the outside on one attachment type is unique and worth considering as a separate attachment type.

Franchthi Cave has the greatest range of attachments from all sites, including Kouphovouno and some of its own Types: 13 and 14, but it also has the largest assemblage of all the comparative sites (Appendix 8). In total 13 attachment types were noted at Franchthi Cave, followed by Lerna with 10, Corinth with 5, and Ayioryitika and Asea indicating 4 attachment types each. The lower numbers for the sites other than Franchthi Cave, particularly Asea and Ayioryitika, could be due to the size of the assemblage that was available for study. In the case of Ayioryitika erosion may have been a factor. Two new groupings could be made from the pedestal bases examined at Franchthi Cave:

Group G; Attachments where the subsidiary clay is pressed into the bowl at an oblique angle and does not make a continuous seam: Type 13, 15.
Group H; where the clay is drawn from the pedestal leg Type 14.

6.6.4 Collar Jars Attachments

Type 1 attachments were noted at Franchthi Cave (Figure 6.38a), Asea (Figure 6.38b), Lerna (Figure 6.38c) and Corinth.
Type 2 were noted at Franchthi Cave (Figure 6.39a), Lerna (Figure 6.39b) and Corinth (see Corinth C68-130; Lot 5598). It is also possibly found at Ayioryitika but the examples cannot be clearly determined to be Type 2 or 5.
Type 3 were noted at Franchthi Cave (Figure 6.40a), Lerna (Figure 6.40b), Corinth (Figure 6.40c), Asea (Figure 6.40d) and Ayioryitika.
Type 4 was noted at Franchthi Cave (Figure 6.41a) and Lerna (Figure 6.41b).
Type 5 attachments were noted at Franchthi Cave (Figures 6.42 a-b), Ayioryitika (Figure 6.42c) and Corinth.

Attachment types 1, 2 and 3 are the most common but are not found at every site (Appendix 9). Franchthi Cave has the widest range with all five attachment types being found while Lerna has four. There is no correlation between the size of the collar and the type of attachment at any of the sites. Occasionally there are differences in the angles at which the collars are attached to the body but, for the most part, the angles are standard. Several collar sherds have burnishing slobbers similar to those found at Kouphovouno (Figures 6.24, 6.43).

At Lerna (Phelps 2004: 52), Asea, and Franchthi Cave some collar jars have what appears to be an internal ridge, extending perpendicularly to the collar and covering the entire circumference of the vessel neck (Figure 6.44a-b). At Asea and Lerna this is accompanied by drilled holes. A function for this ridge may be to create a socket for a stopper to be inserted into the collar but it results in problems with pouring and with access to the inside of the jar.

6.6.5 Everted Rim Bowl Attachments

At Lerna and Franchthi Cave three distinct methods of attaching the rim to everted rim bowls were noted: Type 1 is a single piece where the rim is just folded outward at a right angle to the body (Figure 6.45 a&b; Vitelli 2007: 268 b-f) and Type 2 where the rim is attached to the side of the bowl (Figure 6.46a-b; Vitelli 2007: 268 a). Type 3 seems specific to Lerna; the rim is

folded over before being attached to the body, resulting in a seam (Figure 6.47 a&b). No attachment types were noted at Asea or Ayioryitika.

6.6.6 Lug Attachments

Variation was also noted in the manner in which both tubular and vertical lugs were formed and attached to the vessel body; these attributes, however, were only recorded at Lerna and Ayioryitika. No obvious mechanical benefit could be found for either attachment style.

Type 1 is where a hollow tube of fabric is prepared first and then attached to the vessel body (Figure 6.48 a&b).

Type 2 is where the lug is attached to the body and then the hole created between the applied fabric and the vessel wall by piercing. This latter method leaves a slight bulge on the inside of the vessel and sometimes a scar on the body of the vessel (Figure 6.49 a&b). Vitelli (1993a: 99-100) noted this latter attachment type at Franchthi Cave.

Type 3 is made by attaching a strap of fabric to the outside leaving a central hole (Figure 6.50 a&b).

Type 4 is where a lug was prepared and attached to the vessel. The attachment is then supported by the addition of subsidiary clay either side of the lug (Figure 6.5 1).

6.6.7 Firing

The available evidence points to an adeptness at firing at each site. The pottery from all sites consists of well fired sherds with highly oxidised surfaces, but there was considerable variation in the core colours on the same vessel types across each site (Figure 6.52). There are examples of clear distinctions between oxidised and reduced areas but these tend to be decorative choices (see Chapter 5.3.3.1), rather than a lack of control of firing atmospheres (Figure 6.53 a&b). There is nonetheless some evidence of inconsistencies in firing practises. There are examples of fire clouding in varying intensities but it is difficult to say if this happened during firing or subsequent use; Vitelli, however, found many examples at Lerna on which she is confident that the clouding happened during the firing process (2007: 95). At Ayioryitika there is one vessel (Tegea Museum Number 2376) whose lower two thirds are quite heavily reduced (Figure 6.54). It is unclear if this it was caused by the firing process or subsequent use. There are examples of stacking/firing circles at Franchthi Cave (Vitelli 1993a: 200-1) and Lerna (Vitelli 2007: 95; also Figure 6.55 a&b). Weinberg (1937: 495) noted a few

at Corinth but generally these are not common. Evidence for misfired sherds is rare; there are some examples of misfired and over-fired pieces from Franchthi Cave (Vitelli 1993a: 202), Lerna (Vitelli 2007: 95; 57) and Corinth, where one sherd has evidence of blistering (Figure 6.56). At Asea and Ayioryitika this scarcity could be due to the selective retention by excavators of misfired sherds but firing at a location removed from settlements may also explain this absence.

At Lerna the range of paint colour, poor adherence of the paint to the fabric, and relatively high presence of stacking/firing circles and fire clouding led Vitelli (2007: 94-5) to the conclusion that the Lerna pottery belongs to the earlier stages of the Middle Neolithic. During the later phases of the Middle Neolithic (FCP 2.3-4) at Franchthi Cave, the lack of clouding, improved paint adhesion and general homogeneity of the pottery led Vitelli (1993a: 201-2) to conclude that the potters had become much more proficient at firing. She also concluded that there is evidence of development and innovation in firing technology and paste preparation. Vitelli argues that at Franchthi Cave potters were able to fire for longer at higher temperatures, leading to the possibility of larger stacks or the use of rudimentary kilns (Vitelli 1993a: 200-1; 1995: 56). She argues that potters may have been willing to sacrifice outer pots in large firing sessions to create firing conditions akin to those in a kiln, which improved firing controls, making the paint more lustrous and helping to maintain higher, more consistent temperatures and atmospheres. If this was the case then one would expect more wasters and misfired or over-fired sherds in the assemblages than tend to be found. Furthermore, these sherds which she thinks may have been mobile kilns are found at Franchthi Cave and nowhere else.

Despite some evidence for blemishes, such as fire clouding, misfired sherd and stacking circles, the evidence from firing, both fabric colour and decoration indicates that Middle Neolithic potters at each site had a well developed knowledge of firing technology, with evidence from Franchthi of continued improvements during the Middle Neolithic (Vitelli 1993a: 203). They were capable of producing and maintaining any desired firing atmosphere; which can be achieved even when using the simpler bonfire technology (Sillar 2000: 47; Youni 1996: 69). The assemblages studied further demonstrate a clear awareness of the range of effects that firing can produce and the skill to manipulate them for decorative purposes to circumvent any associated problems, even when using simple technologies. Variations in firing conditions, therefore, must be considered as a matter of deliberate choice, rather than the result of constraining technological or environmental factors.

6.7 Shapes and Gouged Bowls

The shapes from the sites discussed in this chapter have been discussed in detail elsewhere (Phelps 2004). They are consistent with the assemblage from Kouphovouno. As mentioned above the discrepancies in retention patterns at each site has meant that any quantitative data could be misleading and so no work of this nature was undertaken. Nevertheless, it is noteworthy that everted rim bowls are more common at Lerna than in any other assemblage, especially compared to Kouphovouno, where they are extremely rare (Figure 5.5). At Lerna, Vitelli (2007: 96-7) reports that there appear to be many more short collars than tall ones which, she speculates, could indicate a later re-occupation of Lerna, as taller collar jars are a feature of the earlier phases. It may also, however, have been a method to reduce weight, considering the difficulties potters appear to have experienced with other aspects of fabrication.

Gouged bowls are found at each site. At Lerna over 40 rim sherds were recovered and numerous body sherds but only 31 come from Franchthi Cave (Vitelli 2007: 102). At Asea the number from the excavation was not recorded, but forty sherds were found on the Asea survey, which constitute a minimum of sixteen vessels (Alram-Stern 2003: 160-1). It must be remembered, however, that the sherds from Asea and Ayioryitika are only a selection of the diagnostic sherds and so perhaps give a biased picture of their proportion to the rest of the assemblage. Even so, each rim fragment is of differing size; body sherds have different gouging style or body thickness and so must come from different vessels. The shapes were coarse deep open bowls, with both oxidised and reduced cores; each had a wash of reddish brown monochrome paint on the outside. One piece from Ayioryitika, measuring 17cms in height, had an entire profile preserved and an attachment scar for a pedestal base (Figure 6.57a-b).

Despite these similarities there were differences between rim shape and gouging style on the bowls both at and between sites. The gouges are very deep and are cut in a variety of widths, depths and styles at each site (Figure 6.58a-c). Some examples from Franchthi Cave have an extra 'skin' of fabric clay added to the inside before being gouged, which Vitelli (1993a: 185) suggests was added as gouging would weaken the walls. The gouges which were closer to the rim were quite intact and unworn; in fact, a number had excessive clay, caused by cutting of the gouges. In some cases there are irregular gouges, which seem to have been made by a

finger rather than incised (Figure 6.58b). Some of the base sherds were quite abraded. While at most sites the execution is somewhat untidy, at Corinth and Ayioryitika it tends to be well executed, with shallower (c. 3mm depth) and narrower gouges at Corinth and few slobbers or finger made gouges at Ayioryitika. At Ayioryitika there is a distinctive type of gouge; the bottom lip is raised and the gouges seem to be angled (Figure 6.59). In the ASCSA collection from Ayioryitika there were three examples of differing rim types and gouges (Figure 6.60); the same phenomenon is noted at Lerna. The variation of gouging styles and rim types is remarkable. The local instances of gouging styles may be an indication of a site-specific style of manufacture. These features are visible on the pottery and so could be easily copied (Gosselain 2000). That they are not copied at other sites and tend to be site-specific may be a further indication of local style ceramic production, similar to that noted by Vitelli at Franchthi Cave (Vitelli 1993a: 208-9).

6.6.8 Finishing and Decoration

The majority of the pottery from all sites was highly burnished or smoothed. Vitelli (2007: 77) was able to determine differing styles of burnishing, some horizontal and some vertical, and concluded that this indicated different potters. Painted decoration is present at each site. Monochrome is the most common; Jacobsen (1969: 366) estimates that 70% of ceramics at Franchthi Cave are painted, of which 20% are pattern painted and the rest monochrome. Scribble burnish accounts for an average of 4% of the total assemblage (0-6% in the cave and 0-4% on the Paralia), although in one area of the Paralia (Q5) deposits it accounts for 32% of the assemblage (Vitelli 1993a: 196). Both canonical and Acanonical varieties were present but no proportions were recorded. The decorative repertoire is described in detail by Phelps (2004). At Franchthi Cave they tended to apply monochrome paint to motifs, a practice normally confined to earlier phases (Vitelli 1993a: 191, 2007: 105-6); this tends not to be found at other sites.

Rim pendants and elongated rim pendants, although not common, are found on convex flared bowls and collar jars at each site (Figure 6.61a-c). Their arrangement in conjunction with monochrome paint is the same as at Kouphovouno (Vitelli 1993a: 191). There is some variation in the execution of the motifs compared to Kouphovouno. At Ayioryitika the rim pendants and elongated rim pendants (painted triangles and flames or hooks respectively as

Vitelli labels them (1993a: 191-192) seem careless in comparison to Kouphovouno. The monochrome paint is streaky and the rim pendants are poorly formed (Figure 6.62). This was also noticed at Lerna, as were occasional instances of elongated rim pendants which had the tail running from left to right as opposed to the more canonical right to left (Figure 6.63). At Corinth, Franchthi Cave and Lerna some rim pendants tended not to have the clear, sharp edges and, unlike Kouphovouno, there is considerable variation in their execution (Figure 6.64-6; Vitelli 2007: 312b). At Franchthi Cave, Vitelli (1993a: 192) noted, that they varied from vessel to vessel. Only at Lerna were vertical lines noted and in only two instances (Vitelli 2007: 312f; Figure 6.67), although diagonal lines were noted at Lerna and Corinth (Figure 6.68-9).

Overall painted decoration at Ayioryitika, Corinth and Asea, on occasion, tends to be poorly executed, which is not characteristic of Kouphovouno. The paint is smeared; the motifs are poorly formed and often not uniformly sized. Vitelli argues that the similarities of decoration between earlier (Int 1/2, FCP 2.1 and FCP 2.2) and later phases (FCP 2.4) of the Middle Neolithic pottery from Franchthi Cave indicate continuity of potting traditions, with small idiosyncrasies in decoration suggesting individual hands (1993a: 190-1). In the later phase (FCP 2.4) she noted differences in the way motifs are structured and executed, compared to the earlier phases. She remarked on their sloppiness and irregular arrangement, which she argues may be attributed to the potters' lack of experience, skills, or motivation of earlier generations of potters. It is difficult to accept this explanation as correctly referring to a time when other aspects of their ceramic technology were improving (Chapter 6.2.3.5 and Vitelli 1993a: 200-1). Furthermore, the existence of other well-executed examples at the same time shows a contemporary variety in skill. Perhaps, as at Ayioryitika, it may be an indication of copying, experimenting or learning a new decorative style.

Applied or incised decoration is the least common of the categories of decoration. Different styles were noted, such as rope working on handles (Figure 6.70) and rope-like incisions on the rims of cooking vessels (Figure 6.71). There are instances from Asea, Ayioryitika, Corinth and Franchthi Cave of raised circular ridges, almost repoussé-like, that are the result of punching from inside (Phelps 2004: 60) and which Jacobsen (1969: 365) called 'reverse punctuate' (Figure 6.72). This type of decoration is found only on pedestal bases. It is found in two distinct categories, namely lines (sometimes double) or chevrons, which on occasion are found together. One sherd from Corinth (C59-241) has already been discussed (Chapter 6.2.3

and Figure 6.18). It has a series of small welts or pellets, like stippling, arranged around its outside and is similar to one found at Kouphovouno (Chapter 5.2.2). This sherd, along with that of Kouphovouno, contrasts greatly in fabric, colour and decoration with all the other sherds in the assemblages; both are probably imports. Pedestal bases from each site have evidence of fenestrations, which are always cut out before being painted. The cut out shapes are usually triangles or lozenges but other shapes have also been noted (Phelps 2004: 60) (Figure 6.73). Some pedestal bases have perforated holes, punched through the unfired fabric, also from the outside in. Vitelli (1993a: 136) suggested that these holes and fenestrations were deliberate to allow oxygen at the base of the pot during firing so that they would oxidise completely. This sounds unlikely because several completely oxidised pedestal bowls exhibit no evidence of punched holes. These features, while they could perform this function, seem to be an overly elaborate technique to achieve an oxidising atmosphere that could also be achieved by other means and does not seem necessary. It seems probable that their purpose is purely decorative.

A further category of marks were raised welts and low ridges on the outsides of vessels. The ridges were linear, horizontal, vertical, crossing or curved (crescent shaped) (Figure 6.74a-b). Vitelli (1977: 17) noted that these examples of applied decoration tended to be at the point of maximum diameter or below it in a place where they would not be very visible but more likely to be noticed by touch rather than sight. They are found alone and are not part of a repeated motif around a vessel. Isolated marks, i.e. not repeated motifs, are also, on occasion, painted at Lerna but they are not found in the same number as relief marks (Vitelli 1977: 19). No clear relationship could be established between shapes and marks (Phelps 2004: 60; Vitelli 2007: 96-100) and the same marks were found on several different shapes (Vitelli 1977: 23). Vitelli (1977: 21) mentions that there were several hundred sherds with marks at Lerna and that they were less common at Franchthi Cave, while they were not noted at all at Ayioryitika or Asea (Vitelli 1977: 29; Phelps 2004: 60). One was noted at Corinth (Figure 6.74b). Vitelli records a distinction between the style at Franchthi Cave and Lerna. At Lerna the ridges are covered in monochrome paint, as the rest of the vessel, whereas at Franchthi Cave the ridges can be painted as part of overall pattern decoration on the vessel wall (Vitelli 1977: 21). Vitelli (1993a: 209) takes this site-specific style to be an indication of localised ceramic production.

The location beneath the maximum diameter indicates that they may be 'lifting bosses' as Vitelli (1977: 21) describes them, although she argues that a separate category of larger pellets

located in a similar position may have served this function. Furthermore, it is doubtful that single examples of these marks on each pot would have aided lifting, as it would have unbalanced the grip. The positioning of these ridges beneath the point of maximum diameter and not in the typical decoration zone of Neolithic pots (i.e. the upper third of the pot (Phelps 2004: 57), in areas of reduced visibility, and additionally the fact that they are painted the same colour as the entire bowl, suggest that whatever function they had did not depend on their visibility and, therefore, that their visibility was not of prime importance. Vitelli (1977: 22-8) discusses possible functions for these at length, including such possibilities as script, as aids for blind people, or to identify pots after communal firing and superstition; none of these seems plausible. It seems that there is no satisfactory explanation for these ridges.

6.6.9 Use-wear

The evidence for use of sherds from other sites is similar to that of Kouphovouno, although not as prevalent (Figure 6.75). Instances of use of ceramics with heat are rare but there is some variety in how this is manifested. Some base sherds have localised areas that were affected by heat or scorched. Examples are found at Franchthi Cave (Figure 6.76), Lerna, Corinth and possibly Ayioryitika but the amounts noted at each site rarely exceeded 10 sherds (Figure 6.54). Sooted residues were noted at Franchthi Cave, Corinth and Lerna (Figure 6.77a-c). They are rarely found on the outside but are more common on the insides of sherds. The sooted residue at Franchthi Cave has a powdery texture. At each site there are examples of fire clouding, in some cases on both inside and outside (Vitelli 1993a: Plate 2C; 2007: 85, 94, 95; Figure 13e, Figure 6.77b & 6.78). This cannot be conclusively proven to be use wear and is more likely to be due to firing.

Evidence for pitting is found at each site. As at Kouphovouno, it tends to be confined to the insides of vessels; it is rarely found on the outside and has a tendency to be found more commonly on coarser wares (Figure 6.79a-c). Unfortunately, it was not possible to determine the shapes the pitting is on, although one example which is intensively pitted is a piriform jar (Figure 6.79c). Only one vessel from Franchthi Cave showed any clear sign of wear from dipping or scraping (Vitelli 1993a: Plate 3a) and a similarly limited number was noted at Lerna (Vitelli 2007: 86). Finally, one sherd from Asea Holmberg (1944: 43 Fig. 43) may have been a scoop.

6.6.10 Reworking

A small number of sherds have regularly rounded edges, which indicate some reworking or use-wear as sherds rather than pots (Figure 6.80a-c; Vitelli 1993a: 76-77; Plate 4; Vitelli 2007: 98). Some sherds are trapezoidal in shape with rounded edges (Figure 6.80b). Their shape and the use-wear seem to indicate that they were possibly used as scrapers or as burnishing tools. Rounded sherds are also found at Franchthi Cave, where some are perforated (Vitelli 1993a: 41, 53; Plate 4a), suggesting that perhaps they may have been used as pendants. Others have evidence of retouching (Vitelli 1993a: Chapter 12 Plate 4d & e). Reworked sherds were found only at Franchthi Cave, although at Lerna one thick sherd with rounded edges was identified (8mm). It is unlikely that this was used as a scraper; but more likely as a polishing implement (Figure 6.80c).

6.7 1019, 2016 and C Sondage: Discussion

Overall this exercise has produced a good cross section through the Middle Neolithic ceramic assemblage from Kouphovouno. It has provided both a temporal and, as far as possible, a spatial picture of the assemblage. There is a great deal of similarity between the assemblages but also some striking differences. Coarse wares are found in slightly larger proportions in both 1019 and 2016 than in C Sondage but overall proportions are roughly similar, ranging from 8-12% (Figure 6.81). The proportions of weights show considerable variation across the three assemblages. In C Sondage coarse wares are found in higher proportions but it is the reverse in 1019 and 2016 (Figure 6.82). In terms of weight, the proportions of fine wares are significantly larger in both 1019 and 2016, with the largest coming from 2016 (Figure 6.82). The same evidence for fabrication is evident in each assemblage, but is more prevalent in 2016 than either 1019 or C Sondage (Figure 6.83). As discussed in Chapter 5.1 this evidence is usually obliterated during final finishing of the vessels. This suggests that less attention was paid to finishing sherds deposited in 2016 than in the other two assemblages, which may be indicative of different potters who placed different emphasis on finishing their ceramics than in the other assemblages. The location of 2016 at a distance from C Sondage and 1019 lends support to this view, although there is some difficulty in comparing the chronologies of these deposits. Furthermore, the presence of unique pedestal base attachments and a unique collar jar attachment in 2016 further emphasise the distinctive character of the assemblage.

Both pedestal base and collar jar attachments are found in differing proportions in each assemblage with Type 1 pedestal base attachments being the most common in all three assemblages (Figure 6.84). Overall the attachment proportions in 1019 reflect those of C Sondage more closely, as both indicate preferences for Types 1, 2, 3 and 4. When attachment groupings were considered each assemblage demonstrated a preference for Group A more predominantly in 2016 (Figure 6.85). Group B is found in significant proportions in C Sondage and 1019 but this is not the case in 2016. Group E features only in 1019 and 2016 and Group F is limited to 2016. Collar jar proportions also vary across all three assemblages, with no clear pattern prevalent (Figure 6.86). Evidence of firing is similar across all assemblages with a range of atmospheres identified in all assemblages and a clear preference for oxidised surfaces and cores. Fire clouding is rare as are misfired sherds, which are not found in 2016.

Both 1019 and 2016 have a narrower range of shapes than found in C Sondage, piriform jars, everted rim bowls. Gouged bowls are confined to the earlier deposits of C Sondage and are absent from 1019 and 2016 (Figure 6.87). Display and consumption vessels (Open shapes) are found in a larger proportion in 2016 than in both 1019 and C Sondage but in 1019 and 2016 convex plain bowls are the most common of both shapes. Storage shapes (Closed shapes) are found in similar proportions in all three assemblages (26-30%); in both 1019 and 2016 they are exclusively collar jars. Collar jar sizes are found in similar proportions between C Sondage, both phase groupings and 2016 but in 1019 there is a significantly greater proportion of taller collar jars compared to C Sondage and 2016 (Figure 6.88). Vitelli's (2007: 96-7) observation of smaller collar jars being a feature of the later Middle Neolithic does not seem to be borne out at Kouphovouno. Although the numbers of small collar jars increase, the proportions only reflect a slight increase in small collar jars. Cooking wares are rare in 1019 but in 2016 are found in similar proportions to C Sondage.

The proportions of decorated sherds vary between each assemblage, although it should be remembered that those in 1019 may have been affected by post depositional factors. Painted sherds are found in significantly lower proportions in 1019 and 2016 than in C Sondage (Figure 6.89). This may reflect a trend of decreasing proportions of decorated sherds that is indicated between Phase Grouping 1 and 2 in C Sondage (Chapter 5.2.4). Fenestrated pedestal bases are found in both 1019 and 2016 and are absent from C Sondage. The proportions of scribble burnish show slight variation between the assemblages relative to painted pottery

(Figure 6.90) but pattern painted pottery is the dominant decorative method in each assemblage. Similarly the proportions remain relatively similar with canonical scribble burnish dominating (Figure 6.91), but in 2016 there is an increase in the proportion of Acanonical scribble burnish. Convex flared bowl decoration shows considerable variation between the assemblages both in the proportions and execution of each motif and, in the case of 2016, two new motifs were noted (Figure 6.92). The above analysis demonstrates that 2016 and to a lesser degree 1019 has a distinctive decorative method compared with C Sondage. Despite similar conventions of decoration across the site both C Sondage and 2016 appear to have their own decorative character. Finally, all assemblages have similar evidence of use wear both in the type of evidence and the location of it (Figure 6.93).

2016 demonstrated distinctions in the quality of finishing of the pottery, unique pedestal base and collar jar attachment types, as well as distinctive decorative motifs on the convex flared bowls compared with C Sondage and 1019. One may suggest that this is an indication of different motor or potting traditions between the two areas but this must be confirmed by closer analysis (see Chapter 8.2). However, given the individuality of the character of each assemblage it is difficult to place them chronologically, although C Sondage and 1019 do have a stratigraphic relationship. 2016 is stratified below transitional Middle-Late Neolithic phases, which may suggest that it is later than 1019 and C Sondage, indicating that the unique features in 2016 may be suggestive of later activity rather than different contemporary motor/potting traditions. On the other hand, there are some indications of temporal development in the decoration between the phase groupings in C Sondage and 2016, such as decreases in the proportions of painted sherds, increases in the proportions of Acanonical scribble burnish and reducing proportions of rim pendants as well as unique motifs on convex flared bowls.

6.8 Kouphovouno and the Peloponnese: Discussion

Despite the vagaries of different retention biases by excavators at some sites, Middle Neolithic ceramics from the Peloponnese demonstrate a considerable homogeneity of construction techniques throughout the Peloponnese. Analysis indicates that ceramics are produced at each site using broadly similar forming techniques, firing practises and decorative syntax. Nonetheless, there are indications of localised styles and practices throughout the *chaîne opératoire*. Variations in rim forms, attachment practices, gouging style and decoration all

suggest some degree of individuality of the sites. In some cases this variation in practices may be explained by difficulties in working clays, inexperienced potters, experimentation, or improvements in the knowledge of ceramic technology (Vitelli 1993a: 200-2, 2007: 93). There are indications of a degree of localised style in fabrication of pedestal bases at Franchthi Cave, Lerna and Kouphovouno, localised styles of gouging at Corinth and Ayioryitika, applied decoration at Lerna and Franchthi Cave and painted decoration at Kouphovouno and Lerna. Concurrent with these local practices, there are variations in how well some potters choose to decorate and to finish their vessel. It appears that the range of colours of surfaces and cores from Middle Neolithic potters could also be a deliberate choice of skilled potters who were confident in their own technological ability to be able to produce any desired finish on their pottery. Evidence of use-wear at each site is similar both in the type of evidence and its location on sherds. Reused sherds in between Franchthi Cave and Kouphovouno vary with respect to shape, but their use-wear is similar.

Chapter 6 has demonstrated that there is an overarching style of construction and decoration in Middle Neolithic ceramics in the Peloponnese. There is also evidence of wide scope for choice in several aspects of the ceramic fabrication process. Chapter 6 has expanded the range of known pedestal base and collar jar attachments from Kouphovouno. It has also provided informative data regarding the development of decorative syntax across the site and shows similarity in use-ear across the region. The significance of these observations and of those from Chapter 5 are the basis for the discussion and conclusions in Chapter 7

CHAPTER 7 DISCUSSION

Before progressing to a discussion on the wider implications of the findings discussed in the previous chapters, it is necessary to put the ceramics in context. Drawing on Chapters 4, 5 and 6, this chapter will begin with a discussion of settlement patterns in Laconia, followed by an assessment of evidence for firing practises, the location of ceramic production and the use of ceramics. The identification of technological choice in ceramic production is a central aspect of this thesis and it is used to inform the subsequent discussions on ceramic production strategies, social control of ceramic production and social boundaries and interaction between communities at Kouphovouno and the Peloponnese.

7.1 Middle Neolithic Settlement in Laconia

As explained in Chapter 2.2.2, evidence for settlement patterns in Laconia presently indicates no Early Neolithic sites, while during the Middle Neolithic there was one large site, Kouphovouno, and two smaller sites further south at Apidia and Ayios Strategos (Johnson 2007: 151). The Middle Neolithic ceramics that we do have seem to indicate that ceramic technology arrived fully developed at the site. This could of course be an excavation bias, as very little of the earlier deposits has been examined, but the intensive survey in 1999 (Cavanagh *et al.* 2004) did not find any Early Neolithic material at Kouphovouno. This, as well as the demonstrated links between Kouphovouno and the other larger Neolithic sites further north in the Peloponnese (see Chapter 6.6.2), suggest that Kouphovouno may be a 'frontier' site.

Perlès (1999: 53) proposed that resource stress and population pressure may have caused the fissioning of settlements in Thessaly with some new settlements being off-shoots of older ones. Such a model, applied in the Peloponnese, with its sparse settlement pattern, is insufficient to explain why Kouphovouno exists in isolation, away from other sites in the Northern and Central Peloponnese. Chapter 2.2.2 outlines how claims that the Peloponnese was unsuited to intensive agriculture and lacked resources (Johnson 2007: 103; Washburn 1983:157) are in error (Cavanagh 2004:165-89). Other factors apart from resource stress, such

as limited gene pools and social pressure, can cause a 'push effect' and cause the splitting of settlements and induce populations to move (Rockman 2003: 9), but these are difficult to trace. The ceramic data in this thesis, however, indicates links with all the other sites, which, as explained below (Chapter 7.8.2), are more indicative of the movement of people rather than ceramics. It is plausible that a possible benefit, although not the primary reason for the establishment of Kouphovouno, may have been genetic multiplicity, drawn from the other sites in the Peloponnese.

As Kouphovouno is the only large settlement in Laconia, the question arises why would a settlement unique to a landscape be relatively restricted spatially, especially since Kouphovouno seems to have access to a large area and resources, potentially rendering it self-sufficient, with a sizeable area to control, as suggested by Cavanagh's model, discussed in Chapter 2.2.2 (Cavanagh 2004: 181). There are two criticisms to Cavanagh's model. Firstly, it makes a large assumption that to 'control' an area you need a physical presence. This could be the case where there are competing neighbours, but in a sparsely populated landscape it may not have been necessary. Secondly, it assumes that, given the opportunity, early farmers would have had a natural inclination towards extensive agriculture as opposed to intensive agriculture, which was already being practised elsewhere in Greece (see Chapter 2.3).

The archaeological evidence from Kouphovouno has demonstrated that it had a number of features in common with other Middle Neolithic sites, such as the re-use of space and features on the site (see Chapter 4.4.2). Also the material culture shares large degrees of commonality with other Middle Neolithic sites in the Peloponnese. However, should 'new settlers' be expected to abandon their settlement and subsistence practices in a new landscape? As mentioned earlier (Chapter 2.2), it is plausible that they may have only cleared enough land as they needed, rather than investing in massive land clearance to practice extensive agriculture, which would have required a large amount of labour to maintain. It is also plausible that subsistence could have been linked to identity or heritage, that subsistence practices could have re-affirmed or expressed identity, consciously or unconsciously. Furthermore, changes to agricultural practices would require changes in relationships between cultivators/farmers and their crops as well as changes in the crops themselves; it is not simply a matter of replacing one subsistence strategy with another (van der Veen 2004: 159). It appears that agricultural practices may have had more to do with cultural practices and existing knowledge of agricultural processes well adapted to deal with any eventuality or stress and that, despite a

new landscape, the people continued to use them; perhaps a Neolithic case of 'if it's not broken don't fix it'.

The available evidence, the apparent unsettled landscape, the arrival of fully formed forming techniques for ceramics with parallels at other sites (see Chapter 6.2-6.6) and the similarity of subsistence and settlement practises all seem to indicate that Kouphovouno may be an initial settlement in a new landscape, an expansion of settlement from the Northern Peloponnese; one which did not face competition for resources in the immediate vicinity thus allowing it to flourish. The reasons for this settlement remain unclear as traditional models, such as resource pressures, do not offer a sufficient explanation. The ceramic data does suggest that it may have facilitated the expansion of genetic multiplicity in the Peloponnese as a whole (see below Chapter 7.8). Despite the lack of competition, the community at Kouphovouno appear to have held onto their subsistence and settlement practises, probably because these practises had proven themselves, over time, to be sufficient or perhaps, as expressions of their identity and as mechanism to maintain links with parent sites.

7.2 Firing: Location and Practises

The lack of ceramic production installations at any site has made it difficult to determine the method of firing. None of the large ceramics found at Franchthi Cave, which Vitelli (1993: 184-5) suggests could have been kilns, were found at Kouphovouno or at any other site in the Peloponnese. Vitelli (1974: 2, 29) noted that the remains of bonfires do not last but wasters/misfired sherds and remains of kilns can survive, although no evidence of a kiln was found at any site. At each site there are few ceramic wasters or misfired sherds, which could be a result of negative retention biases by some excavators but also because the identification of wasters is difficult. While it is safe to assume that the number of wasters and misfired sherds was significantly greater at each site than those recovered or retained by excavators at sites where all sherds were kept, such as Kouphovouno and Franchthi Cave, the numbers of wasters are still low. Those that were found were not in a quantity that would indicate a location for ceramic production, or disposal associated with ceramic production, although some production strategies do allow for wasters to be mixed with domestic refuse (see below Chapter 7.5). This would appear to indicate that ceramic production either took place away from settlements and that the presence on site of wasters and misfired sherds is a deliberate

action, that either the shapes, despite being at times over-fired, misfired or misshapen, were still useable or that the misfired sherds were being used for a different purpose.

While work to determine firing temperatures for the pottery from Kouphovouno has yet to be undertaken, Vitelli (1993: 10) estimates that the firing range for Franchthi Cave is 800-850°C and is below 800°C at Lerna (Vitelli 2007: 77); both of these temperatures can be achieved in bonfires. This does not mean that they could only achieve these temperatures; the quality of the firing and the consistency of the atmospheres indicate that they could also maintain these temperatures and atmospheres for a sustained period of time, indicating a high level of skill and knowledge of their craft. This question of the location and type of firing of ceramics requires further data from excavation and survey; based on the ceramic evidence to date there is no reason why ceramics could not have been fired in bonfires located away from settlements.

7.3 Function Use-Wear and Re-Use

There is a large degree of similarity in the evidence of function in the ceramics from the different sites. Kouphovouno has the largest number and widest range of types of heat effects on sherds, but there is similar evidence, regarding the type of heat effects and location of that evidence, at the other sites. This seems to indicate that ceramics were used in a variety of ways in association with heat, with some indications of a co-relationship, although not an exclusive link, between shape and the type of heat as well as where that heat was applied (see Chapter 5.7.1). Furthermore, there are some spatial differences at Kouphovouno in the proportions of sherds, which indicate the use of heat in conjunction with ceramics (see Chapter 5.7.1 and 6.4). Also, at Kouphovouno the temporal trend indicates a slight increase in the use of ceramics in association with heat (see Chapter 5.7.1). This exists alongside a slight increase in the proportions of a ware with mechanical features that could be interpreted as a cooking ware (see Chapter 5.2.3 and 5.5.4). This trend would, at first glance, seem contradictory; why would the use of ceramics with heat continue when a ware exists with mechanical attributes which made it more suited to use with fire? However, what it does seem to suggest is that there is an increase in the use of ceramics in association with fire, perhaps as a response to potential, or reflecting an expanding range of tastes or practices in food preparation, perhaps even culinary

practises; however, this assumes that ceramics were only used for food production and not the processing of other materials.

Evidence of pitting is found in similar circumstances at each site, usually on coarse wares, on the insides of vessels; while there is a lack of pitting on the outsides, no clear pattern of association with particular shapes could be determined. It seems that whatever activity caused the pitting, fermentation of beer or processing of fruits, for example, it was a widespread practice in the Peloponnese. Scraping on the insides of bases was only noted at Franchthi Cave and Kouphovouno. Pitting and the use of heat with ceramics indicate relatively standardised practices from the Peloponnese of how ceramics are used, whether for food preparation or otherwise.

Similar shapes at each site do indicate a large degree of regional stylistic homogeneity in the conceptualisation of how the pots should look; the similar style of decoration and colouring reinforces this point. However, there are some subtle differences; gouged bowls, which are found at each site and whose function has been discussed earlier (see Chapter 2.5.4), demonstrate considerable variation and, at the same time, considerable similarity. The shapes and decoration, generally open vessels with red monochrome paint, are alike. The wear patterns, concentrated on the bases, are also similar. The differences in gouging and rim types noted between the sites are interesting; within what could be considered the same function, there is a degree of localised stylistic flexibility and individuality.

The evidence for reuse of sherds is similar on all sites; reworked sherds are rare, being found only at Kouphovouno, Franchthi Cave and Lerna (see Chapter 5.7.4, 6.4 and 6.10). There is variation between all three sites in the shape of the sherds and in the evidence of wear patterns. It seems that the reused sherds at Kouphovouno may have been personal adornments or weights, whereas some from Franchthi Cave were used as rubbers or as burnishing tools, and perhaps for polishing at Lerna. These indicate a range of uses for sherds that are reused. The lack of such finds from other sites is disappointing, but this could be a reflection of an excavator's bias considering retention of sherds. It is highly probable that sherds were reused at the other sites.

While there is enough similarity to speak of a regional style between the Middle Neolithic ceramics from Kouphovouno and other Peloponnesian sites, within that regional style there is sufficient variation to allow the identification of technological choice in the fabrication of ceramics and to speak of some localised stylistic features. Establishing a chronology between the sites is difficult, as we do not as yet have radiocarbon dates for Kouphovouno. Vitelli (2007: 131) has speculated that the potters at Lerna may have been contemporary with those at Franchthi Cave during the Early Middle Neolithic, but that there are indications of some seasonal occupation before final abandonment of Lerna at the end of the Middle Neolithic. At Kouphovouno there has been no Early Neolithic material found as yet but the sequence runs from Middle Neolithic through Late and Final Neolithic with transitional phases (Cavanagh *et al.* 2004; Whitley *et al.* 2007). The volume of pottery at many of the sites does hint at occupation over a long period and the stability of potting traditions gives indications of continuity as well as some sense that the sites are roughly contemporary. The following sections (Chapter 7.4.1-3) discuss to what degree it is possible to determine choice in the fabrication process but, as mentioned in Chapters 5 and 6, it will not be possible to include fabric analysis.

7.4.1 Shaping and Firing

At Kouphovouno there is some spatial variation in the finish of ceramics (see Chapter 5.3 and 6.2-4). Across the Peloponnese ceramics are made using either coil or slab building (see Chapter 5.3, 6.4 and 6.6.2-6). Variation in shaping practices were also noted in and between sites in the methods used to form rims and lugs. At some sites there are localised styles of making gouged bowls, everted bowl rims and lugs. There is variation in both the intensity and style of burnish and scraping strokes, which is suggestive of individual preferences for stroke patterning, but it is difficult to confidently attribute this to different forming traditions. At Lerna variation in forming techniques has been attributed to technological and environmental constraints (Vitelli 2007: 93). The ceramics from each site have evidence for a range of firing atmospheres (see Chapter 5.3.4, 6.2.5 and 6.6.7). Due to the consistent quality of firing and evident maintenance of heat, it seems plausible that the varying instances of oxidation and reduction were deliberate and, as such, an indication of choice. No relationship could be established between shapes and firing atmospheres, nor was there any demonstrable co-relationship between firing practices and attachment types.

7.4.2 Pedestal Bases, Collar Jars and Everted Rim Bowls

Analysis of the pedestal base attachment types has indicated a large degree of inter-site homogeneity with many of the same types found at different sites (Appendix 10, Table 1 and 2). C Sondage at Kouphovouno has shown that temporal development can be ruled out as an explanation and that several of the pedestal base and collar jar attachment types are largely contemporary (see Chapter 5.3.3.1.2-3 and 6.2.3-4). Alongside a widespread distribution of similar pedestal attachments are some types which are unique to particular sites, such as Type 9 and 10 at Kouphovouno and Types 13 and 14 at Franchthi Cave. There are also some types which have limited distribution, such as Type 15 at Lerna and Franchthi Cave (Appendix 10 Table 1) as well as Type 11 at Franchthi Cave and Kouphovouno, but overall the majority of attachment types are found at Kouphovouno and Franchthi Cave. Furthermore, no distinct geographical distribution of attachment types could be discerned.

Collar jar attachments similarly indicate choice, with Kouphovouno and Franchthi Cave having the widest range of attachment types and Corinth and Asea showing the narrowest range (Appendix 11 Table 1). All five types were noted at Franchthi Cave, Kouphovouno and Lerna, but no clear distribution pattern could be discerned. The everted rim bowls demonstrate a range of attachments at Lerna, but insufficient numbers at other sites preclude comment (see Chapter 6.6.5).

The existence of contemporary styles of attachment, temporally and spatially, at Kouphovouno as well as regionally in the Peloponnese that cannot be explained by mechanical or technical factors indicates the presence of technological choice in the fabrication of pedestal bowls, collar neck jars and, to a lesser degree, everted rim bowls. With possibly fifteen styles of attaching pedestal bases, it is tempting to suggest that there are fifteen motor traditions of pottery fabrication, which have been divided into eight groupings (A-H) based on different conceptualisations of the pedestal attachments (Appendix 10 Table 2). At Franchthi Cave, Vitelli (1999: 187) claims five different potters are present due to the existence of five different recipes for Early Neolithic pottery, but one cannot confidently discuss potting traditions based on one attribute alone (see Chapter 8.2). In the case of pedestal base Type 9, which is an isolated example, there is no evidence of continuity. This may not indicate a separate tradition but instead could be an example of experimentation, and it is important because it indicates a different mechanical approach to pedestal attachments. Also, considering the case of pedestal base Type 8, which could in effect, be a slight variation on

pedestal base Type 1, the number of potential motor traditions could be refined downwards but, nonetheless, the variety of attachments and of conceptualisations of attachments is remarkable.

7.4.3 Decoration

Overall there is a large degree of decorative homogeneity in the decorative style used for Middle Neolithic pottery, in the paint, motifs and arrangement of decoration (Cullen 1985a and 1985b; Phelps 2004: 55-60, Washburn 1983). At Kouphovouno there are subtle changes to decoration through time, which have proved to be informative, such as increases in the proportions of scribble burnish to painted pottery and Acanonical scribble burnish to scribble burnish, as well as significant temporal changes in the execution of rim pendants and vertical lines (see Chapter 5.4 & 6.2.6). Furthermore, there seems to be some spatial differences at Kouphovouno in motifs on convex flared bowls, but crucially the arrangement of the decoration on these bowls stays the same, suggesting choice in the motif but that potters may have been constrained in how the motif was arranged. It has been discussed earlier (Chapter 4) that C Sondage, although in excess of four metres in depth, may not cover an excessively long period of time and, as such, the temporal changes to the decoration seem to be happening at a much faster rate than may first appear. This is not surprising as decoration tends to change and develop at a much faster and more noticeable pace than forming techniques due to its visibility, interaction with 'consumers' and the exposure to influence from different types of decoration used by other potters (Gosselain 2000). Across the Peloponnese vertical lines are found at Kouphovouno and in limited numbers at Lerna, the 'Reverse Punctuate' technique is not found at Kouphovouno, fenestrations are rare and not found in C Sondage (see Chapters 5.4, 6.2.8 and 6.6.8). At other sites the decoration is executed with localised nuances, which in some cases can look sloppy or careless when compared to Kouphovouno. The examples of rounded chevron bases and blotchy rim pendants are quite widespread in the Peloponnese, which indicates that it is perhaps more of a stylistic nuance rather than inexperience but that those at Ayioryitika are particularly poorly formed and could be explained by experimentation or copying (see Chapter 6.2.4).

7.5 The Organisation of Production

Understanding the organisation of is important because the issues of social organisation, the social role of potters and inter-site interaction are so closely related to it. No evidence of the physical location of Middle Neolithic ceramic production has been found either at Kouphovouno or elsewhere in the Peloponnese, which means that production strategies have to be worked out using other methods. The following section, using the methodology outlined by Costin (2000: 388), discusses some possible models for how production is organised.

7.5.1 Itinerant or Peripatetic Potters

The possibility of itinerant or peripatetic potters was discussed in Chapter 2 (see Chapter 2.5.2). Similar decorative styles and shapes across the region that are made in local fabrics (Cullen 1985b: 82) suggest the possibility of itinerant potters. They have been widely attested in the Eastern Mediterranean, in the Balkans and beyond (Nicklin 1979: 443-4). Also, there are ethnographic records of dynasties of peripatetic potters (Burrison 2008: 164-7; Voyatzoglou 1974: 19). Voyatzoglou (1984: 19) recorded that sources for clay exploited at Thrapsano by peripatetic potters continued to be used through generations; however, the use of local clay is not a sufficient indicator of peripatetic potters. They have in some cases been known to bring their clays with them (Nicklin 1979: 443-4), although the difficulties of transporting it overland make this improbable. Nicklin's examples are mainly from islands where movement of clays is made easier by use of boats. Also, on the islands good clays could have been scarce, making the movement of clays necessary. On the other hand, potters, by using their own, familiar clays, avoided the necessity of having to learn features of local clays and develop suitable recipes to make the clay paste workable. Alternatively, they have been known to deliberately source clays with similar properties to those they are more familiar with (Day 2004: 121). Furthermore, there is evidence from lithic production of travelling, itinerant craftsmen (Perlès 1992: 136-7); therefore, the concept of travelling craftspersons may not have been an improbable occurrence. Finally, the continuation of potting traditions at Kouphovouno would suggest that if peripatetic potters were in operation then there were several generations of them. This is not an unlikely scenario because potting is generally a conservative craft and because of the methods by which ceramic knowledge tends to be passed on.

The 12 motor traditions identified at Kouphovouno, while suggesting the existence of several potting traditions at one site, cannot alone be taken to indicate that there were no peripatetic potters. There are several other reasons why it is improbable that ceramic production was not conducted by peripatetic potters. Firstly, there are sufficient localised nuances and local styles to indicate that they are not due to peripatetic potters: the localised attachments types at Kouphovouno and Franchthi Cave, lug and everted bowl types at Lerna, the gouging styles and rims at Ayioryitika, Corinth and Lerna, the decorative developments of rim pendants and vertical lines at Kouphovouno, as well as the reverse punctuate decoration on pedestal bases found everywhere except Kouphovouno all suggest localised production and a degree of local styles within a broader technological stylistic framework. Some of these elements, like the gouging and the decoration, could have been demanded of the peripatetic potters at each site but it does not explain the localised styles of attachments, which are more dependent on motor skills and not as visible to consumers.

Secondly, the nature of peripatetic potters groups must be considered; are they specialists who exist solely on their craft? If so, how would they exist out of season? If they are semi–specialists, the scheduling of tasks would have to be considered. Dry summers would be when they were most in demand but that is also the time when there is usually a lot of agricultural activity scheduled. The restricted nature of the potting season in the Mediterranean climate is such that potting seasons tend to be relatively short (Annis 1985: 243; Arnold 1985; Whitelaw 2001: 68), which reduces the time period in which peripatetic potters would have been able to visit each settlement.

Thirdly, it is difficult to estimate if the few communities spread out across the Peloponnese would have been able to sustain a number of peripatetic potters. Even allowing for visiting several settlements each year and the need for regular visits, either annually or bi-annually as utilitarian pots tend to have a relatively short life span (Mills 1989: 133-47), it is doubtful if it would have made for a 'sustainable economy' in the loosest sense. Fourthly, despite the difficulties in estimating production rates (See Chapter 5.6), it is fair to say that production at each site may be too high to be within the capabilities of itinerant potters, who must service each site during a short potting season and contend with scheduling conflicts. In sum, the large number of motor traditions, local nuances of pottery production at each site, high production rates *vis a vis* scheduling conflicts and short potting seasons indicate that ceramic production was not conducted by peripatetic potters.

7.5.2 Domestic Mode of Production (DMP)

As explained in Chapter 4.4.3, the deposition pattern of pottery at Kouphovouno does not lend itself to identifying individual domestic contexts. Perlès (2001: 218) feels that one cannot use the identification of several potting traditions alone to indicate that each member of a community may have been a potter. As most of the ceramics come from secondary deposits, which appear to be communal deposition, this task is much harder to attempt, making the understanding of intra-site distribution of ceramics all but impossible. Rice (1987: 181) argues that individual domestic household 'for own use' production can be hard to identify archaeologically because of low output, sporadic seasonal production, informal organisation and a lack of formalised ceramic producing installations (Peacock 1982: 8). Costin (2001: 280-1) suggests that production debris, i.e. wasters and misfired sherds mixed with domestic refuse, is an indication of a range of domestic activities but at the sites in this study only a few sherds, which could be considered production debris, were found, even from well-stratified deposits like at Kouphovouno and Franchthi Cave. Furthermore, using estimated production rates as a method to suggest production strategies is fraught with danger because there is as yet no clear method for evaluating production rates (see Chapter 2.5 and 6.1.), let alone high- or low-intensive production rates (Costin 2001: 281). Likewise, equating production output with the organisation of production is problematic. Output is determined by technology and available labour. Estimating available labour and production rates is difficult without detailed information on either technology or available labour. Finally, ethnographic literature has found that assumptions on production rates from individual artisans or specialists do not equate readily with production output (Costin 2001: 291).

Perlès (2001: 290) comments that the presence of a range of domestic installations, such as hearths and ovens in many Neolithic houses, suggests that there was little domestic co-operation and that houses were generally self sufficient as a unit of production and consumption. Households, however, can go through cycles of production and are often affected by issues, such as gender, group size or a number of social factors (Souvatzi 2008: 14-15). Furthermore, disagreement, inequality and independent labour in households results in not all household members benefiting from the labour of other household members (Costin 2001: 275). This could impact on demand and production capabilities in such a way that cooperation between households is necessary at some times.

Despite the problems with identifying individual households, there is some indication of spatial patterning at Kouphovouno. There are clear differences in forming practices, variation in attachment types and decoration between C Sondage and 2016 but this could be a temporal phenomenon (see Chapter 6.2.2.1). There are issues when assuming that spatial depositional patterns can signal household/domestic discard of ceramics. Firstly, deposition at Kouphovouno is communal; the deposits appear to be secondary disposal, which can result in mixing of material so that it is impossible to pick out individual depositional episodes and which also does not allow for exchange of ceramics across the site. Secondly, it assumes that there is a link between space and household. Boundaries of household tend not to be rigid and, as such, can be hard to define and recognise. Criteria by which boundaries of households are set are not always reflected in material culture (Souvatzi 2008: 9-10). Households do not exist as inert groupings and changes cannot be explained by single factors. They are, rather, the result of social practices and relationships between households at different levels (Souvatzi 2008: 46). Furthermore, household does not necessarily mean co-residence. There are many ethnographic examples of several 'households' living together, also members of the same 'household' do not always engage in the same practices together; eating, for example (Bender 1967: 498). Finally, there is a danger in attempting to collate social groupings with households because, although both can be represented spatially and use shared space, not every social grouping is a household (Souvatzi 2008: 11).

It appears that the available evidence does not give a clear indication of the existence of domestic or 'for own use' production strategies. Due to the lack of production installation evidence, ambiguous depositional evidence and problems with the ever-changing nature of household, there is no clear indication of domestic 'for own use' or household production strategies.

7.5.3 Specialisation, Standardisation and Diversity

It is clear from the production methodologies and the finished products that Middle Neolithic potters were highly skilled and had an in-depth knowledge of the potential of various potting techniques. The large degree of temporal continuity and repeated attachment types would seem to suggest that there is a degree of standardisation and perhaps specialisation. It has been argued earlier that technological expertise does not necessarily indicate craft specialisation (see Chapter 2.5.2 and Costin and Hagstrum 1995: 621; Mee 2007: 209-10) and that the use of labour input or technical knowledge is, likewise, insufficient to indicate craft specialisation

Diversity

Conversely, it could be argued that the attachment variability demonstrates a range of diversity. Diversity is sometimes taken to demonstrate the existence of non-specialists, but diversity can exist among specialists too (Rice 1991: 273). Low diversity does not necessarily mean craft specialisation or mass production. It can sometimes be linked to constraining factors, such as limited resources, whereas the existence of a greater range of diversity suggests a wider range of producers or even a lack of control of production strategies (Rice 1989: 111). Rice (1989: 112) warns, however, that, as yet, concept and implications of diversity are not fully understood. Also, where possible, similar attributes must be studied in isolation because each attribute is subject to its own range of influencing factors (Rice 1989: 111). Rice's doubts about the usefulness of diversity as a field of study are somewhat influenced by her application of the concept to inter-site diversity and she says finding comparable samples between assemblages is problematic. In a study of an assemblage from a single site diversity may be more useful, although it might be difficult to separate it from a study of choice, as they tend to amount to the same conclusions. Diversity and standardisation of motor traditions can help to identify the number of producers but they cannot be used to identify specialist potters.

Costin (2000: 378) proposes a general model for specialists, which is where a sub-set group of producers manufacture goods for a larger group of consumers, linking this to social complexity and the division of labour rather than skill levels. Costin links the existence of a sub-set of producers to production rates, but the estimation of production rates in Middle Neolithic communities is problematic (see Chapter 5.6.1). The existence of contemporary ceramic traditions could hint at specialisation sustained over generations of potters, which, considering how ceramic knowledge is transmitted, is not implausible. Were this the case, then on a crude level, using motor traditions as an indicator, one could speculate about the existence of between six and twelve traditions of specialist potters at Kouphovouno and perhaps nine to fifteen in the Peloponnese (based on the minimum number of groupings: 6, and maximum number of attachments: 15). It is difficult to estimate if twelve is a potentially large number for a community, such as that at Kouphovouno, whose population may be estimated to be in the hundreds (Halstead 1981: 307-39). Whitelaw (2001: 68), on the other hand, estimates that in Messenia during the Late Helladic III period small villages of roughly two hectares in size were served by between one and four potters. A crude estimation of a population range of 100-300 persons per hectare at Kouphovouno, based on Halstead's (1981:

(Kalogirou 1997: 15-16). The lack of production evidence makes it necessary to consider other criteria, such as standardisation and diversity.

Standardisation

The repeated techniques found in C Sondage are suggestive of standardisation, more specifically mechanical standardisation (Costin 2001: 302), of forming techniques and learning patterns that reflect different production strategies (Costin and Hagstrum 1995: 622). Rice (1991: 257-9) is, however, unsure whether this necessarily indicates craft specialisation. Furthermore, Arnold (2000: 333-375) is doubtful that standardisation of paste can identify specialisation. Longacre (1999: 44-53) argues that standardisation as a by-product of specialisation is indicative of experience and skill, arguing that older potters are more adept at producing standard pots. His work, it should be noted, focused on metric rather than technical skill attributes. Also, using metric traits to study standardisation is problematic due to difficulties in setting the parameters of variation (Rice 1991: 271). Furthermore, Roux (2003: 768-782) found that the rate of production can affect the degree of standardisation. Even among specialist potters there is significant variation caused by several factors, including age and demand for ceramics (London 1991: 200-1). Hagstrum (1985: 65-75) used brush strokes and design elements to assess the degree of standardisation of decorative features and argued that it can indicate specialisation, but Blinman (1988) argued that fast stylistic change makes tracing standardisation impossible, certainly with decorative attributes. This is plausible, but when dealing with forming methodologies which are known to be conservative and slow to change, one cannot be so dismissive.

In the assemblages studied in this thesis there is what could be classified as a standardised set of attachment types. Spatially there is a wide range that does not suggest standardisation, but when considered temporally it demonstrates a standardisation of attachment types throughout the life of the site. This alone, however, is not a sufficient criterion to suggest specialisation. Other aspects of the assemblage, such as firing and decoration, which all demonstrate a high level of skill, have as much variation as they do standardisation. Finally, as petrographic work not as yet been undertaken, one cannot say where patterns of standardisation exist or whether it found in other attributes of the ceramics. It seems that standardisation, while hinting at specialisation, is insufficient to identify it. Its benefit, rather, is that it can help to identify the number of producers or production units, regardless of their size (Costin 1991: 36).

312-3) work and Mee's (2001: 03) estimation of the size of Kouphovouno at its largest; 4 hectares, gives a population range of 400-1200 people at the site. Basing a calculation on this population range and estimating 6 (groupings) to 12 (motor traditions) potters, it suggests a ratio of one potter per 33-200 persons, or using Whitelaw's criteria (2001: 68) and Kouphovouno's size of 4ha, could indicate up to 8 specialist potters at Kouphovouno, which works out at 1 potter per 50-150 persons. These estimates vary considerably and there are too many variables (see Costin 2001: 281, 291) for such estimates to be reliable, but they do give a sense of how many potters may have been at Kouphovouno. Costin and Hagstrum (1995: 623) note that with full-time potters there is less need for a large number of them as opposed to part-time potters. However, when one considers the seasonality of pottery production in the Mediterranean region (Annis 1985: 243; Arnold 1985; Whitelaw 2001: 68), it is plausible that this restriction on the time when potting could be done may have caused an increase in the number of potters.

The existence of specialists is hard to determine, the absence of production evidence or installations cannot be taken as denying their existence. Skill and accrued knowledge do not indicate specialists. Other criteria, such as standardisation and diversity of attachment styles are problematic. The criteria proposed by Costin (2000: 378) can be used in some cases to identify sub-sets of producers and therefore, specialists, but while estimating production output may be fraught with difficulties, the evidence from Kouphovouno does indicate generations of producers. Whether the number of producers is sufficient to 'service' a community the size of Kouphovouno is difficult to estimate.

7.5.4 Household Industry

Household industry, described by Balfet (1962: 163-4) and van der Leeuw (1976) and elaborated on by Peacock (1982: 8), does present a more acceptable model for production strategies. Household industry is usually performed by women who are semi-professional and potting for profit, often as a supplement for household subsistence (Balfet 1962: 163). As this type of potting is part-time and scheduled due to climatic constraints, seasonal demand for objects and/or labour (Costin 2001: 280), the technology used tends not to be complex. The lack of production installations equates well with this model, as like domestic production these installations tend to be informal and production activity is sporadic. Likewise debris, although scarce, tends to be mixed with domestic waste. The problems associated with estimating rates of production (See Chapter 7.2.2) would still apply; nevertheless, the rate of production would

be higher than that for domestic production as production units of this type will produce more than they need themselves.

In the household industry model, pottery is intended for use within and beyond the immediate production unit (Rice 1987: 184). A result of this would be a wide distribution of motor skills across a settlement and range of attachments in the same contexts, similar to that at Kouphovouno, while this also could also be explained by communal dumping, there is nothing to suggest that both could have caused the deposition pattern of attachment types found at Kouphovouno. Household industry has elements of the general model for specialists proposed by Costin (2000: 378); that of a sub-set group of producers manufacturing goods for a larger group of consumers. The range of motor traditions would potentially allow for several potters to be in existence at the same time. Nevertheless, the problem of whether the number of motor traditions is indicative of the number of production units and if this is sufficient to produce enough pottery for Kouphovouno remains difficult to address. Household industry also would allow for the scheduling of agricultural activities around ceramic production, and although high skill levels and proficiency of technique do not necessarily indicate specialisation, competition between production units in household production strategies could account for the high-skill level evident in the completed ceramics.

Judging from the available evidence, household industry provides the best fit as a production strategy. Although there are problems with direct evidence for this production strategy, it accounts best for the available indicators. It could account for the lack of production installations as they tend to be informal, and wasters tend to be mixed with domestic refuse. It explains the distribution of ceramics across Kouphovouno, it allows for a number of motor traditions in existence at the same time and for the high quality of ceramics. Household industry, where potting is in the hands of women, using simple technology as a supplementary activity organised around other scheduled subsistence and household activities, accounts best for the evidence at hand for production strategies.

7.6 Decoration, Attachment Types and Potters Marks/Signatures

A link between decorative syntax and attachment types could prove informative about the nature of the relationships of forming techniques or motor traditions to visible decorative repertoires. If there is a co-relationship between technical styles evident as ceramics are being formed and decorative styles, this could give much more of an insight into how social interaction is played out. Furthermore, a demonstrable link between visible decoration and forming techniques could possibly help to identify individual potter's signatures, should they exist. Potters marks allow for the identification of specific pottery attributed to a particular individual or workshop by leaving deliberate decorative characteristics or sometimes fabrication characteristics on pottery that mark them out from other similar pots and can be a conscious expression of individual identity (Rice 1987: 182-3). Vitelli noted the possibility of potters marks, both painted (2007: 98, 100) and plastic/applied (2007: 57, 97), on some complete vessels from Lerna. The sections below explore both painted and plastic decoration to see if there is a link between decoration and attachments and what these potential relationships may signify.

7.6.1 Painted Decoration and Attachment Types

For painted decoration this study was problematic; the nature of the breaks on incomplete pedestal bowls meant that rarely was there any decoration associated with a pedestal base. They tended to be painted in monochrome and, on some occasions, the undersides were also painted. There were instances where some of the bowl was attached but no full motifs were extant. This type of analysis on pedestal bowls needs to be undertaken on examples which preserve as much of the decorative syntax as possible. The problem with this is that it means that rarely will the attachment type be visible on complete pots.

The decoration of collar neck jars is a different matter to pedestal base bowls. Decoration on collar neck jars is arranged in zones which are easily framed by the contours of the vessel wall between the rim and the shoulder. This provides a useful unit to be examined because in this zone decoration is often repeated and contains small motifs. Unfortunately, no collar jars were complete enough to provide a clear demonstration of attachment type with a complete motif on the body of the vessel. Nevertheless, it was possible to compare the decoration on the vessel's 'neck' with the attachment type (Appendix 12). The sample consisted of: Phase

Grouping 1; 24 examples, Phase Grouping 2; 27 examples, 1019 7 examples and 2016; 24 examples.

Analysis of 82 catalogued examples from Kouphovouno showed that monochrome and diagonal lines were the most common, being present with all attachment types, temporarily and spatially. The only exception is 1019 but the sample size was very small. In some cases decorative motifs were associated with two or three attachment types, such as rim pendants and elongated rim pendants in Phase Grouping 1, as well as scribble burnish and chevrons in Phase Grouping 2. More important are the five decorative motifs which are associated with a single attachment type. Tentatively this does suggest a degree of individualisation of decoration in association with specific attachment types, but in most cases it is indicated by a single example; this study does need a larger data set. Nevertheless, this may have important implications when the use of collar jars is considered. Collar jars have mechanical properties suited to storage, are easily transportable and are an ideal mechanism for sharing of social capital akin to the use of decorated ceramics for serving food (see Chapter 2.5.4). Furthermore, their size and seal-ability would allow the parcelling of produce into smaller manageable portions. It seems plausible that they provided a useful unit for distribution of food with the added bonus of preventing spoilage. The use of ceramics as a mechanism for sharing/distribution of food or competitive feasting would suggest that there was a link between food and the owner/maker of the vessel, which would help associate the food with the ceramics they were served in and perhaps reinforce obligation. The results of the above exercise do hint at the possibility of linking visible attributes with manufacture attributes, although perhaps this link is not consciously intended. This could be an indication of, firstly, the visible expression of identity through decoration and, secondly, an association of the deliberate expression of identity through decoration within unintended signalling of kinship groups through motor traditions of ceramic manufacture.

7.6.2 Plastic Decoration: Potters Marks/Signatures?

Vitelli (1977: 17-31) has argued that plastic decoration on pottery at Lerna may have been, among other things, potters marks, a means of identifying who made the vessel. While this may be possible, their location on the lower sections of vessels, covered in monochrome paint, does limit their visibility, unless of course, to a trained eye of someone who would know where, and what, to look for. A study (Appendix 13) was undertaken to see if motor tradition could be linked to plastic decoration, to test if Vitelli's suggestion could be supported. Finding

a link between attachments and motor traditions would be a clear indication not only of differing potting traditions but also of the intentional signalling of a potter's produce and, perhaps, a clearer indication of production strategies.

The majority of attachment types would not have been visible on completed pots, with the exception of three examples: pedestal base attachment types 11, 12 and 15, being attached in such a way that a trained eye could probably identify them (see Chapter 6.2.2.2). As with pedestal bases, collar jar attachments are not visible on completed pots. Therefore, should potters have wished to indicate their pottery, it would have been necessary to use a different mechanism, such as painted or plastic/applied decoration. As mentioned above (Chapter 7.6.1), painted decoration does, in the case of collar jars, tentatively suggest a relationship between motor skills and decoration. Few suitable examples of plastic/applied decoration were noted at Kouphovouno, but at Lerna there are twelve sherds of pedestal attachments that also bear plastic decoration. There were too few collar jar attachments to conduct a study. Within the twelve pedestal bases examples five attachment types were identified but no clear relationship could be established with the plastic decoration pattern (see Appendix 13). Furthermore, there were numerous examples of pedestal bases and collar jar attachments without any indication of plastic decoration, suggesting that if plastic decoration was indeed a potter's marks then it was not applied to all vessels.

No demonstrable link could be found between plastic decoration and motor traditions. This is not to say that a link does not exist between decoration and forming techniques, but that the analysis of the assemblage undertaken to date does not easily allow such a link to be established; also, this does not necessarily rule out an association between individual potters and plastic decoration although it could equally be transmitted through painted decorative syntax. This study is very limited and the conclusions drawn above must be considered as preliminary. It would benefit from a wider data-set as well as a consideration of other steps in the manufacture process to further refine any link between potting traditions and decoration. Looking for co-relationships between fabric recipes and pedestal attachment types would not be as constrained a study as decorative analysis because it would include pedestal bases, which have a much wider repertoire of attachment types than collar jars. Furthermore, a study of this nature between sites could help to identify links between sites, reaffirming indications of contact but perhaps also of kinship between sites.

7.7 Social Influence on Ceramic Production

Social control over production is difficult to see in Middle Neolithic ceramics. For example, the ubiquity of clay sources and other resources would make control of resources difficult, although there can be a co-relation between clay sources and producers (Costin 2000: 386-7). Nonetheless, pottery during this period is used as a 'social technology', facilitating the exchange of information and the creation or maintenance of social relationships within and between communities (Halstead 1995: 16-19; Hayden 2001: 26, 55-6). The dynamics of Middle Neolithic society, the sharing of food and use of display vessels with an elaborate decorative repertoire, which is perhaps related to a role in competitive feasting and social dialogue, are all suggestive of a large degree of social influence on ceramics. Therefore, while social control might not be direct, through control of resources, for example, it is certain that society had a wider impact on how shapes were conceptualised, formed and used.

7.8 Learning Patterns and Social Boundaries

Two of the previous sections have, firstly, identified the existence of technological choice that cannot be explained by mechanical or environmental constraints in the ceramic assemblage from Kouphovouno and noted similar patterns in the assemblages from other sites (Chapter 7.1). Secondly, it was shown that ceramic production (Chapter 7.2) remains relatively conservative with some localised stylistic traits and appears to have been a semi-specialised household, industrial-based activity. This information has interesting implications for our understanding of Middle Neolithic society in the Peloponnese. Chapter 3.8 outlines the usefulness of technological choice as a tool in archaeology. The close relationship between technical style and learning patterns and their links to social and cultural stimuli situated as unconscious actions, which are a consequence of cultural traditions rather than signals of them, means that technical style and learning patterns are well placed to inform archaeologists on social interplay between people and communities at various levels. Within the framework outlined above, it would be useful to see what it can reveal about social interaction in Middle Neolithic Southern Greece.

7.8.1 *Social Groupings/Boundaries at Middle Neolithic Kouphovouno*

C Sondage and comparative work from other trenches on the site have shown that there is continuity of many different attachments/forming techniques through time and space. It indicates that these methods of attachment/forming techniques went well beyond the personal preferences and lifetimes of individual potters. This, in conjunction with the architectural evidence from C Sondage, allows us to identify what are essentially several generations of motor traditions, which remained in existence at Kouphovouno throughout the Middle Neolithic period. Concurrent with the relative stability of these methods of forming pottery there are subtle changes in the decoration, such as frequencies of particular styles and changes to some decorative motifs.

When learning patterns and motor skills are used as criteria by which social groupings are identified (see Chapter 3.5 & 3.8.2) there are indications of a number of such groupings at Kouphovouno extant over several generations. The context of deposition and the spatial patterning across the site could have been a result of communal dumping, but it may be an indication of widespread interaction and intra-site exchange between social groupings. The archaeological evidence from Kouphovouno does not allow us to identify much spatial distribution of attachment types, although there are some affiliations between space, forming practices and some pedestal bases attachments: Type 9 is limited to C Sondage; Type 11 is exclusive to 2016. Types 10 and 12 are found only in 1019 and 2016 but also at Corinth and Franchthi Cave. The deposition pattern further suggests that there was generally no segregation of individual social groupings at Kouphovouno; instead they seem to have been well dispersed through the community. This could also be explained by the fissioning of 'production units' over generations, giving rise to numerous other groups which are linked to a 'parent' tradition. In this scenario we are no longer looking at the production from a production unit or tradition that consists of a single structure or even a family, but an extended kinship group which maintains links, either consciously or unconsciously, with its 'parent' through ceramic traditions. Although inter-site exchange between sites cannot be ruled out until petrographic work is undertaken, one might plausibly suggest that this indicates newer interactions with other sites, forming different or newer social groupings (Gosselain 1998).

It seems that while several social groupings must have existed at Kouphovouno through the life of the site, there is no clear indication of an association between space and social groupings in the ceramic evidence. Instead what this evidence does tend to indicate is that social groupings were either well dispersed through the community, linked to a parent tradition of forming ceramic shapes, or that there was considerable exchange of ceramics through the community which, considering production strategies were probably organised as household industries, is probably the more likely scenario.

7.8.2 Social Boundaries in a Regional Setting

A key to understanding the regional relationships of Middle Neolithic sites in the Peloponnese is the large geographic distance between settlements. Even those in the Argolid are a considerable distance from each other (Cullen 1985b: 88) and Kouphovouno is about 50 kilometres from either Asea or Ayioryitika. This suggests that any interaction between these sites was purposeful and directed. Nevertheless, Kouphovouno, despite its geographic remoteness, demonstrates a large degree of similarity with other Middle Neolithic sites. There is similarity in the organisation of the site, the continuity of place and indications of communal cooperation (see Chapter 4.3 & 4.5). The similarity of material culture demonstrates that Kouphovouno, despite being geographically remote, was by no means culturally isolated.

On a regional scale there is a lot of commonality between the sites. The existence of similar motor traditions in ceramic manufacture at several sites has been discussed above in detail. This is remarkable considering the distances between many sites, most notably Kouphovouno, which has the largest collection of attachment types but is the most geographically remote. As outlined earlier, learning patterns of ceramic and other technologies tend to be transmitted vertically along lines of kinship and tend to reflect social boundaries. Where these boundaries are set can range from household to regional. Their occurrence across a wide region is suggestive of learning patterns and kinship ties that extend well beyond the immediate settlement. In societies where pot making is limited to females, the distribution of technical styles can be very broad, often on a regional scale (Gosselain 1998: 103). Reasons for this tend to have to do with marriage exchanges. In a society as relatively small as Neolithic communities were, it would not be unexpected that exogamy would have been practiced as a mechanism for increasing a gene pool and possibly for political or social capital as well as a

means of preventing isolation (Cullen 1985b: 96). Also, one cannot rule out abduction as a mechanism for the movement of women (Cullen 1985b: 96).

Cullen's (1985a & b) study was able to establish different zones of interaction between Middle Neolithic sites of which Lerna seemed to be a central node (see Chapter 5.4). Her conclusion was based on the similarities of decorative style found between all the large sites in the Middle Neolithic of the Peloponnese but, as argued before (Chapter 3.6), decorative style as a tool to argue for kinship can be problematic, technical style, on the other hand, because of its reliance on the unconscious memory of motor skills and in general its long term conservatism, can be a lot more reliable. Could this then be an indication of closer kinship connections across the region? Certainly it would appear so, but, when the sparse settlement pattern of the region is considered, it seems that connections between sites might have been an inescapable eventuality. Nevertheless, it is an indication that geographic remoteness did not prevent close social ties and regional interaction between the disparate sites in the Peloponnese during the Middle Neolithic period.

Cullen's (1985a and b) work outlined networks of interaction between sites, noticing a close relationship between Asea, Lerna and Ayioryitika that was mirrored by a similar network between Corinth, Lerna and Franchthi Cave, although she disagreed with Washburn's (1983: 155-6) suggestion that terrain could have been a limiting factor in the distribution. Unfortunately, Cullen's conclusions do not allow for a chronological examination of decorative stylistic interaction, but she is satisfied that the sites were relatively contemporary within a 200-year period (Cullen 1985b: 81). Vitelli (2007: 131), however, suggests that the Middle Neolithic potters at Lerna are operating earlier than those at Franchthi Cave. When the distribution of pedestal bases and collar jars are examined, no clear distribution could be noted (Appendix 10 Tables1 & 2, Appendix 11). There is no evident north-south or other divide. The distribution pattern does not match with Cullen's zones of interaction. It appears that both pedestal base and collar jar attachments were widespread but Lerna, the nexus of Cullen's distribution, has the largest number of attachments outside of Franchthi Cave and Kouphovouno.

Gosselain (1998: 104) warns that we must be careful when we try to make simplistic associations between social groupings, identity and material culture patterns because they can be complicated through population mixing and changes to the contexts of production and

consumption, although changes to either of these are not visible in the Peloponnese during the Middle Neolithic Period. Nevertheless, the lack of co-relation with Cullen's patterns does seem disappointing, on the one hand, but should a similarity of distribution between technological style and decorative style be expected? Gosselain (1998; 2000) and Maceachern (1998) found that the distribution of both tends to differ considerably. Decorative style is more easily influenced and can be manipulated to express social information and so would be expected to have a more localised distribution. Technical style on the other hand, because it is more conservative and not as open to short term influences, reflects a different distribution. It is possible, therefore, during the Middle Neolithic period in the Peloponnese, through the distribution of technical and decorative styles, to see distinct levels of social boundaries and scales of interaction.

Essentially it seems possible to identify three distinct levels of social groupings through technical and decorative styles. Firstly, there seems to be evidence of localised, site-specific styles, based on nuances of forming techniques and decorative preferences with interaction at an intra-site scale. Secondly, decorative styles demonstrate interaction between sites arranged along two distinct axes identified by Cullen (1885a, 1985b). Thirdly, at a regional level mainly across all sites, but in some cases between two sites, distributions of motor patterns are to be found, which seem to be in existence, through successive generations at Kouphovouno. These patterns could be a consequence of the movement of people across a region through exogamy or perhaps raiding and could indicate deeply embedded aspects of kinship and perhaps language (Gosselain 2000: 193). While this has allowed the identification of varying scales of social interaction it has one shortcoming: it does not allow us to understand how such boundaries operated, or how they were structured. We are, therefore, somewhat at a loss to understand local interaction and issues of cultural affiliation but it is something which could benefit from more excavation and a fuller, holistic, multi-technological investigation, which would enable a better grasp of the economic, social and perhaps political interactions that these communities engaged in.

7.9 Conclusions

This thesis has argued that during the initial settlement of Laconia in the Middle Neolithic period there is clear evidence of links to other sites, a continuity of traditions, both of the organisation and use of space and subsistence strategies, even when the factors of population and resource stress did not apply. This suggests that these features were an attribute or perhaps an expression of identity, which in a regionally remote area like Laconia, could possibly have heightened the community at Kouphovouno's wish to express it.

The assemblage from Kouphovouno has given some interesting perspectives on aspects of ceramic manufacture and use in the Middle Neolithic period. The construction of the ceramics is of the same high standard recorded at other sites in the Peloponnese. All aspects of the production sequence demonstrate the skill and adeptness of crafts-persons confident in their craft, such that most deviations and nuances must be considered stylistic traits. Furthermore, motor traditions appear to be stable throughout generations of potters. Available evidence for production strategies is ambiguous, mainly due to the lack of ceramic production installations but, using data from the ceramics; peripatetic potters do not appear to be responsible for production. Despite some indications of spatial patterning at Kouphovouno, household or domestic production is difficult to prove and criteria for specialisation are also problematic. It seems that household industry is the more likely production strategy employed for ceramic production.

Overall in the Peloponnese there is a large degree of regional homogeneity in the construction of ceramics, but within that there is a significant amount of localised variation such that one may speak of localised styles in decoration, attachment types and, in some cases, vessel form. The lack of firing installations and the low numbers of wasters/misfired sherds found on Neolithic sites suggest that ceramic production may have taken place away from the settlement. It was, additionally, noted that ceramic production did not necessarily need kilns as the required temperatures and atmospheres could be achieved in bonfires. Various attempts have been made to develop a formula for the quantification of production and consumption rates of ceramics; unfortunately each attempt seems to be site specific. This is not aided by differing recording strategies, making inter-site comparisons difficult. Also, because we are dealing with discarded pots in most cases, it is probably better to speak about consumption rather than production rates. What these exercises have shown, however, is that, although

absolute numbers may not be meaningful, the benefit of quantitative analysis is that it allows discussion on proportions of shapes and fabric types through time.

The use of Neolithic ceramics is similar at Kouphovouno and other areas in the Peloponnese. In this regard it demonstrates that ceramics were conceptualised in the same way at different sites and further indicates that Kouphovouno was by no means culturally isolated from the rest of the Peloponnese. Evidence for the use of ceramics with heat is remarkably consistent at each site but Kouphovouno has the widest range of evidence. In some cases this could be related to firing but not in all. At Kouphovouno there is some indication of an association between shapes and the type of heat used, suggesting, perhaps, variable practices of food preparation which required application of different rates of heat in different ways. More importantly, at Kouphovouno there is a trend that suggests a slight increase in the use of heat on ceramics alongside a rise in Vitelli's (1993: 213-4) cooking ware. Even highly decorated bowls have been exposed to heat, although this is limited to Kouphovouno. This could indicate different practices in how heat is applied to ceramics and/or variation in the amount of heat applied to them when they were used. More importantly, it shows that despite the existence of a ware that was designed for exposure to heat, had features to maximise the effects of heat and resist thermal stress, there was a continuance of exposure of vessels which did not have these features.

All the above evidence combines to indicate not only the possibility of a variety of food preparation strategies but also of an increasing use of ceramics with heat. Other evidence, such as pitting, is consistent across all sites with respect to the location of the pitting and in the shapes it is found on, indicating a region-wide consensus on aspects of the fabrication of the vessels used and how material/food was processed in them. The open display shapes, with their highly visible decoration, certainly tend to indicate that Kouphovouno was governed by the same practices of food sharing, perhaps a social obligation, as at other sites in Middle Neolithic Greece. Finally, there is evidence that re-use of sherds was practised widely across the Peloponnese for a range of purposes, from practical tools to personal decoration. Yet even here there are indications of variability and some indications of localised practises or preferences.

This thesis has shown the usefulness of the concepts of technological choice and technical style as archaeological tools, using them to identify social boundaries, networks of interaction and un-intentioned social signals. At Kouphovouno, it has identified several possible contemporary ceramic forming traditions in existence at the same time, while there are indications of subtle temporal decorative changes in the same assemblages and of a spatial relationship between technical and decorative styles. Furthermore, with collar jars there seems to be a relationship between forming techniques and visible decoration. This may be an indication that the use of ceramics as vehicles for the transfer of food may be linked to social capital, which may be related to kinship.

Through the use of technical style it has been possible to place Kouphovouno in a regional setting. There is strong evidence for contact between Middle Neolithic sites, whilst, at the same time, there are some localised styles of pottery manufacture as well as some evidence of decorative development. Due to the processes of transmission of knowledge and learning patterns, which tend to be organised along social boundaries, it has been possible to identify at least three different levels of social interaction through technical style operating at a site scale and localised inter-site and broader regional scales. The evidence of interaction between different sites seems to indicate that this contact was not purely for exchange or in any way fortuitous. The distances between these sites suggest instead that it was a lot more directed and purposeful. The similarity in technical styles at different sites seems to indicate that interaction was organised at a household level, that households had bonds that extended beyond each individual site, leading to regional social networks through the practice of exogamy. This could indicate the existence of familial bonds which extended beyond each individual site, leading to regional social networks providing a mechanism by which social storage, reciprocity and risk spreading strategies could have been ordered throughout the region. It suggests that social storage might have been organised along social boundaries; in other words, that the transfer of food between communities may have been between kinship groupings that have elements at different sites and that through the use of technical style one is clearly able to see how bonds can be formed across a region, without the active or purposeful transmission of information.

The analysis of the ceramics from C Sondage at Kouphovouno, together with comparative data from other trenches at Kouphovouno and beyond, has demonstrated the widespread regional homogeneity of Middle Neolithic pottery, both in its fabrication, function and relationship with society as a whole. It has revealed through the use of technological style the existence of several motor and forming traditions of ceramic production at several sites. It has highlighted delicate nuances of localised decorative and technical style. It has shown that Kouphovouno was well integrated with the other sites in the Peloponnese, linked by social bonds and perhaps kinship. It has shown that, although a remote site removed from the 'hub' of interaction of Middle Neolithic sites in the northern Peloponnese, Kouphovouno was by no means culturally isolated. It is plausible that interaction between these sites was facilitated by processes, such as exogamy, which could have been central to subsistence or perhaps alliance strategies.

The work undertaken here is a starting point and the results must be seen as preliminary, an initial examination of technological choice and technical styles in Neolithic ceramic technology. Much more needs to be done on other aspects of ceramic production and consumption to fully understand the process of the transmission of skills and influences on technology which can inform on social processes and interaction between people and sites as well as production rates and use of ceramics. Future directions for work in these areas are outlined in Chapter 8.

8. BEYOND THE SONDAGE: FUTURE WORK

This section outlines some future work to be undertaken which will complement and refine the conclusions of this thesis. The constraints of time and other unforeseen circumstances have meant that some intended work could not be undertaken on the ceramics at Kouphovouno. This section outlines how ceramic petrographic work can be used in conjunction with chemical analysis to further the conclusions drawn in this thesis regarding provenance, compositional analysis, ceramic technology and social processes. It also outlines how further quantification work can be conducted to gain a fuller understanding of the proportions of shapes in the assemblage. A study of other technologies would complement this work by providing data on the organisation of other networks of interaction. The scope of technological studies should be extended not only to other technologies but to other regions, notably Central Greece considering the similarities between the regions on many scales. Finally, analysis of technological choice goes hand in hand with analysis of technological change through time. The processes of that change both at Kouphovouno and in the Peloponnese is a crucial area to be studied.

8.1 Introduction

In this thesis it has been attempted to identify the range of technological choice in the ceramic assemblage from Kouphovouno. It is necessary to flesh out this study and to use scientific analysis to give a full account of ceramic ecology from the Middle Neolithic deposits at Kouphovouno which will further refine understanding of potting traditions. This chapter outlines future work that could be undertaken and other avenues that have emerged as a result of the analysis undertaken here that could complement this work.

The basis for this thesis was a sample of the Middle Neolithic pottery from Kouphovouno. Extending the analysis to the entire pottery assemblage recovered from the excavation and the material from the 1999 survey (Cavanagh *et al.* 2000), would allow further statistical refinement of the conclusions in this thesis and considerably increase our understanding of the spatial distribution of technical styles at Kouphovouno. Furthermore, the Area G Sondage did

not reach the bottom of the archaeological deposits. Geological cores taken in the area suggest that there is potentially another 2 m of anthropogenic material as yet unexcavated. The sequence of pottery analysed thus far indicates that it is later Middle Neolithic material (Mee Pers. Comm.). The, as yet, unexcavated material therefore, would be useful to tie the ceramic series in the C and G Sondages together more tightly. This would provide some overlap in the sequencing and would give a ceramic chronology from the Middle Neolithic through transitional phases into the Late Neolithic period at Kouphovouno, which is crucial to understanding the development of the Neolithic in Laconia.

8.2 Further Work: Ceramic Petrography, Chemical Analysis, Re-Firing, SEM & X-Radiography

The application of archaeological scientific approaches used in the study of ceramic ecology could expand the scope of this thesis by clarifying some ambiguities which have arisen during the analysis already undertaken in this thesis, by refining the identification of choice even further, and by refining the identified motor traditions in pottery production. Furthermore, it would provide a greater understanding of raw materials, ceramic paste preparation, and firing practices in Middle Neolithic society in the Peloponnese.

X-Radiography: Resolving Ambiguities

As explained in Chapter 5.3.3, the identification of some attachment types (e.g. Pedestal Bowl Attachment Type 8 and Collar Jar Attachment Type 4) is difficult and eroded sherds can make identification of any attachment type difficult. Furthermore, as discussed in Chapter 6.6, variation was noted in the forming and attachment techniques of other ceramic shapes, such as lugs and handles. Not all of these are visible to the naked eye. X-radiography could help to clear up these ambiguities (Berg 2009: 137-46; Tite 2008: 218). X-radiography could allow analysis of these attachments that are still attached to vessels, helping to further increase our understanding of the location of choice in forming techniques. It would also facilitate the examination of fine wares for forming techniques, where the outward evidence has been obliterated (Berg 2009: 138-9, Rice 1987: 403-4). Finally, as discussed in Chapter 7.6.1, attempts to understand the relationship between decorative syntax and attachment types are greatly hampered due to the need for complete fields of decoration and visible attachment types. The nature of the ceramic assemblages studied in this thesis means that, while

attachment types are visible, sufficient decoration is not. X-radiography would permit analysis of complete or almost complete vessels to determine if a relationship exists between decoration and motor traditions in Middle Neolithic potting communities.

Petrography, Chemical and Residue Analysis

Further analysis is mandatory for a holistic understanding of pottery traditions targeting aspects of raw material selection, fabric preparation, forming techniques, firing practises and surface treatments and for the examination of co-relations between them. Such a study should not be limited to the ceramics from Kouphovouno.

Preliminary macroscopic work already undertaken on the ceramics from Kouphovouno indicates that the assemblage is comprised of fabrics that incorporate local minerals in varying quantities and mixed with different ratios of clay and sand (Whitbread in Whitley *et al.* 2007 26-27). This nascent conclusion needs to be confirmed. Furthermore, fabric recipes need to be more robustly categorised and ceramic preparation practises need to be understood to refine choices and potting traditions (Arnold 2000: 369-70). Petrographic work, in conjunction with a good understanding of the local geology and the use of a suitable technique for chemical analysis (see below) will make a significant contribution to this question. It can also inform on cultural practices and preferences (Stark 2000: 324-5), identify recipes with particular technological features related to function (Sillar and Tite 2000: 05; Tite & Kilikoglou 2002: 1-2), recognise potential improvements to the workability of clays (Hoard *et al.* 1995: 823-32) and even examine how ceramics can be manipulated to make them water tight (Kiriatzi in press; Vitelli 1993a: 204 n16).

The data for fabric composition gained from petrographic analysis can be complemented by trace element analysis, which is particularly useful in the search for provenance, particularly in areas of geological homogeneity. In studies of prehistoric pottery from the Peloponnese, Neutron Activation Analysis (Jones 1986; Marketou *et al.* 2006: 1-56) has mostly been used for this purpose, but other techniques have also been successfully applied such as X-Ray Fluorescence (XRF) (e.g. Jones *et al.* 1986) and Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) (Ponting & Karantzali 2001: 105-107). Each technique has its advantages and disadvantages (Tsokakidou and Kilikoglou 2002: 566-572) but it should be noted that NAA has been used on Late Bronze Age to Hellenistic ceramics from Laconia (Jones *et al.* 1986: 208-213) and more broadly in the Peloponnese for Middle Neolithic

material (Cullen 1985a & b). The use of NAA may, therefore, be preferable in order to accomplish better comparability with these previous studies.

The analysis undertaken in Chapters 5.3.4, 6.2.5 and 6.6.7 demonstrated that a broad range of firing practices were in use during the Middle Neolithic. Re-firing of sherds allows for an estimation of the range of atmospheres and temperatures at which the sherds were initially fired. More accurate categorisation of firing temperatures, forming techniques, porosity and in some cases, atmospheres can be achieved by using Scanning Electron Microscopy (SEM), examining the degree of structural changes to minerals in the fabric matrix (Barclay 2001: 26; Tite *et al.* 1982: 109-112; Whitbread 2001: 455-6). This may give a clearer picture of whether firing took place in a kiln or bonfire.

There are hints at a link between forming practises and decoration (Chapter 7.6), but this analysis was limited in some places by a lack of data. The use of a comprehensive analytical programme in tandem with decorative analysis would provide a wider data set and could facilitate more detailed analysis of the relationship between other aspects of the formation process and the more visible decoration, thereby providing a more complete account of potting traditions. This would generate a keener insight into possible relationships between technical styles and decorative styles, also. These potting traditions, as outlined in Chapter 7.6, could contain valuable information on the nature of interaction between Middle Neolithic communities, not only with regard to the movement of people with potter skills, but also on social discourse and subsistence practices.

Chapters 5.7, 6.4 and 6.6.9 described a number of sherds which had evidence of use wear, often in the form of carbonised remains, but also, such as pitting. This evidence is in need of clarification and refinement and holds potential, particularly in the case of those sherds which display a variety of evidence for different types of heat (Chapter 5.7.1), to determine if firing practices are related to particular foods. Residue analysis using Gas Chromatography has been undertaken on Neolithic pottery (Decavallas 2007; Urem-Kotsou *et al.* 2002: 109-118; Urem-Kotsou and Kotsakis 2007: 225-46) and Gas Chromatography in combination with Mass Spectrometry has been used to analyze Early Bronze Age cooking vessels (Roumpou *et al.*: 2007: 158-172). However, given that the sherds have been washed in water (but thankfully not acid), it is probably questionable whether any satisfactory results would be found. A study of this type would probably require the excavation of new material from Kouphovouno.

8.3 Estimated Vessel Equivalents

Section 5.6.1 discusses in detail problems with assessing production rates for ceramics using weight and sherd counts. The results of such efforts however, allow for some degree of relative comparability across a site and, in some cases, between sites. The results are also informative for broad general trends of production or, probably more correctly, discard. Despite these setbacks the benefits for developing a method of analysing production or consumption patterns is a worthwhile and informative avenue of research. However, the need to overcome a range of variables, that can affect archaeological assemblages as outlined in Chapter 5.6.1 means that devising an appropriate method could be difficult. An examination of the maximum and minimum number of vessels, such as that attempted by Tomkins (2001: 254-9) at Knossos, holds some promise. Estimated vessel equivalents, a process developed by Orton (Orton *et al.* 1993: 169-73) give the proportions of individual vessels in assemblages based on the percentage of each vessel represented by every rim sherd. This method is very time consuming and subject to the vagaries of discard or breakage. It must, therefore, be used with caution, but nonetheless, would be a useful and informative exercise. Having an indication of the proportions of each shape relative to each other would provide insights into preferences and relative proportion for particular shapes whether for storage, consumption or display, i.e. for utilitarian purposes or reasons of prestige. A basic attempt was conducted (see Chapter 5.2.3) that returned useful data on ratios of shapes and trends in ceramic production and consumption but this was conducted only on very diagnostic sherds. Rims were not measured, fabrics were not considered and there was no assessment of body sherds.

8.4 Other Neolithic Technologies.

As technologies are transferred through learning mechanisms they become mediums for the spread of cultural traditions and regional social networks (see Chapter 3.8.2-3). This provides a valuable framework for identifying long term regional links, where the connection is deeply and unconsciously embedded within society. The study of technological choice should not be restricted to one craft alone if one is to understand the dynamics of the relationship between different technologies. By examining one of these crafts we may be limiting ourselves to studying social relationships at one scale, although many can co-exist at the same time, may be patterned at different scales and reflected in crafts in different ways (Costin 2000: 398-9;

Hitchcock and Bartram 1998: 47-8). Unpacking the various relationships presents a difficult task for archaeologists but a potentially rewarding one.

Technologies do not exist in isolation. There is always interaction between existing skills, even when using different materials, within the same society and choices and are usually informed or affected by these other crafts (Sillar and Tite 2000: 10-11). The production sequences of some crafts can work in tandem with others and consequently affect aspects of each other, for example in the sourcing of resources (Sillar 2000: 43-61) or the scheduling of tasks (Arnold 1985: 99-109). An understanding of other technologies and cultural backgrounds is necessary not only to locate where technological choice is situated but also to understand how craftspeople interact with other aspects of society and skills beyond their own craft (Sillar 2000: 43-60).

Ceramic production is not the only technology that uses motor skills. Lithic technology, although organised differently to ceramics (Karimali 2005: 108-214; Perlès 1992: 116; Perlès and Vitelli 1999: 96-107; see also Andreasen, Bekiaris and Metaxas in Stratouli: in press), requires a range of necessary motor skills (Karimali 2005: 189; Perlès 2001: 201-10), as do bone and shell working (Perlès 2001: 221-6). Domestic architecture in Neolithic Greece demonstrates a great deal of freedom both in materials and domestic style (Halstead 2006: 13). It has been suggested that the construction of houses and their use of space can demonstrate technological style (Stark *et al.* 1998: 216-7).

The methods by which motor skills are transmitted in these technologies (apprenticeship, instruction, observation and imitation) are the same as those for ceramic technology. One could assume, therefore, that they are socially embedded and can be organised along the same lines as language or kinship and so could be arranged along similar regional networks. However, despite the similarities in the method of transmission of skills, lithic production and distribution is organised very differently to ceramic production (see Chapter 2.4.2). For example, ceramic technology was organised at a household industrial scale level (see Chapter 7.5.4) and the technology probably moved through exogamy (Cullen 1985b: 94-7), whereas lithic technology has been argued to move through itinerant skilled specialists (Perlès 2001: 201). Examining the different networks along which technological skills are transferred could prove fruitful by helping to identify different networks of interaction between sites. It might also be instructive to contrast this with the modes of exchange of other goods, such as

spondylus and andesite, which indicate a differing type of interaction framework. If it is possible to demonstrate that there are different scales of interaction between sites identifiable through technological styles and exchange, it would allow us to assess the degree of interaction and movement of people and to contrast the spread of differing technologies between settlements. In later periods it could also play a beneficial role in tracing settlement expansion in the Peloponnese, perhaps allowing the identification of 'parent' and subsidiary sites.

8.5 Beyond the Peloponnese: Central Greece

This thesis has focussed on the Peloponnese but has drawn largely on our knowledge of the Neolithic of Central and Northern Greece. Admittedly, any study, because of time constraints, must have some degree of an imposed and, at times, artificial limit and this can give a skewed picture. Considering the similarities between the regions both in settlement layout and material culture, an obvious area of research to pursue is to understand how closely the Peloponnese and Central Greece were connected. Sites like Corinth and Lerna are geographically as close to sites in Central Greece, like Orchomenos and Chareonea, as they are to Asea or Kouphovouno. The similarities between these areas have already been noted. The phrase 'Urfirnis Ware' was first coined by Kunze (1931) relating to pottery from Orchomenos. Washburn (1983: 151-157) noted that there were similarities in ceramic decorative style between Southern Greece, Central Greece and even Northern Greece. Despite the limitation of decorative style as an indicator of the nature of contact between groups of people, which has been outlined throughout this thesis (see Chapter 1.3, 3.6), there is evidently interaction between all regions. This is borne out by the evidence of exchange of andesite, sea shell and obsidian.

A wide scoping examination of technical style in the fabrication of ceramics, as well as an examination of technical style in other technologies, could contribute vastly to our knowledge of scales of interaction between these regions. An examination of this nature could, perhaps, help to understand why settlement patterns in the different regions are so different, even though there is clear evidence of similarities in areas, such as settlement layout, architecture and material culture between Central and Southern Greece.

A study which compliments a study of choice in ceramic production is that of change. By what processes do ceramics change through time? How does ceramic change come about? Is it through innovation (Barnett and Hoopes 1995; Van der Leeuw and Torrence 1989), or is it an evolutionary process (Neff 1992: 141-92)? Pottery manufacture by its very nature is generally a conservative craft (Rice 1984b: 234-5). Nonetheless, it does change, with attributes changing at different rates (Gosselain 2000) and we, as archaeologists, depend on these changes for classifications and studies of fabrication processes. Changes in fabric, form, style and decoration allow archaeologists to make divisions within an assemblage. There has been a tendency to use this to denote cultural differences and movement of people (Miller 1985: 2-3, see also Chapter 3.2) but not to attempt to understand the reasoning for this variability, i.e. essentially how and why it happens. This has been somewhat addressed in recent literature (Lemonnier 1993a; van der Leeuw & Torrence 1989). Just as with choice in ceramic production, change cannot be explained by concentrating on outside stimuli and environmental factors. The reasons driving change must also be considered in tandem with the effects of cultural principles. As already discussed in Chapter 3.1 and 3.7.1, environmental, technological and resource factors only occasionally seem to have an impact on ceramics (Bleed 2001: 154; Gosselain 1998, 2000; Mahias 1993; van der Leeuw 1993: 239). The assemblage at Kouphovouno, which runs from the Middle Neolithic through to the Middle Helladic period, is ideal for a study of this type, especially as G Sondage has produced secure contexts of transitional material (Whitbread in Whitley *et al. 2006*: 24-7).

8.6.1 Setting the Scene: Late Neolithic – Early Helladic Laconia

The Late, Final Neolithic and Early Helladic periods in Southern Greece demonstrate an expansion of settlement across the southern Greek Mainland with greater exploitation of the uplands, caves and islands. In the Peloponnese, however, there seems to be a decline during Early Helladic III (Rutter 2001: 122). On the mainland in particular the Early Helladic period is one of elaboration in architecture, social organisation and hierarchy (Cavanagh *et al.* 2002: 129-33; Mee 2001: 10-12; Rutter 2001: 111-3). There is also evidence of increased and varied trade networks (Cavanagh *et al.* 2002: 134; Rutter 2001: 122). Explanations that have been suggested for this pattern range from socio-economic and environmental factors to changes in subsistence methods (Halstead 1981: 328-9; 1990b: 72-5, 1996b: 22-35; Johnson 1996b: 284-7). Alongside this expansion of settlements in the latter half of the Late and Final Neolithic

period there seems to be a change to a more introspective society. This is reflected in more secluded architecture and more 'sober' ceramics that are extremely well fabricated in the Late Neolithic, with ceramic shapes which are more individualised and utilitarian with local styles and less vibrant decoration (Mee 2007: 210-215; Vitelli 1995: 58). There are indications that some shapes may have been used for rituals (Mee 2007: 213-5).

In the Final Neolithic there is broad stylistic homogeneity but coarse wares predominate, consumption is localised and shapes are designed for bulk storage (Mee 2007: 216). A variety of new shapes appears, suggesting newer ways to prepare food, which seem to be designed with practical necessity in mind and with little interest in embellishment of the pottery (Vitelli 1995: 58). These are substantial changes from the Middle Neolithic where settlements seemed to express collective identity and pottery was indicative of a more socialised environment (see Chapter 2.2, 2.5.4). Early Helladic pottery has a regional style across the Peloponnese. It appears to be quite standardised and well made, leading to suggestions that there was a degree of specialisation in its manufacture (Mee 2007: 217-9; Weincke 2000: 637).

During the Late and Final Neolithic period there is some evidence of increased settlement in Laconia but not much. It tends to be in caves or on poorer soils and marginal land (Cavanagh 2004; Mee 2001: 3-5). In Laconia there is an increase in the number of Early Helladic sites (Cavanagh and Crouwel 2002: 129-33) but no Early Helladic III activity was found in the Laconia Survey. Some, but not all settlements, tend to be smaller in size (less than 1 hectare), suggesting that they are single households or farmsteads (Cavanagh 2002: 129-33). To date no large Early Helladic sites like Lerna or Tiryns have been found in the region. Settlements appear to have been arranged in clusters around larger sites, which Cavanagh *et al.* (2002: 133) have suggested may indicate smaller sites servicing larger ones, also there are larger sites that seem to be isolated across the landscape. This led Mee (2001: 10) to suggest two differing settlement patterns for the region. From the short review above it is clear that there are significant changes in society during the Late Neolithic to Early Helladic Period. There can be no doubt that these changes in settlement patterns mean that population densities and subsistence did have an effect on the ceramics, both in terms of shape and decorative style, as well as the scale and organisation of ceramic production and consumption.

8.6.2 Changes to Society and Ceramics

Settlement and Population

The changes in settlement patterns in Laconia, principally the increase in site numbers, indicate that either there was more production at these sites or exchange between production sites and consumption sites, especially in the areas where settlements seem to be clustered around larger sites (Mee 2001: 8-10). It may also suggest there were two different production strategies. It is tempting to associate increases in the number of sites with an increased population, although the estimated population for the region is quite low (Cavanagh *et al* 2002: 134-5). Despite ceramic production being a relatively conservative craft, there are factors that can cause changes in ceramic production.

Changes in production methodologies can arise from sourcing different clays to finding workable recipes in new geological landscapes, although resources rarely constrain potters and production strategies are usually so adaptable as to be able to overcome any problems that arise (Van der Leeuw 1993: 238-9). Changes in population can affect demand for ceramics. Increased populations can cause increases in demand and therefore, changes in ceramic production strategies (Arnold 1985: 224; Boserup 1981: 05; Rice 1984b: 244-7). Population decreases on the other hand, are often expected to be reflected in ceramics. This is manifested by the greater variability and poorer quality of ceramics but these features seem to be limited to 'finer' wares rather than utilitarian wares (Rice 1984b: 267-72). Population increases could cause ceramic change in the Early Helladic period, affecting the types and amount of vessels produced as well as the production process. This change is not, however, a dramatic revolutionary change. It seems to be an unhurried response over time, which does pose the question of whether ceramics can be used as markers of minute social and cultural change. However, due to the low number of sites in Laconia at this time (Cavanagh 2002: 135), it is doubtful that population changes would have had that much of an impact.

Elites

In terms of social change during the Late Neolithic-Early Helladic period the emergence of social elites has been speculated, as reflected in architecture and burials. With the emergence of an elite there is often the use of ceramics as a mechanism for the display of status (Rice 1984b: 249-59, 275). The emergence of elites could also have affected the organisation of ceramic production and paved the way for specialisation and standardisation of the ceramics. Costin *et al.* (1989) used their study of the Mantaro Valley to investigate how and by whom

changes in ceramic production is initiated. Is it an imposition by a social elite? Is innovation a 'top-down' process initiated by an elite or does it begin with the lower rungs of society from the 'bottom-up'? The rationale that might cause a 'top-down' process is that the elite have the wealth and influence to sponsor innovation or, as Costin *et al* (1989: 107) suggest, to control production thus allowing them social and political influence. A bottom up approach could be driven by necessity or efficiency. The lower echelons of society in an economically hazardous position do not have much room for experimentation or innovation and are hampered by a lack of capital and time because of their own domestic needs (Papousek 1989: 140-66). The examples outlined above from the Mantaro Valley (Costin) and Oaxaca (Papousek) show that social and economic rationales can have varying motivations, not directly related to pottery, but also that they can effect change to ceramics in order to achieve their social and economic goals.

Subsistence and Economy

Rice (1984b: 246) suggested that changes in diet would be reflected by changes in shape and production methods. A link has also been found between ceramic change and consumer group size (Arnold 1985: 224; Boserup 1981: 05; Rice 1984b: 244-72). Ceramics can be used for a range of functions that they were not designed for, although there is some relationship between design and efficiency of function (Miller 1985: 68). Laconia with its changes to settlement patterns, subsistence practices and social structure from the Middle Neolithic to the Early Helladic period provides a rich landscape to conduct such a study. The sites identified and the material recovered by the Laconia Survey (Cavanagh *et al* 2002) and the Laconia Rural Sites Project (Cavanagh *et al.* 2005; Mee and Cavanagh 1998), alongside the ceramics recovered from the survey and excavation at Kouphovouno, provide a wide regional and temporal framework within which a study of changes to ceramic technology and ecology in a landscape can be conducted and which would build on the study of technological choice undertaken in this thesis.

8.7 Concluding Remarks

In summation, the ceramic assemblage from Kouphovouno would benefit from a holistic examination of the many technological facets of pottery manufacture. The use of scientific techniques would address other questions which could not be considered in this study, or

which have arisen as a consequence of the work undertaken in this thesis. These issues, relating mainly to fabric production but relevant to the entire production sequence, will provide a wide and in depth understanding of ceramic ecology and the consumption of Middle Neolithic ceramics from the Peloponnese. The data from such analyses could be used in conjunction with the results of the work undertaken in this thesis to identify relationships between choices throughout all stages of the fabrication process, enabling a more wide ranging characterisation of potting traditions. They would also indicate if ceramic traditions remain consistent at Kouphovouno, while they could also highlight regional preferences that need not be explained by the limitations of local raw materials. Beyond this, a similar approach with a wider data set, regional and temporal, as well as a consideration of other technologies and interaction models, would provide a broader framework for the study of pottery from the early prehistoric period in the Peloponnese.

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