

Ethnoarchaeology as a tool for a holistic understanding of mudbrick domestic architecture in ancient Egypt

Etnoarqueología como herramienta para una interpretación holística de la arquitectura doméstica en barro en el antiguo Egipto.

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Abstract

The aim of this article is to offer an overview of doctoral research recently completed (Correas-Amador, 2013) and present a summary of results obtained.

The research focused on an ethnoarchaeological study of ancient Egyptian mudbrick houses, from the Old Kingdom period to the Third Intermediate Period (c. 2575 - 664 BC), using both survey and interview data from modern mudbrick houses in different areas of rural Egypt. A series of key variables were extracted from this study, which were tested on ancient remains and articulated into a rationale for the analysis and interpretation of ancient Egyptian mudbrick houses.

Keywords: Egypt, domestic architecture, mudbrick, ethnoarchaeology.

Resumen:

El objetivo de este artículo es el de ofrecer una visión general de la investigación doctoral finalizada recientemente (Correas-Amador, 2013), así como presentar un resumen de los resultados obtenidos.

La investigación consistió en un estudio etnoarqueológico de la arquitectura doméstica de adobe en el Antiguo Egipto, entre el Reino Antiguo y el Tercer Periodo Intermedio (c. 2575 - 664 a.C.). Dicho estudio se valió tanto del análisis arquitectónico de casas de adobe modernas como de entrevistas a sus ocupantes en diferentes áreas de Egipto. Como resultado, se extrajeron una serie de variables con las que se construyó una metodología para el análisis e interpretación de las casas de adobe en el Antiguo Egipto.

Palabras clave: Egipto, arquitectura doméstica, adobe, etnoarqueología.

RESEARCH BACKGROUND AND RATIONALE

The subject of domestic architecture in ancient Egypt has traditionally received less attention than other topics within this geographical area. The interpretation of houses relied for most of the 20th century on two sites with abundant domestic remains, Amarna and Kahun (el-Lahun) (Fig. 1), as well as on a comparison with artistic depictions of houses, such as tomb representations and clay models. The literature about Amarna is abundant, and systematic excavations have been carried out

since the late 1970s (see Kemp, 1984, 1985, 1986, 1987, 1989, 1995). The unparalleled large amount of information generated by this Middle Egyptian site sparked an interest for the study of ancient Egyptian domestic architecture when it was first published at the turn of the 20th century (Petrie, 1894). Given the large amount of house plans uncovered, Amarna was first believed to contain examples of house plans which represented different stages of the evolution of Egyptian houses across history as a whole (Ricke, 1932). The Standard Amarna Villa (a type of house arranged around a



Figure 1. Location of archaeological sites included in the ancient sample.

central hall) (Lacovara, 1997: 58) became a paradigm of the ideal Egyptian house. Although the chronological plan evolution as described by Ricke has now been discarded, the house type names he coined and the importance he gave to the Standard Amarna Villa endured (see, for example, Bietak, 1996). So did the focus on the study of house plans from a morphological point of view. Consequently, Amarna has continued to play a central part on the general discourse about ancient Egyptian houses (see Janssen, 1983; Tietze 1985 and 1986; Crocker, 1985), partially due to the absence of comparable remains in terms of quantity, variety and state of preservation, partially to the lack of development of alternative interpretative tools.

For long, the only other site offering substantial information about ancient Egyptian houses was Kahun or el-Lahun, situated in the Fayoum Oasis, the best known example of an ancient Egyptian planned settlement to date. The evidence from this site was also used towards a discourse of ancient Egyptian houses, particularly in comparison with Amarna, e.g. Arnold (1989). With the development of systematic excavations in 1970s, supported by the increasing interest in urbanism, other sites in addition to Amarna started providing information, such as Tell el-Daba, where domestic architecture was fundamentally seen as a tool to further understand social and productive urban dynamics. Findings from Tell el-Daba and other sites were progressively

incorporated into the general discourse especially from the 1990s (e.g. Bietak, 1996); yet, Amarna continued to dominate this discourse in what concerned the conceptual understanding of ancient Egyptian houses, determining key topics in the discourse, such as the existence of a central courtyard or hall which played a main role in the house, and social differentiation based on house size.

Kahun and Amarna were inhabited primarily within the Middle and New Kingdom periods (c. 2055-1650 BC and c. 1550-1069 BC, respectively), both with very short-lived occupation. Therefore, the chronological and geographical limitations are obvious when attempting to use them towards an understanding of Pharaonic houses. Moreover, although the settlement studies initiated in the 1970s included a wide range of contextual factors which could influence domestic architecture, these factors were not incorporated as key elements for a broader understanding of domestic architecture; hence the practical ways in which they affected house features, distribution and use of space were not explored.

This means that, overall, previous interpretations systematically neglected context when analysing domestic architecture remains, despite context being a key recognised part of the archaeological record (Hodder and Hutson, 2003: 171).

Perhaps even more strikingly, no studies focused on analysing the relevance and role of the material in defining both the house architecture and its space, even though mud is the common building material regardless of period, location and social differences.

These approaches hindered standardisation, which is likely to have also been made more difficult due to the use of different definitions for architectural features and the lack of a standardised method for describing them.

In contrast to this, this research believes that the study of buildings, as material culture (Tilley *et al* 2006: 1, 4), relies as much on the context as any other cultural production. Consequently, it considers houses as the product of universal human-environment interaction factors, particular contextual factors and material factors, which cannot be understood independently and therefore require a holistic study.

Based on such approach, an ethnoarchaeological study of mudbrick houses was proposed, with the aim of tackling the arguable theoretical and methodological weaknesses of previous interpretations and to overcome the bias caused by the relatively small quantity of houses preserved. This allowed a study of all factors operating in mudbrick houses while facilitating a comparison across sites and periods. The ultimate aim was to provide a series of interpretative tools that could be articulated into a methodology for the study of ancient Egyptian mudbrick houses.

As most aspects related to the act of living in the house are conditioned by material and context, it was appropriate to study these relations in a living environment such as modern Egyptian mudbrick houses, which share the material and certain contextual characteristics (e.g. environment) with ancient Egyptian ones (Fig. 2). In order to further explore environmental aspects as one of the significant contextual factors surrounding mudbrick, three different areas were selected, namely the Nile Delta, the valley and the Dakhleh Oasis. This also allowed for the exploration of factors such as localisms, isolation, etc.

Following a study of modern mudbrick houses in Egypt during the late 19th and across the 20th century, contextual factors were divided into: environmental, sociocultural, community-related and individual-related aspects. The architectural features to be analysed during the ethnoarchaeological study were divided into external and internal, and each one further subdivided into: roofs/ceilings, walls, doors, windows and features/others. With the aim of analysing the influence of context and material on the distribution and use of space, the following main activity areas were identified: storage, animal keeping, cooking, sleeping and social interaction.

The categories developed were then applied to a series of archaeological remains from different periods and areas within Egypt, with the aim of abstracting key concepts for the interpretation of mudbrick houses. These variables were then articulated into an interpretative tool, whose underlying concepts will be presented in this article.

METHODOLOGY

As the driving force from a theoretical point of view was the study of universal interaction factors, context and material, the methods were chosen to adjust to those aims.



Figure 2. A mudbrick house in Kom Surad (Lower Egypt) (photograph by author).

The study sought to utilise the knowledge regarding contextual factors and material properties towards a comprehensive understanding of modern mudbrick houses in each one of the chosen areas. This knowledge was to be obtained from the analysis of the impact of the particular contextual and material relations in architectural features, distribution and use of space in modern houses. This information was obtained through individual fieldwork as well as from a small number of published and unpublished sources (Castel, 1984; Hivernel, 1996; Henein, 1988; Schijns, 2008; Simpson, 2008; de Filippi, 2006; Lozach, 1930; Hug, 1930; Eigner, 1984; Hassan Fathy's personal collection (RBSCL-AUC)). During individual fieldwork, architectural surveys and observation, photographic recording, and interviews with house owners and builders were carried out.

The information that was collected about architectural features was divided according to the categories previously mentioned. For each feature, the materials generally used and the variations found were described. This process of data analysis was repeated for each one of the three areas (Lower Egypt, Upper Egypt and Dakhleh Oasis) in order to facilitate summarising

and comparison between areas. Once each one of the three areas was described, the information was synthesised and presented as a comparative summary between areas featuring each one of the external and internal features previously mentioned.

The synthesis of data related to distribution and use of space was carried out through the identification of the main activities which were commonly found across the sample and through the literature examined; these were: storage, animal areas, cooking, sleeping, social interaction and others; the first three being areas of particular archaeological relevance. These activity areas were described for each of the three geographical areas, Lower Egypt, Upper Egypt and Dakhleh Oasis. After, the similarities and differences between the three areas for each type of activity were synthesised, focusing on roofing, access and room position. This was done in order to identify possible areas subject to having held another storey above, as well as isolating potential associations between rooms, what could potentially be of archaeological relevance.

The interviews were processed comparatively with those of other locations and used to comple-

ment the information obtained through observations and surveys. The analysis of the surveys was made through the production of sections and plans (AutoCad drawings).

Following the analysis and interpretation of data from modern mudbrick houses, the same method was applied to a series of archaeological house remains.

The main criterion for the selection of archaeological sites was offering a varied sample, both

from a chronological and geographical point of view (to allow for the exploration of environment as a contextual factor). This meant that sites were chosen from the Old Kingdom (2686-2160 BC) to the Third Intermediate Period (1069-664 BC); it also meant that a conscious effort was made to choose sites with different environmental conditions where possible (Nile Delta or valley). With all those considerations in mind, a table of sites was produced (Fig. 3; see Fig. 1 for sites' location).

Site	Period	Area	Phase/level	Dynasty	Houses
Giza	Old Kingdom	Kentikarers Town (KKT)		4th	Houses A-K
Kahun	Middle Kingdom	Western town - workmen's houses		12th-13th	All (general descriptions)
		N wall: 5 large properties			All (general descriptions)
Elephantine	Middle Kingdom	South city of Chnum temple	XVb	Late 11th	H25b
		South city of Chnum temple	XVa	Early 12th	H25a
		North City	XIV	12th	H86
		South city of Chnum temple	XIII	12th	H20, H12
Lisht	Middle Kingdom/Second Intermediate Period	North - Cemetery	Ila	13th	A.11, A.13
Tell el-Daba	Middle Kingdom	f/i	stratum e	Early 12th Late 13th	V20: 5, 6, 7, 8
Tell el-Daba	Second Intermediate Period	A/V	stratum E/1, O/1, O/2	15th	032-33,056-59,056-60,081-083,092-093,173-176
Deir el-Ballas	Late Second Intermediate Period	Houses by North Palace		Late 19th	House E
Memphis	New Kingdom	Kom Rabia RAT	level IV	Early NK	rooms 7/23, 8/22, 15/16, 2/17/14, 19/20/5/26/27, 24/6
			level III	18th	
			level II	19th	
Amarna	New Kingdom	Main city		18th	N 51.4, P 47.6, Q 46.2, O 48.11, P 47.19, O 47.8, M 50.10, N 48.12, N 49.6, Q 47.23, O 49.14, N 50.19, P 46.33
El-Ashmunin	Third Intermediate Period	Site W	level 1b, 2a, 2b, 3	22th-25th	j.10 and k.10
		Site W	levels 1c, 3	22nd, 24th, 25th	j.11 and k.11
Karnak	Third Intermediate Period	East of Amon's temple sacred lake	phase 1	21st	Houses I to VI

Figure 3. Houses included in the ancient sample.

The methodology developed for modern houses was applied to each archaeological site, analysing each group of houses in relation to their context and the material found in them (see Correas-Amador, 2013: tables 4.1 to 4.29). Features were summarised in tables for the purposes of an easy comparison and quick relation between them. Then, a comparative analysis of each feature was made, synthesizing the information from all sites and highlighting the similarities and differences between them.

The distribution of house space within each settlement was organised in a series of tables to allow for a comparison of size and shape in relation to the estimate residential area, environmental considerations, social considerations, planned vs. organic settlements (community circumstances) as well as chronological considerations. To facilitate this comparison, the net room and total areas of all properties were calculated; then the house areas were divided into four categories to facilitate comparison: less than 50m², 50-100m², 100-200m² and over 200m².

The use of space was analysed through the categories used for the modern sample: storage, animal keeping, cooking, sleeping, social interaction and others. Any evidence of these activities found in each site was compiled and the evidence analysed in view of the results of the modern sample.

INTERPRETATIVE TOOL

As a result of this analysis, an interpretative tool was developed with the aim of presenting potential relations between context, architectural features, materials and space in order to provide a new range of interpretative possibilities and to challenge some of the connections assumed by previous interpretations. This tool was, nevertheless, not meant to be deterministic, but rather aimed to offer a range of interpretative possibilities, each one of which might be less or more likely in their application to specific archaeological sites. This interpretative tool, set out in a practical way which allows its use in the field, can be found in Correas-Amador (2013). What follows here, however, is an explanation of the factors identified as a result of the research and included into the interpretation tool, together with the reasons for their inclusion and their correlation with certain architectural features were relevant.

The relations proposed have their basis on the ethnoarchaeological study undertaken. Through the analysis of the modern material, a number of variables were identified which appeared to have an influence on the physical characteristics of mudbrick houses. Some variables had an apparently clear correlation in the archaeological record, while others were not as obvious. Some of them actually had no correlation, though in the cases where other features suggested that a correlation might have existed, those variables were included. If there was no parallel evidence for them, they were excluded.

The tool is formed by three sections:

Section 1 focuses on settlement contextualization, which is deemed to be necessary prior to the analysis of specific houses.

Section 2 is the central element of the tool and provides a method of analysis and interpretation for the most common domestic architectural features found across both modern and ancient samples.

Section 3 suggests elements of comparison between houses of the same and different settlements, following the analysis from Section 2.

Section 1

General factors identified as part of Section 1 refer to settlement aspects which might affect overall house appearance, although specific correlations in architectural features were not necessarily apparent from the archaeological sample. The factors identified were: isolation, balance between central and local powers settlement function, chronology, existence of other settlements and planning.

During the study of the modern sample, it was observed that architecture in the Dakhleh Oasis, a region traditionally isolated geographically, presented certain unique and distinct architectural features and decorations which were not present elsewhere. This made isolation a possible factor for the recurrence of certain features, to be born in mind when analysing houses. Partially associated to this is the issue of the balance between central and local powers, and the effects that this has in local production, which means that it could have also affected architecture. For that reason, it is worth taking into account, where possible, evidence regarding the particular degree of political and cultural independence of different sites within the same period and across time.

Similarly, the function with which the settlement was originally founded is also a factor to be considered when interpreting the domestic architecture found in it. Aside from settlement function and location, chronology is also relevant; it must also be considered whether the settlement was founded prior to, or at the time of, the examples under study, particularly in terms of evaluating the long-term influence of global and local traditions in architecture.

When considering the particular architecture of houses, whether other settlements within the site is of relevance, as this might influence the particular social groups represented within each settlement.

Lastly, although the degree of planning within the settlement, e.g. state orthogonal plan vs. individual development as needed or as possible, usually has an influence on how structures develop, it is also worth pointing out that planned houses are also subject to modifications throughout time, just as organically-developed ones are. In addition, organic and planned development may not be mutually exclusive, e.g. a house built against a city or temple enclosure wall might have organic private walls, while also incorporating part of the enclosure wall.

Section 2

Section 2 attempted to show possible relations between architectural features and their potential function, and a series of variable groups which were identified as a result of the ethnoarchaeological study. Architectural features previously described were assessed in terms of function according to the following categories: structural, decorative, adaptive and practical features, identified throughout the study of modern mudbrick houses. Structural features, such as walls, contribute decisively to the physical integrity of the house. Decorative features are those whose main purpose is ornamental, though they can be an expression of identity in various forms. Adaptive features are those developed to suit the surroundings, such as drainage barriers to stop water from flash floods coming into the house. Lastly, practical features, such as niches to hold oil lamps, respond to specific needs; however, they are not structurally critical.

The series of variable groups considered were the following: environment variables, material

variables, social and cultural variables, community and individual variables, space alterations, activity areas, individual house characteristics and archaeological processes. Each of these groups included a number of sub-factors.

To describe the suggested relations between the features and the different variables, the following links were developed: 'related to', 'subject to', 'modified by', 'encouraged by', 'not encouraged by' and 'enables' (A full description and application of these relations to each architectural feature can be found in Correas-Amador, 2013: 248 and in a scheme form at the back of volume II).

It is worth stressing once again that these relations have been identified, with different strengths of evidence, as factors to take into account when interpreting ancient house remains and that they are not intended to be exclusive.

Environmental variables

The potential variables which could have an effect on the various architectural features were defined as: settlement location, hydrography and flood, climate and land availability.

The study of the modern mudbrick houses during the 20th century suggested that the recurrence of extended or dense houses was partially related to settlement location. This also seemed to be the case in the archaeological sample analysed, where there was a correlation between mound locations and a larger amount of smaller houses (Correas-Amador, 2013: Table 4.26). Generically, the effects of the movements of the Nile, and the annual flood of the Nile have proved to be important across history and have influenced the internal distribution of sites. Specifically, location in relation to the river or the desert also influences the particular soil, sediment or clay used to build the house, consequently influencing brick colour and consistency. Finally, climate is a constant factor affecting housing throughout history, through the action of rain, sunlight and wind, which particularly affect organic architecture.

Lastly, the study of Egyptian modern mudbrick houses across the 20th century also hinted at the influence of land availability on the distribution of the house. The area of land available has, in fact, been suggested in the past as the reason

behind the presence for extended houses in Amarna (Fairman, 1949: 42). Nevertheless, the analysis of the archaeological sample within this research showed that the particular land available on the site might or might not affect the settlement area; yet, the settlement area can potentially affect the distribution and appearance of houses.

Physical variables

The following processes were identified through the study of modern mudbrick houses as modifying the physical characteristics of the house: maintenance/repairs, collapse, recycling, lateral cycling, and secondary use. These variables were abstracted on one hand, from applying artefact processes (David and Kramer, 2001: 93 based on Schiffer, 1976: 27-41) to buildings; on the other hand, there were based on the ethnographic study of processes within organic buildings (see, for example, Van Beek and Van Beek, 2008: 36).

Maintenance is essential in mudbrick houses due to the organic nature of the building material which makes it is easily susceptible to the action of the elements, unless repairs are carried out regularly. For that reason, these processes, documented for modern houses, are most likely to also have occurred in ancient houses. These maintenance processes can be carried out in the short and in the long term. Examples of short-term maintenance are sweeping and general daily cleaning; examples of medium to long-term maintenance include yearly re-plastering of walls and roof repairing. When maintenance is not carried out, certain features such as staircases, roofs and upper storeys, can easily collapse in the medium term if they are not regularly maintained, as was observed in the study of modern mudbrick houses (Fig. 4).

The organic nature of the building material also encourages recycling; a process whereby mud features, such as storage bins, can be repeatedly recycled into other features to suit, for example, seasonal needs. While maintenance takes place, a process of passive recycling might also occur, meaning that loose ele-

ments are incorporated to certain features (McIntosh, 1974 cited in David and Kramer, 2001).

David and Kramer (2001: 93) described 'lateral cycling' as one of the processes that undergone by certain artefacts. This research adopted this concept for the description of a process occurring in mudbrick buildings whereby the feature keeps the same function but is used by a different person; for example, re-used lintels which are present in the archaeological sample.

Through 'secondary use', also originally described for objects by David and Kramer (2001: 93), a feature acquired a purpose other than that for which it was made; an example of this process was seen in the modern sample, where pieces of stone from nearby archaeological sites were often re-used as lintels, steps, etc.



Figure 4. Collapse of upper storey structures due to lack of maintenance (Najrij, Lower Egypt) (photograph by author).

Social and cultural variables

These were defined as internal social variables, external changes, tradition, superstition/religious beliefs, local idiosyncrasy/produce, cultural meanings, class-specific cultural variables and ethnicity.

Social variables related not only to the internal changes that occur within the household, but also to the external changes in the way that the household inhabitants are perceived by the community. Internal changes in the family structure (offspring moving out, children being born, incorporation of extended family) can have a direct effect on house distribution, as shown by Castel (1984). Evidence for such changes in internal family structure is also available for ancient sites, for example in a census in Kahun which showed changes in household members throughout time (Kemp, 2006: 221).

In addition, the perception that other members of the community have of a household influences status, which can reflect on architectural features; any variations on this status are also likely to affect variations in features. For example, Castel (1984: 133) documents the changes in door posi-

tion following the appointment of the owner as mayor of the village.

A fundamental aspect related to vernacular architecture is that of tradition. This factor was particularly highlighted during fieldwork interviews, with building expertise passed on from generation to generation. In addition, certain architectural features might also be potentially reflecting particular local traditions and industries, reflecting idiosyncrasy/produce. For example, in Naqada (Upper Egypt) the famous pottery industry also reflected on the architecture (Fig. 5). Other distinctive characteristics of a place, such as the presence of a particular type of rock, can also result in particular architectural features; this was observed in the case of Elephantine, where red granite was abundant and featured in wall protection plaques not found elsewhere (Von Pilgrim 1996:77).

Other cultural traits, such as superstition and religious beliefs can also determine the presence and, particularly, the position of certain house features. This was seen in the modern sample in the presence of white plates above doors as protection from the evil eye. Similarly, Castel (1984: 133)



Figure 5. Walls built with pots in Naqada (Upper Egypt) (photograph by author)

reported a case in which a door was moved after it was believed to have been affected by the evil eye, causing the death of a young child. We know of the relevance of religious beliefs in the history of ancient Egypt, and have specific examples of their application in a domestic environment, for example, in Deir el-Medina (see Weiss, 2009). Therefore, it is likely that other superstitions/beliefs affecting architectural features might escape us.

Overall, cultural meanings can only be properly understood within the particular culture in which they are created. While some of these meanings might have been decoded through the combined study of ancient Egyptian texts and iconography, those specifically expressed through the domestic architectural need considerable further research. For example, the analysis of the archaeological data sample has suggested that some cultural variables could be exclusive of specific social classes.

Lastly, ethnicity may prompt the use of particular motifs, as was observed in both ancient and modern houses.

Community and individual variables

These were identified as food distribution/supply, financial means, personal preference and occupation.

Community variables essentially refer to the overall organisation of the settlement with regard to, for example, food distribution and supply, which would have affected the presence or characteristics of certain features, most notably, those related to storage; namely, storage bins, pottery and holes in the ground.

The impact of financial factors has sometimes been overrated in archaeology, and some necessary caveats must be added. The analysis of modern mudbrick houses suggested that, in most cases, households presented the same feature, with financial possibilities potentially affecting only the quality and degree of elaboration of the feature; a contrast between presence/absence of features was only seen in the poorest and richest groups.

In addition to this, it is worth highlighting that the study of the modern material has proved that, in the end, the specifics of some architectural features are actually a matter of personal preference (Fig. 6); this could also have been the case in the

ancient houses. Although this is obviously not very helpful for archaeological synthesis, it is a factor that must be considered. The quick distribution changes undertaken even in state-planned settlements are testimony of the importance of personal preference; the extent, for example, to which features related to security are present, also has an element of personal preference.

Lastly, the archaeological sample suggests a possible correlation between certain house features and the work undertaken by the inhabitant of the house, although in certain contexts, for example rural areas, it can be notably difficult to separate occupation from other ordinary household activities.

Space alterations

These were identified as room distribution, access, room use/wear, function/use, gender, public/private areas.

Room distribution can be influenced by a series of variables, such as environmental factors – in as far as distribution influences ventilation – and cultural factors. Changes can therefore respond to changes in these variables; this is also the case for access modifications (by blocking or creating openings), a very common process in mudbrick houses (Fig. 7).

In addition, the type of activities undertaken in a room and the amount of traffic experienced in it can be indicated by certain marks.

One of the most important contributions of the study of space in modern mudbrick houses is the distinction between function and use. It is important to note that, despite the fact that rooms might be originally designed with a certain function, this function usually changes throughout time; not only throughout a long period, but also at different times of the day and the year. A consequence of this is that certain rooms are demoted from their original functions as, for example, bedrooms, and transformed into animal keeping or storage areas.

The distinction by gender or in relation to public and private areas is also an important factor influencing room distribution. However, despite these aspects being often focused upon in house interpretation, it is important to explore to what extent they have a physical correlation; for example, it was noted during the study of the modern material that the place where women and men carried out certain activities was heavily



Figure 6 Decoration on a façade in Kom Surad (Lower Egypt) (photograph by author)



Figure 7. A blocked window in Buto (Lower Egypt) (photograph by author)

influenced by the presence of people who did not belong to the household. When this presence disappeared, activities moved elsewhere; however, this could only be observed through activity analysis and had no physical reflection in the house structure.

Such activity areas were defined, as has been previously mentioned, through the ethnoarchaeological study. There was an emphasis on analysing houses by activity as opposed to by room, although courtyards were singled out given the variety of activities there undertaken – inferred from the modern study – and their relevance in previous archaeological interpretations.

Individual house characteristics

These were identified as orientation, environmental conditions, structure and secondary role.

It seems clear that the location of certain features, for example ovens, and the performance of certain activities, are heavily influenced by house orientation, which has an effect on the areas that are hit by sun and the times of the day when this occurs. This correlation showed in the archaeological sample, at least in some cases. Orientation can therefore have an influence on ventilation and light, which in turn affect general house conditions, such as temperature. Nevertheless, these conditions can be modified by the existence and alterations to various types of openings, as previously seen.

One other factor which would have had an effect on ventilation and temperature would have been the number of floors, an aspect difficult to identify from the archaeological record. In the modern sample, roof terraces were overwhelmingly the most common arrangement for multiple-storey houses. Such arrangement could explain certain characteristics in artistic representations of houses for which archaeological evidence has not survived, as will be explained later.

Lastly, during the analysis of the archaeological remains, it was suggested that houses might be performing a secondary role aside from being a residence, perhaps associated to the job of the inhabitants; however, further research would be needed in order to confirm this respect.

Archaeological variables

In addition to all previous considerations, deposit formation, inconclusive remains and the

action of the elements should be considered when evaluating the reasons for the presence or absence of architectural features.

It seems clear that, given the organic nature of mudbrick houses, their excavation can cause specific problems; for example, the thick layers of deposits created as a result of repetitive maintenance of buildings can be mistaken for a sign of long occupation. Distinguishing between the contents of a room, its fallen roof and any structures located above it is also problematic. Remains can sometimes indistinctively belong to different features; for example, walls can be mistaken for roof and ceiling fragments and vice versa; ceiling beams can also be mistaken for wooden beams used in walls as structural reinforcement – as seen in modern houses – as their original length and diameter are usually badly affected by rot.

These erosion processes can also alter the dimensions of certain features, such as bricks, or even cause their total disappearance in some cases. This process does not only occur in the long term, but also in the medium term, which is why regular maintenance is paramount.

SECTION 3

This section provides a summary of possible factors behind variation within the same settlement and between different settlements (the explanation of these factors is given in section 2).

On the other hand, the previously detailed variables which were deemed to be potentially responsible for differences within the same area were: economic reasons, individual preference, household characteristics (family structure), status of the owner within the community, suitability of the house for main activity and possible secondary roles.

The factors detailed above which were seen as particularly susceptible of causing differences within different areas were: settlement location and climate suitability. The former determines the local materials available, while variations in climate might encourage or discourage the use of certain features. Both factors also have an influence on the extent to which the action of the elements has affected the archaeological remains.

Another factor which can have an effect on the specifics of the local material available is the hydrography and susceptibility to the flood. In

addition, land availability might have an effect on the number of extended or dense houses. Lastly, as has been detailed before, local tradition/idiosyncrasy might result in the presence of particular architectural features, as well as influence their characteristics.

IMPLICATIONS OF THE ETHNOARCHAEOLOGICAL STUDY

Implication for previous sources of interpretation

In addition to archaeological sites, artistic representations of houses – both clay models of houses and representations on tomb walls – have also been used in an attempt to explain house plans and to reconstruct their possible three-dimensional appearance. While the research adopted a skeptical approach to their reliability as a source of information for the interpretation of ancient Egyptian houses, some instances appeared throughout the research in which models and representations appear to be reliable.

Firstly, the floor plan of the granary areas in the Kahun mansions (Bietak, 1996: 32) is consistent with a series of interconnected rooms separated by low walls and accessible from the top, as can be observed in the model of a granary from the tomb of Meketre Metropolitan Museum of Art, 20.3.11).

Secondly, although the archaeological evidence is limited given the relatively low height of most preserved walls, the absence of low level windows in the archaeological record does not contradict depictions of windows in Theban tomb representations of houses which show windows in the upper part of ground floors and in first floors, and none close to the ground (Davies, 1929: 24, 243).

Thirdly, some clay models represent superstructures built on the first floor. Although evidence for these was not available for the archaeological sample researched, the presence of these superstructures corresponds to a roof terrace structure observed in the vast majority of modern houses; moreover, a Theban wall representation (Davies, 1929: 242) of a house with a palisade stretching between two superstructures is consistent with the structure of a roof terrace.

With regard to the archaeological remains at Amarna, it is worth pointing out that many architectural features in the sample are found exclusively in that site, whether it is because of the good degree of preservation within the site, because of the extensive studies undertaken there, or because such architectural features were indeed particular to Amarna. Nevertheless, it is worth pointing out that the diversity of house plans within the Amarna site is manifest, and that the Standard Amarna Villas are only one of multiple architectural solutions available within the site.

Implications for previous studies

As was explained in the first section of this article, ancient Egyptian domestic architecture has been the subject of studies whose main rationale was the comparison and classification of house plans. However, domestic architecture also featured as part of the urban fabric in settlement studies.

Formal studies, which have endured throughout the years (e.g. Ricke, 1932; Tietze, 1985 and 1986, Arnold, 1989) focused mainly on house plan types and house sizes. Through the study of house sizes in relation to contextual factors which included environment, sociocultural factors, community and individual factors, this research concluded that all these factors may have an effect on the particular size and spatial arrangement of the house. Despite the fact that certain ones may prevail over others in certain sites (e.g. topographic location, which might have a strong influence in house size possibilities), these factors are not exclusive. They must therefore be understood within the consideration of all other contextual circumstances; a corollary is that before a comparison between sites may be attempted, a comprehensive house comparison must be established within each settlement, where possible.

Studies that focused on domestic architecture as part of urban fabric (most notably focused on Tell el-Daba and Amarna, see e.g. Bietak *et al*, 2010) used it to identify urban society dynamics at settlement level. Conversely, this research has recognised that the diverse manners in which those dynamics reflect in the house deserve study on their own right. For example, the influence of environmental factors in the house has been studied before (Endruweit, 1994; Spence,

2004), concluding that they physically reflect in the orientation of the house, amongst other factors. However, this research has focused on linking those contextual factors to the human element and the actual practicalities of daily and cyclic living; for example, in Amarna, the prevailing wind has been seen to have an effect on the location of ovens which is consistent with drawing fumes away from the house; however, the study of modern houses highlighted that the presence of exceptions might be explained by seasonal factors, which discourage cooking in certain areas and favour others.

On the other hand, studies such as Samuel (1989 and 1999), focusing on bread making, or Kemp (1994) dealing with organization of food distribution, both of them at Amarna, are necessary to fully understand the dynamics of storage activities within the house. In this respect, this research highlighted that the individual study of houses shows limitations in the understanding of aspects which strongly depend on overall site organization. Nevertheless, as information on site organization is lacking for many sites which do have house remains, this type of research can at least provide some indication of the importance of certain activities at community level.

Implications for the archaeological record

The recording and interpretation of domestic remains is problematic, mainly with regard to courtyards, upper storeys and the identification of building phases.

Courtyards have been traditionally used as a typological element; however, research on both modern and ancient material has shown that the position of the courtyard needs not be central, which discourages such use.

In fact, identification of courtyards in the archaeological record is often doubtful and relies on a high degree of recording accuracy, particularly as preservation of upper stories is infrequent; for example, if organic material found within room deposits is not documented in detail, organically roofed rooms can be mistaken for courtyards. A series of other considerations must be born in mind when trying to determine what rooms would have been roofed, such as the spanning capability of beams, and the correlation with the type of activities performed within the space, for example, cooking might benefit from a totally open

space, but a partially closed space does not necessarily obstruct this activity.

With regard upper storeys, one of the main practical contributions of the study of modern mudbrick houses has been that of identifying the roof terrace as the most common arrangement for upper storey areas. In a roof terrace arrangement, the upper storeys do not occupy the totality of the ground floor roof. As previously mentioned, this has a correlation in some clay models and tomb representations. This provides further support for previous research which suggested various upper storey arrangements by focusing on architectural rules concerning, for example, ventilation (Spence, 2004). From an archaeological point of view, this implies that deposits thick enough to indicate the existence of upper storeys may only be present in some areas, a factor to be added to the other possible difficulties in identification already noted.

Another important aspect to bear in mind from an archaeological practice point of view is short-periods alterations, including those within the yearly cycle, should be added to the frequent difficulty of distinguishing building phases. The consequence of these short term changes is that multiple building phases can be not just representing a same period, but also correspond to occupancy by a same household group. In addition to these diachronic changes, this research also identified parallel processes such as the secondary use of structures following their abandonment as main residences. An analogy for this secondary use may be found in Bietak's (1994) suggestion of Tell el-Daba houses as the origin of private chapels.

Despite the difficulty to recognize building phases, ethnoarchaeological research of this kind can provide clues towards their identification and aid in explaining contradictions or absences in the archaeological record. Their identification is, in any case, essential for the correct interpretation of domestic remains and adds a further dimension to the investigation of the contextual levels described.

Secondly, this research also highlighted, through the analysis of modern mudbrick houses, that the recording of elements located in the surroundings of the house are essential not just to understand the house, but to correctly appreciate the transitional spaces that connect public and private areas.

A further important point is that, although material can often be used to establish social differentiation, in the case of ancient Egyptian architecture it overwhelmingly is the most used material across periods and sites. This would require social differences to be established through other means, for example, in different characteristics of architectural features or in the distribution and use of space. It also means that comparison with temple or palace architecture is further discouraged, as not only do they have different aims, but also the fact that they do not share the same material means that building restrictions and possibilities are dissimilar.

Finally, it is worth posing the difficult question of what cultural determinants influence the complete realisation of the possibilities of a material; in this case, what dictates whether the extreme flexibility provided by organic materials should or should not be taken advantage of. This is, of course, extremely difficult to assess, but would surely be revealing of a society's priorities and conventions.

CONCLUSION

Despite the fact that only a succinct summary of this research could be provided in this space, it is hoped that this article has shown the potential of a holistic approach to the study of ancient Egyptian houses.

Ethnoarchaeology can be extremely helpful in reconstructing the practical and human living aspects of the domestic environment, aspects which are notably difficult to infer from the archaeological record. The abstraction of principles that can theoretically inform the sociocultural and environmental factors influencing the domestic sphere, reveals itself as an essential tool to unveil the complexity of the living experience, both in a literal and figurative sense.

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