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Intra-Cross-Craft Interaction and Cross-Craft Interaction in the Architectural Domain from the Bronze Age to Archaic Period in Mainland Greece[1]

Abstract

This paper examines the evidence for intra-cross-craft and cross-craft interaction for architectural innovations in mainland Greece from the Early Bronze Age to the Archaic period. Ceramic roofing tiles of the Early Bronze Age, Late Bronze Age, and Archaic period are given particular focus due to their long history in the region and their unmistakable materialisation of both forms of interaction. Following a discussion of this case study, a survey of architectural innovations during the study period is presented. The survey largely confirms the observations about the pace, visibility, and influences on both intra-cross-craft and cross-craft interaction that were noted for the ceramic roofing tiles. It shows that intra-cross-craft interaction never seems to occur without cross-craft interaction, and that the latter was often obscured in the final appearance of the architectural feature; the same is not true for the contributions from non-architectural craftpersons.

Keywords: Greek architecture, architectural innovation, clay building materials, intra-cross-craft interaction, cross-craft interaction, Aegean prehistory, Greek archaeology

Introduction

In most pre-modern societies, non-elite, domestic structures were typically built by the people living in them, often with the help of their kin or community. This was most likely true in mainland Greece in the Bronze and Early Iron Age (Table 1).[2] The typical vernacular structures of these periods were stone-and-mud brick constructions with flat or pitched roofs (Fig. 1).[3] Although rather modest in appearance, such structures required a diverse set of building techniques and materials. Stones were first collected and stacked in a deliberate manner to form the solid wall socles. Next, hundreds of mudbricks were mould-formed, sun-dried, and stacked on the socles. Timber was then collected, shaped, and arranged to create frames for the windows/doors, ceiling, and roof. Only after this were the roofing materials collected, processed, and arranged. To ensure a longer lifespan for the building, lime or mud plaster was prepared and applied to the walls. Finally, any fixed or semi-fixed features, such as clay bins or hearths, were constructed in place.

Of course, many of the tasks were not unique to a particular architectural feature or the architectural domain specifically. For instance, the shaping of timber was necessary for various other architectural elements, as well as outside crafts, such as furniture or wooden tool-making. Thus, typical stone-and-mudbrick vernacular constructions incorporated both cross-craft and intra-cross-craft interaction.[4] Unfortunately, for anyone studying such craft interactions, however, the specific field in

[1] I would like to thank Stephanie Aulsebrook and the University of Warsaw for inviting me to speak and present my paper in this volume. I also thank the Greek Ministry of Culture and the American School of Classical Studies at Athens for facilitating and/or permitting my visits to numerous archaeological sites and collections of ceramic roofing tiles.

[2] Jazwa 2016.

[3] See, among many others, Fagerström 1988; Darcque 2005; Wiersma 2014; Jazwa 2016; 2021.

[4] For definitions and discussion of these terms (along with references), see Aulsebrook's (this volume) introduction to this special issue.

Table 1. The absolute and relative chronology of Mainland Greece during the study period. All dates approximate and BC.

Early Helladic (EH) = Early Bronze Age	
EH I	3100–2650
EH II	2650–2200
EH III	2200–2100
Middle Helladic (MH) = Middle Bronze Age	
MH I–III	2100–1700/1600
Late Helladic (LH) = Late Bronze Age	
LH I	1700/1600–1600/1500
LH II	1600/1500–1410/1390
LH IIIA	1410/1390–1315/1300
LH IIIB	1315/1300–1190
LH IIIC/Submycenaean	1190–1000
Early Iron Age (EIA)	
Protogeometric (PG)	1000–900
Geometric (G)	900–700
Archaic	700–479

which many of these tasks, especially the very basic ones such as the retrieval and stacking of stones in deliberate arrangements, were initially developed is unlikely to ever be ascertained. Similarly, it is impossible to tease apart the precise origins and direction of the interaction among crafts due to the ubiquity and long history of vernacular architecture and its associated activities. More promising contributors to such studies are the numerous innovations and additions to the architectural domain that occurred throughout the Bronze and Early Iron Ages in mainland Greece. For instance, it is much clearer when and where the ceramic tiled roof was invented and developed within mainland Greece.[5] Careful study of this and other architectural innovations can, therefore, reveal how these technologies relied upon, added to, or altered techniques and methods that had already applied to other areas of construction (intra-cross-craft interaction) and/or incorporated techniques from other craft domains of the period (cross-craft interaction).

Although several different architectural features and innovations have been incorporated into one final product (the building), the innovations can be studied individually as additions to vernacular traditions. Not only were the innovations never accompanied immediately by a complete revision of fundamental building techniques and materials, but the building construction never relied entirely upon one or more specialist craftspersons.

Fig. 1. A modern mudbrick structure in Greece that possesses many of the features of the prevailing vernacular methods in the region (photo by K. Jazwa).

[5] Wiencke 2000; Marzolff 2017; Jazwa 2018; 2020.

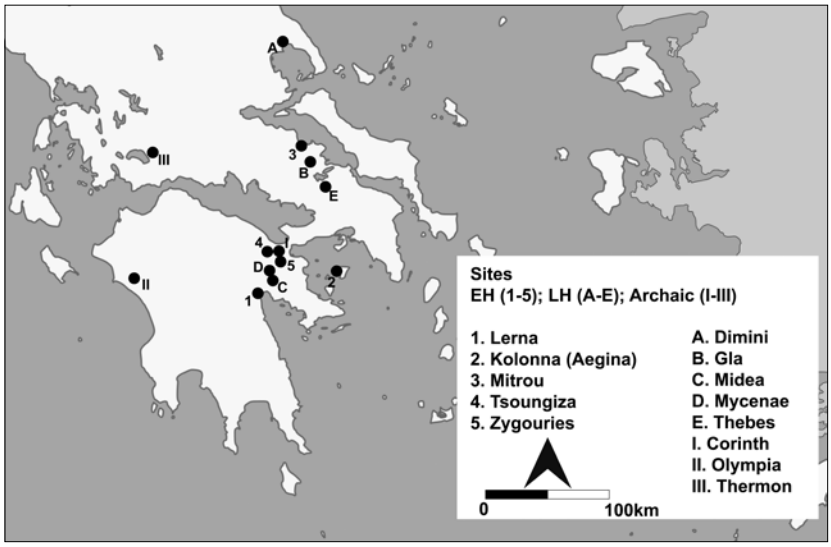

Fig. 2. A map of mainland Greece and location of sites mentioned in the text (compiled by K. Jazwa).

The production of other elements of the building (*e.g.*, stone foundations, mudbrick walls, timber framing) were accessible to and practised by nearly every inhabitant of mainland Greece. This is true even for elite or monumental constructions of these periods. Only with the construction of the Temple of Artemis at Kerkyra in 580 BC, a building made almost entirely of worked stone, does a substantial deviation from the vernacular, such that non-craft specialists were almost entirely unnecessary in its construction, appear in the study area.[6]

In this paper, the variety and pace of intra-cross-craft and cross-craft interaction evident in mainland Greek architecture of the Early Bronze Age to the Archaic period are examined and compared among periods. The invention of ceramic roofing tiles in the Early Helladic (EH), Late Helladic (LH), and Archaic periods is first offered as an illustrative case study. Following this discussion, other architectural innovations/additions from the study period are surveyed and the apparent intra-cross-craft and cross-craft interaction noted. The results attest to the importance of both types of interaction, and demonstrate that they were equally stimulated during periods of increasing socio-political complexity and depressed during others.

Ceramic Roofing Tiles

Ceramic roofing tiles were independently invented in mainland Greece on three separate occasions: the EH period, Mycenaean (LH) period, and the beginning of the Archaic period (Fig. 2).[7] In the first two instances, the technology was widely used for several centuries before being abandoned; only after the third episode of invention did the technology endure. In this section, each episode of roofing tile use is briefly described, and the outside craft and architectural influences are emphasised.

EH Tiled Roofs

EH ceramic roofing tiles are thin, rectilinear slabs of clay *c.* 20–25 x 20–25 x 1–2 cm. They were occasionally accompanied by similarly sized schist roofing tiles. All tile types were arranged in a shingle-like arrangement on the buildings' roofs (Fig. 3).[8] This roofing system appears to have been developed at the end of the EH I period and continued to be constructed during EH II, before it became a casualty of the accompanying sociocultural changes and transition to EH III.[9] The tiles roofed a variety of structures including the period's corridor houses, fortifications, and domestic buildings, but they never became the primary roofing method in mainland Greece nor were they adopted outside the mainland. Instead, vernacular traditions – pitched thatch and/or flat, unfired clay roofs – persisted.[10]

Although EH ceramic roofing tiles appear to have been produced without a single, standard production method, the *chaîne opératoire* of one subgroup, *i.e.* those produced by the mould-and-cut method, has recently

[6] For earlier monumental construction methods, materials, *etc.*, see Barletta 2001.

[7] For an overview, see Winter 1993, 8–10; Sapirstein 2008, 29–78.

[8] Caskey 1954; Wiencke 2000, 197–307; Marzolff 2017; Jazwa 2018; 2020.

[9] Jazwa 2018. For this period of transition, see Caskey 1960; Forsén 1992; Maran 1998; Weiberg, Finné 2013.

[10] Jazwa 2020.

Fig. 3. A schematic representation of typical EH II ceramic roofing and the arrangement of these tiles on the roof (drawing by K. Jazwa).

been reconstructed.[11] This technique is recognised among several assemblages, including Mitrou's, Tsoungiza's, Lerna's, Tiryns's, Kolonna's, and Zygouries's. With this, prepared clay paste was first spread in a long, narrow mould, before individual tiles were cut by making single slices through the narrowest width of the clay pad; these formed tiles were then dried and fired. Such a production process demonstrates clear interaction with other tasks in both the architectural repertoire (mudbrick making) and non-architectural craft traditions (pottery production). Whereas the latter is evident in the preparation of the refined clay paste and expert firing of the tiles, the former is manifest in the use of a mould for the forming. The addition of chopped organic (straw/grass/chaff) temper to the clay paste and the use of a specially prepared production surface covered by a suitable parting agent, such as grass, straw, or sand, are also shared with mudbrick making, along with another architectural feature of the EH period: monumental clay hearths.[12] Consequently, the development of the ceramic roofing tiles reflects an entanglement of multiple influences, including both cross-craft and intra-cross craft interaction.

LH Tiled Roofs

Nearly a millennium after the EH tiled roof technology was abandoned, the LH IIIA inhabitants of mainland Greece again turned to fired clay for roofing some buildings, but this version was considerably different in form. Unlike the EH ceramic tiled roofs, the Mycenaean roofing system required two distinct varieties of ceramic roofing tiles: pan and cover tiles (Fig. 4).[13] The flat pan tiles have walls on two parallel sides (*c.* 4–8 cm) and are slightly longer (*c.* 50 cm) than they are wide (*c.* 40 cm) with the width tapering at one end. The cover tiles are semi-cylindrical, *c.* 45–60 cm long, also with a tapered width. The roof itself was formed with the pan tiles first covering the roof surface such that the wall of one pan tile abutted a wall of another pan tile on either side. The narrower ends of the tiles then slotted into the wider end of the tiles in the row below them. With the pan tiles thusly arranged, cover tiles were placed over the pan tiles' abutting walls.

Unfortunately, the architectural contexts of the Mycenaean roofing tiles are not as well known as in the EH period, because most LH assemblages are rather small in quantity and were from disturbed contexts.[14] While it is true that fragments have mostly been recovered from the period's more substantial settlements, such as Mycenae, Midea, Dimini, Gla, and Thebes, the tiled roof does not appear to have been reserved for the primary palatial or monumental structures at the site. At Thebes, for instance, tiles were found distributed throughout the Kadmeia and associated with a storage shed, among other structures.[15] During this period, the tiled roof appears to have been especially popular in Boeotia and the Argolid. It also managed to survive the initial palatial collapse at the end of LH IIIB, but did not endure to the end of the LH IIIC period.

Like the EH tiles, the published evidence for the Mycenaean tiled roof attests to the influences from outside

[11] Jazwa 2018.

[12] For Bronze Age mudbricks, see: Darcque 2005, 75–78; Devolder, Lorenzon 2019; Lorenzon 2021; for parting agents, see: Sapirstein 2008, 100–102, 269–270, 340; 2009; Jazwa 2018; and for EH hearths, see: Galligan 2013.

[13] Iakovidis 1990; Jazwa 2020; 2021; Aravantinos *et al.* 2020.

[14] There was previously some debate about the proper identification of this material as roofing tiles (for a summary of this debate, see Sapirstein 2008, 29–78). This was largely the result of the small number of fragments found at sites with LH roofing tiles, and the fact that sometimes cover tiles were found without pan tiles and vice versa (Aravantinos *et al.* 2020 count at least 11 sites with both tile types). Recent discoveries at Thebes (Aravantinos *et al.* 2020) and Eleon (Jazwa 2020), however, prove that the ceramics were, indeed, for tiling roofs, due to their abundance, locations of deposition, and weathering marks. With these discoveries, the debate about LH ceramic roofing tiles has largely ceased.

[15] Aravantinos *et al.* 2020.

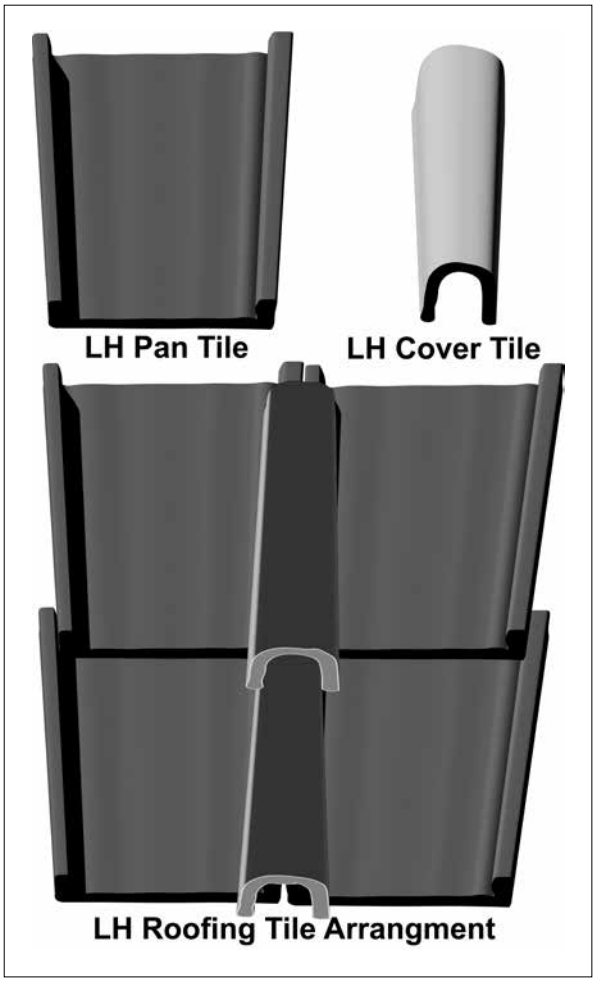

Fig. 4. A schematic representation of typical Mycenaean ceramic roofing and the arrangement of these tiles on the roof (after: Aravantinos *et al.* 2020, fig. 22).

crafts and other aspects of architectural construction. Both the clay paste and firing of the cover tiles, for instance, demonstrate a close affinity with contemporaneous pottery of the period; the manufacture of these tiles also borrowed other pottery techniques, such as the initial forming with clay coils and finishing on the wheel. In these regards, cover tile construction resonates with another form of well-fired architectural ceramics, clay chimneys.[16] This is apparent in both the shape and forming methods, as both required the initial forming of a coil-built tube and wheel finishing. However, the chimney (slightly wider and thicker) remained cylindrical, while individual cover tiles were formed by cutting the cylinder in half lengthwise prior to firing and became narrower towards one end.[17] All the chimneys cited by Pascal Darcque's survey of Mycenaean architecture date to LH IIIB or later, and thus appear to post-date the earliest Mycenaean roof tiles (LH IIIA).[18] Although there has yet to be a thorough study of Mycenaean chimneys, it therefore appears that the direction of influence was from ceramic roofing tiles to the chimneys. In any case, the cover tiles (as well as the chimneys) clearly reflect cross-craft interaction and inter-cross-craft interaction.

Compared to the Mycenaean cover tiles, pan tile production was rooted in more vernacular mud-based architectural constructions than the pottery industry. Mudbrick making, for instance, would have been helpful for any clay pads initially formed with a mould. Additionally, the clay paste used for the pan tiles includes much coarser inclusions, organic temper, and parting agents, just like mudbricks. The clay paste and the forming methods also have analogues in a class of low-fired, prehistoric clay objects: 'utilitarian trays' or 'clay bins'. This type of semi-fixed furniture consisted of a rounded slab of clay, with a wall on at least one side turned upwards.[19] The low firing temperature, handmade appearance, and coarse fabric suggest that these utilitarian trays were probably built by non-specialists. Thus, Mycenaean pan tiles are also the product of both cross-craft and intra-cross-craft interaction.

Archaic Tiled Roofs

Approximately four centuries after the abandonment of the Mycenaean roofing tiles, in the 7th century BC, the tile roofing system was again invented in mainland Greece. This version was initially given to monumental temples, before being deployed on civic structures and domestic buildings.[20] The various ceramic roofing tile systems developed in this period were quite diverse in form, but nearly all feature an arrangement that resembled the Mycenaean system with an appearance (if not use) of distinct pan and cover tiles.[21] This is exemplified in the two earliest-known roofing systems. The seemingly older of the two, the mid-7th century BC roof 1 from Olympia, employed separate pan and angled cover tiles, much like the Mycenaean predecessor (Fig. 5).[22] The Protocorinthian roof from Corinth primarily consisted of 'combination tiles', each of which included a cover tile attached to the pan tile (unlike the Mycenaean system with separate pan and cover tiles) that interlocked with other combination tiles to create a contin-

[16] Shear 1968, 11; Nelson 2001, 66–70; Darcque 2005, 81; Adrimi-Sismani 2014, 169–170, 232–233.
[17] Jazwa 2020; 2021.
[18] Darcque 2005, 81.
[19] Mersereau 2020, 458–466; Jazwa 2022.
[20] For overviews, see Winter 1993; Sapirstein 2016.
[21] Winter 1993; Skoog 1998, 21–44; Sapirstein 2016.
[22] Sapirstein 2016, 41.