

Form Follows Function: Writing and its supports in the Aegean Bronze Age

Sarah Finlayson

University of Sheffield

Introduction: From office blocks to office stationery

The architect Louis Sullivan coined the phrase “form ever follows function” in an essay laying out the aesthetic laws for designing a new and exciting phenomenon of the late 19th century, the office block; his fundamental principle was that “the shape, form, outward expression, design...of the tall office building should in the very nature of things follow the functions of the building, and that where the function does not change, the form is not to change” (Sullivan 1896: 408). I use it here as a starting point from which to unpick the complex and changing relationships between writing and its material supports during the Aegean Bronze Age, with the basic hypothesis that the shape of objects which bear writing, the Bronze Age ‘office stationery’ so to speak, derives from the use to which they, object + writing, are put and the shape changes as this purpose changes.

Following an overview of the datasets included in this study, I review the use of writing supports for each of the three main Aegean scripts, Cretan Hieroglyphic (**Figure 1a–f**), Linear A (**Figure 2a–g**) and Linear B (**Figure 3a–d**), before focussing on Linear A practice to consider how the form and function of different kinds of writing-bearing object interrelate within a particular chronological period. As will become clear, a long time period is covered here, at least 500 years or so, but at points the evidence is embarrassingly meagre and inevitably there are large gaps in our understanding of how, when and where writing is being used. For all these reasons, it is appropriate to keep the following discussion rather general and tentative.

What is written, where?

Before presenting the data, I should acknowledge its arbitrary nature. I pass over the ‘Archanes Script’ (but see Flouda, this volume, Whittaker, this volume) and broader prepalatial seal use,

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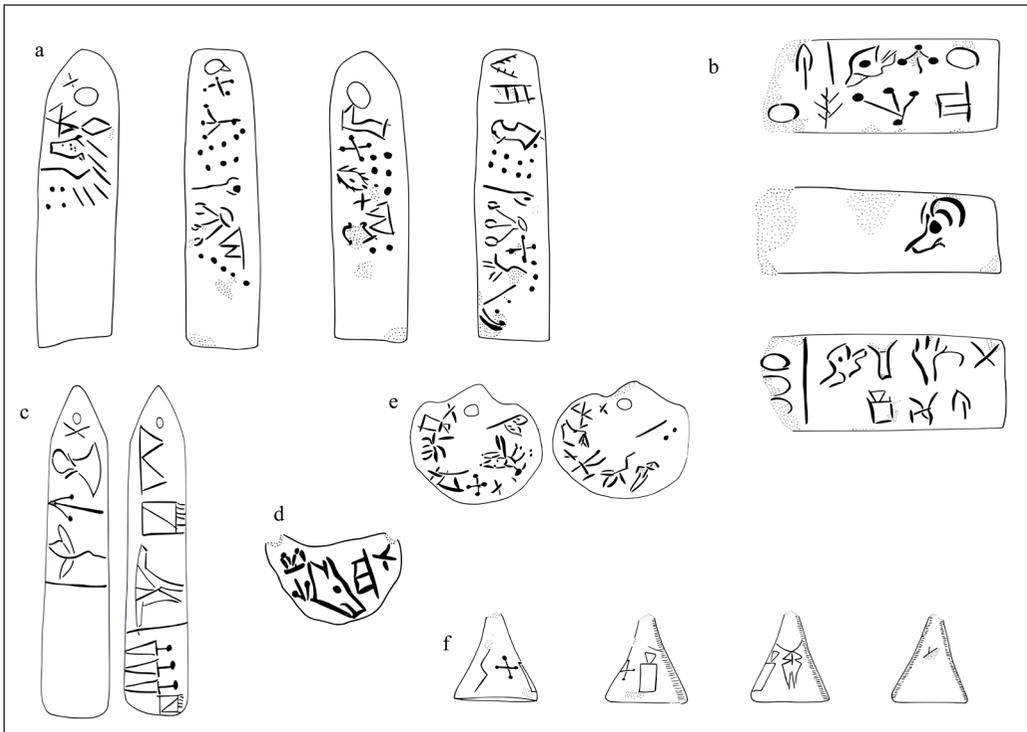


Figure 1: Key Cretan Hieroglyphic document shapes (not to scale). a) Four-sided bar, Knossos Hh (04) 03 (Olivier and Godart 1996: 111); b) Tablet, Malia Palace MA/P Hi 02: front, side and back faces shown (Olivier and Godart 1996: 174); c) Label, Malia Quartier Mu MA/M Hf (04) 01 (Olivier and Godart 1996: 140); d) Crescent, Knossos Ha (04) 01: face gamma shown, with CH inscription (Olivier and Godart 1996: 78); e) Medallion, Knossos He (04) 06 (Olivier and Godart 1996: 92); f) Cone, Malia Quartier Mu MA/M Hd (02) (Olivier and Godart 1996: 126).

which could well represent the beginnings of writing and administration on Crete (Schoep 1999a: 268). Making sense of seal use throughout the Bronze Age is rather tricky; at times, it could arguably be considered a form of writing, particularly those seals bearing Cretan Hieroglyphic (hereafter CH) signs, while at others, seal use is better viewed as writing's “quasi-complementary, quasi-supplementary and quasi-independent partner” (Palaima 1990: 83). While my focus is on those material supports which bear writing, it is necessary, as will become clear, to include in the discussion those sealing shapes which do not. I leave to the side more marginal, less well-understood, writing practices such as potters’ and masons’ marks.

The CH corpus comprises around 200 clay documents, 136 seals and 16 miscellaneous items (incised and painted pots, and an incised stone block, e.g. **Figure 1**). These are distributed widely across central and north-eastern Crete (**Figure 4** shows the key sites mentioned throughout), with seal impressions and a prism-shaped stamp seal found on Samothrace and Kythera respectively (Lebessi et al. 1995: 63; Olivier and Godart 1996: 20–21, 22; Tsipopoulou and Hallager 1996: 165). The four key deposits are: Quartier Mu, Malia (an elite residential complex); the *Dépôt Hiéroglyphique*, Palace of Malia; the Hieroglyphic Deposit, Knossos; and Petras (all palatial buildings). The clay documents comprise crescents (all terms are defined below), noduli, flat-based sealings, cones, medallions, labels, three- and four-sided bars, and tablets (Olivier and Godart 1996: 10–11; Younger 1996–1997: 396). There are also substantial numbers of direct object sealings, which show seal impressions but no incised writing (Krzyszkowska 2005: 99). One should

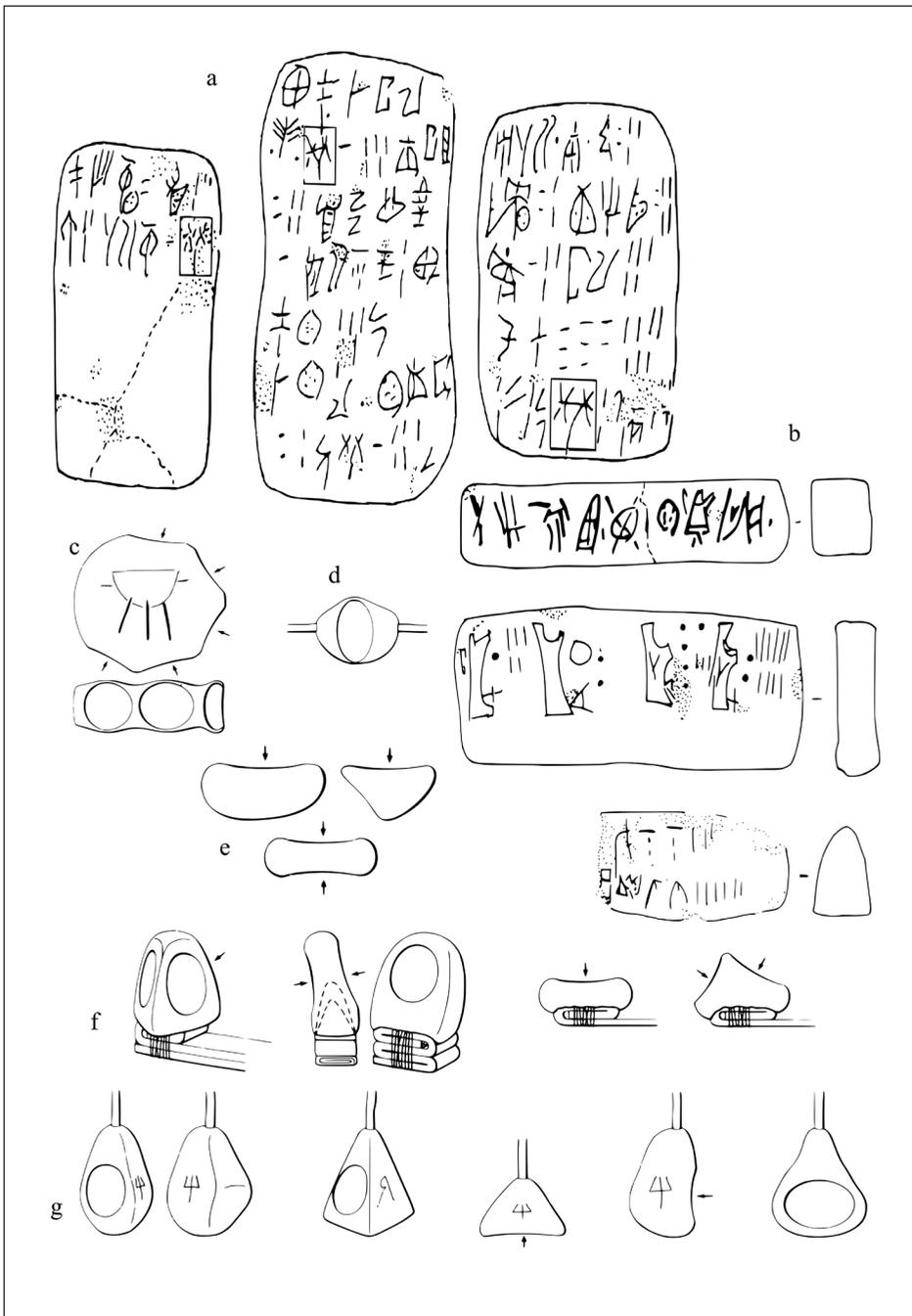


Figure 2: Key Linear A document shapes (not to scale). a) Different shapes and layouts of LA tablets: all deal with commodity AB 30, figs, ideogram marked with rectangle (Schoep 2002a: 95); b) Four-sided bar, oblong tablet and three-sided bar: inscribed face and end profile shown (Schoep 2002a: 17); c) Roundel: arrows indicate seal impression (Hallager 1996: 23); d) Two-hole hanging nodule (Hallager 1996: 23); e) Noduli: arrows indicate seal impression (Hallager 1996: 23); f) Flat-based nodules: arrows indicate seal impression (Hallager 1996: 23); g) Single-hole hanging nodules: arrows indicate seal impression (Hallager 1996: 23).

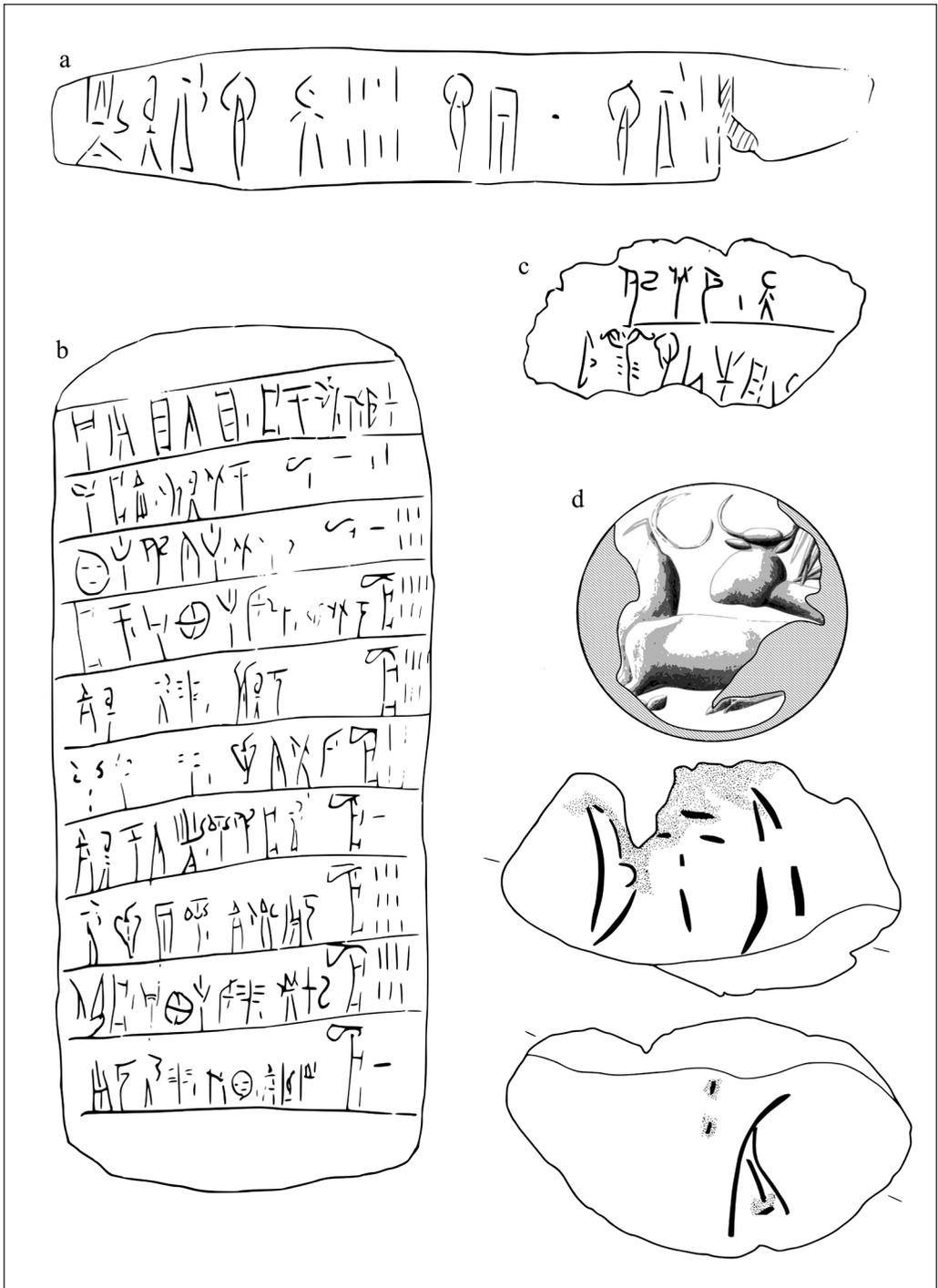


Figure 3: Key Linear B document shapes (not to scale). a) ‘Palm-leaf tablet’, Pylos Aa 98; b) Page-shaped tablet, Pylos Cn 4; c) Label, Pylos Wa 114; d) Gable-shaped hanging nodule, Pylos Wr 1328: lines indicate string holes (Pini 1997: pl. 25) (Figures 3a–c after Bennet et al. 1955: 14, 1 and 15, respectively). © 1955 Princeton University Press, 1983 renewed PUP. Reprinted by permission of Princeton University Press.

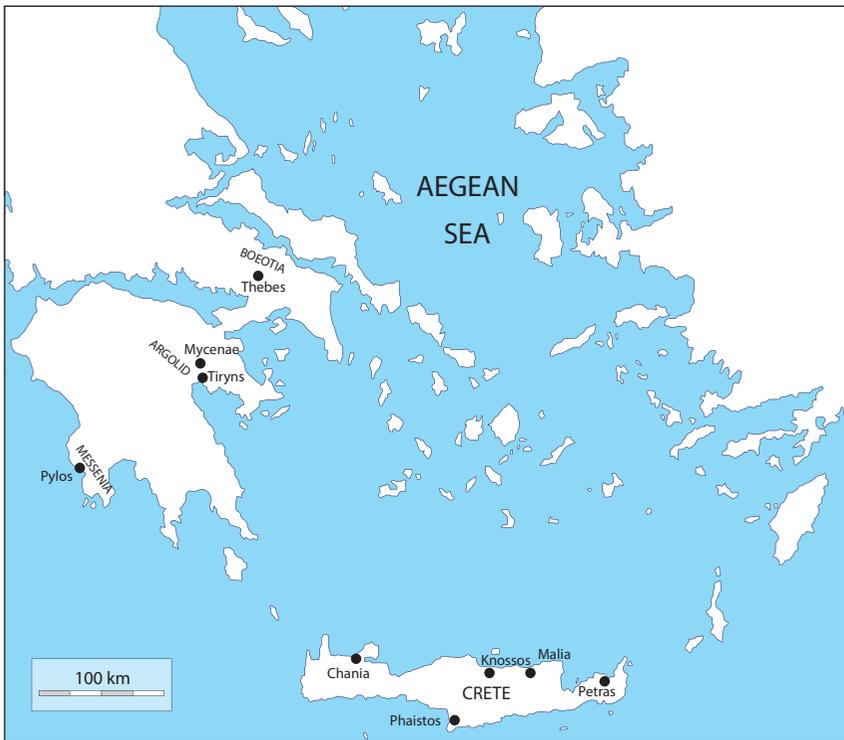


Figure 4: Map showing key sites referred to in text. Base map courtesy of John Bennet.

note that, throughout the Bronze Age, while seals come in a huge range of shapes and materials, impressions are almost always made by stamping the seal on the clay, not rolling it. CH is used in the First Palace Period, Middle Minoan II, at Quartier Mu and Petras, and into the early Second Palace Period, Middle Minoan III, at Knossos and Malia Palaces (Olivier and Godart 1996: 27–28; Schoep 2001a: 157–158).

There are around 1370 Linear A (LA) clay documents (Schoep 2002a: 38; e.g. **Figure 2**). There are some 300 tablets, together with a few three- or four-sided bars, and a single ‘label’ comprised of a flat, oblong piece of clay, pierced at its pointed end (Hallager 1996: 33, 37; Schoep 2002a: 16, 20–21). The sealings can be classified as noduli, flat-based nodules, roundels, and single-hole and two-hole hanging nodules (Hallager 1996: 35–37). Direct object sealings are restricted to the First Palace Period (Krzyszowska 2005: 155). LA is also incised, engraved or painted on a range of other supports, including stone vessels, gold and silver pins and a ring, walls, pots and a terracotta figurine; these objects are found in religious and domestic contexts, and their distribution is mainly concentrated in central Crete (Schoep 2002a: 13–14). LA is used during the First Palace Period at Phaistos; this use proliferates during the Second Palace Period, Middle Minoan III to Late Minoan IB, when it is widely distributed across Crete and on Thera, Melos and Kea (Karnava 2008: 418; Schoep 2002a: 17–19, 21).

There are over 5000 inscribed clay documents in the Linear B (LB) corpus (e.g. **Figure 3**), the most numerous of which are tablets. The only LB sealing type which can bear an inscription is the gable-shaped hanging nodule, and there is also a very small number of clay ‘labels’ (Krzyszowska 2005: 280). Sealing types without inscriptions are irregular hanging nodules, combination sealings, direct object sealings, stoppers and noduli (Krzyszowska 2005: 280). The principal deposits are the palatial sites of Knossos and Chania on Crete, and Mycenae, Thebes, Tiryns and Pylos in mainland Greece; the Room of the Chariot Tablets, Knossos, is probably the earliest use of LB,

in Late Minoan IIIA1, with the documents from Chania, Thebes and Mycenae dating from Late Minoan / Helladic IIIA2–late into IIIB1–late, and those from Tiryns, Midea and Pylos coming from Late Helladic IIIB / C (Driessen 2008: 76; Shelmerdine and Bennet 2008: 292).

There are also nearly 180 examples of Inscribed Stirrup Jars (ISJs), a type of large coarse-ware storage or transport jar on which an LB inscription is painted before firing, dated to roughly Late Minoan / Helladic IIIB (van Alfen 2008: 235, 238). They are found at several mainland sites, although ceramic analysis indicates that most originated from the Chania region in Western Crete (van Alfen 2008: 235). Finally, LB written on non-administrative objects is extremely rare (Palaima 1987a: 502).

Classifying Form / Identifying Function

The Linear B Administration

Turning now to what the various shapes of document ‘do’, I will start at the end, with LB, as its large database and the fact that we can read the inscriptions make it easier to understand how documents are being used. There are two variants of recording documents. The ‘palm-leaf’ tablets (**Figure 3a**) record, usually, a single transaction, or unit of information, and this dictates their shape; the text is written in a single line along the long horizontal axis (Bennet 2008: 17; Ventris and Chadwick 1973: 111). The large, rectangular page-shaped tablets (**Figure 3b**) are ideally suited to holding greater amounts of data, and their sophisticated linear formatting enables information to be well organised and clear to read (Palaima 1990: 97).

The labels (**Figure 3c**), some of which resemble elongated nodules but with LB inscriptions only and no seal impressions, are possibly an adaptation of the nodule form (Krzyszowska 2005: 280). Some show the impression of wickerwork on their reverse, and this, together with analysis of their findspots, where known, and their inscriptions suggests they could be labels for boxes of tablets, with the text providing an ‘abstract’ for the box contents (Chadwick 1958: 4).

Of the sealed documents, the most numerous, and obscure, are the irregular hanging nodules; these are clay sealings of no fixed shape, formed around string, most often found broken along their long axis, i.e. along the line of the string (Hallager 2005: 255–256). Impressions of the string holes often show imprints of two cords, twisted together within the sealing, suggesting these nodules are actually sealing, in the sense of physically securing, the objects to which they are attached (Krzyszowska 2005: 281). These sealings are carelessly made and fastened on their strings (indicating they are not meant to travel far), and then broken and discarded, both factors suggesting that they, and the information they carry, were intended to have a short life-span (Hallager 2005: 256–258; see also Shelmerdine’s discussion following Hallager 2005). Hallager’s (2005: 258) interpretation of the sealings as attached to items stored within the palaces, with the seal impression identifying the individual responsible either for the delivery or the storage, is plausible. That these sealings are deliberately broken, whereas other types are not, seems significant, and one wonders whether that is, in a sense, their purpose, and also the reason why they are kept, at least briefly, prior to discard; their breakage could indicate a change in status of the goods (move from storage into use, for example), or the end of an individual’s responsibility for them.

Easier to understand are the gable-shaped hanging nodules (**Figure 3d**). These sealings are carefully shaped around a knotted string, and carry a seal impression on one face (Krzyszowska 2005: 280). The majority are uninscribed (only 22 out of the 164 sealings from Pylos carry an inscription), but on those examples with incised text, an ideogram is usually written over the seal impression, and additional sign-groups can appear on the other faces (Palaima 2003: 174; Krzyszowska 2005: 280). Analysis of the cache of 60 nodules from Thebes, 56 of which have inscriptions, has

enabled a convincing reconstruction of their use. The gable shape of the nodules results from the way the clay is held between the fingers while impressing the seal and writing the inscription (Piteros et al. 1990: 113). This shape, together with its suspension cord, give a small, solid, virtually indestructible and very portable document (Piteros et al. 1990: 183). In this instance, form does not strictly follow function, but rather the two aspects are intertwined in a more complex way. A key part of these documents' function is their portability, and this governs their very small size, which in turn means only the most important information is recorded, namely the seal impression, the ideogram which identifies the goods, and, rarely, a small amount of additional data, such as anthroponyms, toponyms, transactional terms (Piteros et al. 1990: 177). The formula 'personal name (here represented by the seal impression) + object + toponym / second personal name' is equivalent to that recorded on the 'palm-leaf' tablets. Numerals are rare, because that information is supplied by the object itself. It is suggested that each nodule accompanies a single item, mostly livestock in the Theban examples, from the hinterland into the palatial centre, with the nodule acting as a primary document, recording the most crucial information about its object, the sex of the animal, for example, and also certifying or authenticating, by the seal impression, who is responsible for it (probably in the sense of 'owing' the item to the palace; Piteros et al. 1990: 183–184).

Analysis of scribal hands at Pylos indicates that some nodules there are written by palace tablet-writers, and while the scribes could travel out of the palace, Flouda suggests that these nodules are written and sealed within the palace (Flouda 2000: 236). Rather than enabling data to travel, as with the Theban nodules, these examples would have the dual function of labelling the goods to which they are attached, with the information supplied in the text, and acting as 'certificates', with the seal impression authenticating their receipt (Flouda 2000: 237).

It is important to note, however, that, except at Thebes, there are considerably fewer inscribed than uninscribed nodules. Sealings of this type would therefore seem to be primarily recording instruments within transactions that do not require the use of writing (Palaima 2003: 174), although this is not incompatible with their being primary documents as described above.

Combination sealings (nodules which hang from a cord and are pressed against the object sealed), direct object sealings, and stoppers (lumps of clay plugging the neck of stirrup jars, some of which have seal impressions), operate at "a slight degree higher than the merely practical action of closing", securing an object physically, but also authenticating it, and identifying a responsible party by means of the seal impression (Palaima 1987*b*: 257). Applying the clay directly to the object creates a close physical association between the seal impression and the artefact it references (Knappett 2008*a*: 150), which is not seen with the two kinds of hanging nodules.

So few noduli survive that it is difficult to understand how they functioned (Krzyszowska 2005: 284). I discuss this form below as they are significantly more common in LA administration.

In the case of the final LB document shape, the ISJs, the function of the writing support is clear; they are jars for the transport and / or storage of olive oil, unguent or perhaps wine (van Alfen 2008: 235). The function of the inscriptions, which take the form 'personal name + toponym + personal name in the genitive', has been debated, but van Alfen's proposal that they are acting in the same way as the inscriptions on the gable-shaped hanging nodules, recording the fulfilment of an individual's obligation to supply oil to a 'collector' (a representative of the palatial administration), is convincing (van Alfen 1996–1997: 253–254; 2008: 238). The fact that no nodules dealing with raw oil are known suggests the jars themselves are being used instead (van Alfen 1996–1997: 273).

There are far fewer inscribed than uninscribed stirrup jars, and it is not clear why this should be, although the same is true of the gable-shaped nodules; one marked jar could label the entire batch, or some production could be taking place without written records (van Alfen 1996–1997: 272–273). It is clear that the inscriptions function early on in the production process, when the jars are sent from the oil producers to their superiors (van Alfen 2008: 238). However, the fact that the inscriptions are painted on before the jars are fired and filled suggests that the data to be

recorded are known, or prepared, earlier. Once the jars move into the next stage, the inscriptions lose their intended primary meaning; unlike the nodules, which are discarded, the ISJs could be reused, and it is possible that the inscriptions then become decorative; hoards of 70 ISJs at Thebes and 40 at Tiryns may indicate vessels collected specifically for the prestige or novelty value of their inscriptions (van Alfen 2008: 239). While the ISJs are not meant to serve as archival documents, unlike tablets (van Alfen 2008: 235), their inscriptions objectify them, turning artefact into textual document (Knappett 2008a: 152).

Since the bulk of LB is incised with a stylus on soft clay, it is interesting to note the effect painting with a brush on a pot has on the palaeography of signs; they can be painted much larger, often giving a distorted, elongated appearance, as on jar TH Z 839, or in a freer way with additional elements included that would otherwise be hard to reproduce on the significantly smaller tablets (van Alfen 2008: 237). Nevertheless, the placement of most inscriptions on the shoulder, between the jars' handles, suggests they are intended to be viewed easily, even if the jars are tightly packed together on the floor (van Alfen 1996–1997: 255).

Pulling this together, one can propose a hierarchy of document forms that reflects the upward flow of information through the palatial administration. Using the documents at Pylos as an example (following Palaima 2003: 182–184), on the primary level are the nodules, or other 'labelling' sealings, that relate to delivery of materials, such as nodule PY Wr 1328 shown in **Figure 3d** (it has a seal impression on face a [top illustration], and the text on faces b and c [middle and bottom illustrations] reads *shafts for infantry spears*, with the quantity provided by the pieces of wood themselves); these data are transferred onto 'palm-leaf' tablets as quantities of different items, but without further information, for example, PY Va 1324 (line 1, *shafts for spears 30*, line 2, *shafts for spears 20: axle-sized pieces of wood 2*). The tablet-writers then compile this information onto page-shaped tablets, adding additional details, such as assignments of materials to personnel, as on PY An 1282 (line 1, *for chariots MEN [an ideogram] 18, for wheels MEN 18*, line 2, *for flint points MEN 13: for halters MEN 5*, line 3, *for shafts MEN 36*). At the highest administrative level, a single tablet from the Archives Complex, PY Vn 10, summarises the overall transaction on a regional scale (line 1, *thus contribute the woodcutters*, line 2, *to the wheel-assembly workshop saplings 50*, line 3, *and axle-sized pieces of wood 50*, line 4, *and so many the territorial organisation of Lousos, axle-sized pieces of wood*, line 5, *100 and so many saplings 100*). This chain of documents is probably not the only way that administration is done, and, in fact, Palaima (2000: 237) suggests certain textual features on some inventory tablets at Pylos (erasures, data grouping, layout, and arrangement) point to them being written up from information dictated to the scribe rather than being compiled from a review of nodules.

Whether there is a level of administration above the page-shaped tablets, or indeed the recording of non-administrative subjects, on perishable materials, has been much debated but not resolved. Four of the sealings from the Room of the Chariot Tablets, in Third Palace Period Knossos, have been classified as flat-based nodules, but they differ from the earlier LA versions (for which, see below). The imprints on their undersides suggest they sealed pieces of leather, folded length-wise and bound once in the middle with leather or gut (Krzyszowska 2005: 217–218). This form then disappears from use, and there is no further direct evidence to suggest the use of other writing materials in LB administration. On the contrary, several factors, both contextual and administrative, suggest that the clay documents are the most important administrative medium; both the transferring and summarising of information between records, and the care taken to prepare and correct the tablets suggest they are the highest level of recording and not "mere impermanent records", operating within an administrative cycle of about a year (Bennet 2001: 27–28, 29; Killen 2008: 162).

It is possible that wooden writing-boards, such as the set found on the Ulu Burun wreck (Payton 1991: 99–103), are used, perhaps to accompany moving goods (Perna 2007: 229), although the

evidence, seven hinges each from Pylos and Knossos, is meagre; the hinges could have come from small boxes, although this is thought less likely (Mylonas Shear 1998: 188–189). But the reusable nature of writing tablets, where writing can be repeatedly made and erased on the wax, suggests they should in fact be regarded as an impermanent record (John Bennet, pers. comm. 1 October 2009; see also Whittaker, this volume; cf. Piquette, this volume).

Steele uses the example of a land-dispute between the priestess *Eritha* and the *damos*, summarised on Pylos tablets PY Ep 297 and 704, to argue that ‘bilateral’ documentation (which records and provides legal evidence of a transaction between individuals or groups) does not exist for this period. The tablets do not record either party having any written or sealed documents to back up their claims, but instead they give spoken statements, “*Eritha* the priestess has and claims to have an *etoinon* for the god, but the *damos* says she has an *onaton* of *ktoinai kekemenai*” (PY Ep 704.5–6; Steele 2008: 35, 43–44). That is, it is not that we have lost the laws, contracts, sales documents and so on, assumed to have been recorded on perishable materials (Olivier 1986: 387), but that these data are never written down, instead transacted orally and maintained by memory.

Linear A Document Forms and Functions

In LA administration, the principal recording shape is again the tablet (**Figure 2a**); in the First Palace Period, both oblong and page-shaped, but by the end of the Second Palace Period, only the page-shaped version is used (Schoep 2002a: 16). Two-, three- and four-sided bars (**Figure 2b**) are also found incised with LA in the mixed CH and LA deposits at Knossos and Malia in the early Second Palace Period (Schoep 2002a: 16–17). Although the LA tablets’ purpose is to record quantities of data, they are smaller than the LB versions, and their formatting and contents (principally agricultural produce, as far as we can tell) suggest they do not have exactly the same administrative role as in LB (Schoep 2002a: 189, 192). In comparison with the LB tablets, LA tablets lack standardisation, and are more difficult to read; they are frequently written on both sides, contain multiple sets of entries, and have entries running from one line to the next (Schoep 2002a: 72).

When compared with the typological restriction of LB sealings, the variety of sealed document types in LA (**Figure 2c–g**) is quite overwhelming. Schoep (2002a: 193) suggests differentiating between ‘active’ sealings, which play a role in the transmission of goods, and ‘passive’ ones, which are auxiliary documents, attached to or sealing the actual written documents and not functioning independently, and that this division reflects different administrative functions. Roundels, and perhaps noduli, are ‘active’, independent mini-documents, whereas single-hole nodules, flat-based nodules, and perhaps two-hole hanging nodules, are ‘passive’, attached to documents or goods (Schoep 2002a: 193).

Roundels (**Figure 2c**) are clay disks with one or more seal impressions around their rim, and usually with a LA inscription on one or both faces, but with no trace of having been hung from or pressed against another object (Hallager 1996: 82). The number of seal impressions on the rim probably specifies the quantity of the commodity recorded in the inscription (livestock, agricultural produce, cloth, vessels and so on), with each impression representing one unit (Hallager 1996: 100–101, 113). Analysis of impressions and inscriptions suggests that at least two people made a roundel, one wielding the seal and another, the stylus (Hallager 1996: 112). These two factors have led to the interpretation of these documents as receipts, created and held by the central administration to record goods disbursed; the seal user would be the recipient, certifying with his or her impression the quantity of goods received (Hallager 1996: 116). Significantly, the physical limitations of these documents necessarily restrict the size of transactions, with 15 units being the largest amount attested (Palaima 1990: 92).

Noduli (**Figure 2e**), disk- or dome-shaped lumps of clay with a seal impression but no perforation, imprints of objects, or other visible means of fastening (“sealings that do not seal” [Weingarten 1986: 4]) are a very long-lasting document form, found from the early First Palace through to the Late Bronze Age, but they are particularly common in Second Palace Period LA administration, with around 130 examples known (Krzyszowska 2005: 161; Weingarten 1990a: 17). Only eight have LA inscriptions or countermarks over the seal impression (Hallager 1996: 127). As they are clearly not attached to anything, noduli are independent documents, and their primary purpose seems to be to carry a seal impression, that is to authenticate or certify something. By analogy with Old Babylonian practice, Weingarten (1986: 18) suggests they are originally dockets, receipts for work done, with the seal impression being made by the overseer to authorise ‘payment’; as the form becomes more widespread in the Second Palace Period, they become more like tokens, to be exchanged for goods or services, or as *laissez-passer*, with the seal impression identifying the carrier as legitimate (Weingarten 1990a: 19–20).

Moving on to the ‘passive’ sealed documents, single-hole hanging nodules (**Figure 2g**) are roughly triangular clay sealings, formed around a knot at the end of a piece of string or cord (Hallager 1996: 160–161). They have a seal impression on one face, and a single incised LA sign, or very rarely another seal impression, on one of the other faces (Hallager 1996: 161). There are five sub-categories of single-hole nodule, differentiated by shape and position of seal impression or inscription (pendant, pyramid, cone, dome / gable and pear, see **Figure 2g**) with pendant being by far the most common (Hallager 1996: 162–163). About 13 signs or ligatures are found on these nodules, but it is very difficult to discern their meaning; the restricted range might suggest they are acting as arbitrary symbols, along the lines of ‘A’, ‘B’, ‘C’, rather than as syllabograms (Krzyszowska 2005: 160). These nodules hang from something, although there is no evidence for what (Krzyszowska 2005: 160). Hallager has proposed a use similar to that observed in contemporary Egypt, where nodules were hung from rolls of papyrus as identification labels, with their cord threaded through holes in the lower part of the scroll to enable it to be unrolled and read without breaking the cord or sealed nodule (Hallager 1996: 198–199).

Two-hole hanging nodules (**Figure 2d**) are also lumps of clay, usually triangular, formed around a knot in a cord, but they differ from the single-hole variety in that the cord runs horizontally through the nodule and out each end (Krzyszowska 2005: 160), suggesting they hang horizontally with the string running left and right (Hallager 1996: 160). One surface carries a seal impression, while the other two may be empty, have other seal impressions or, on four of the 74 nodules of this type, a single sign inscription (Hallager 1996: 161, 234). As the knot or twist in the cord is to prevent the nodule from slipping, rather than to tie two pieces together, and the nodules hang freely, a function as tags or labels seems likely (Krzyszowska 2005: 160).

Flat-based nodules (**Figure 2f**) really represent two documents; they are clay sealings, with a seal impression and, very rarely, an inscription, applied around a folded piece of parchment bound with thread (both parchment and thread survive only as impressions in the underside of the sealing, Hallager 1996: 136). Care is taken to keep the nodule firmly on the parchment by winding the thread into the clay (Krzyszowska 2005: 156). There are two sub-types, standing, which are taller than they are broad, and recumbent, which are broader than tall, and each kind can have varying numbers of seal impressions (Hallager 1996: 136–137). The function of the flat-based nodules is clear: they very carefully secure the integrity (and secrecy?) of folded parchment, with the seal impression authenticating the whole. The function of the folded parchment is less clear; the assumption is that these are written documents, perhaps concerning subjects not recorded on clay, such as legal matters like loans, sales or contracts, or diplomatic correspondence (Schoep 2002a: 195). However, analysis of the impressions indicates the documents would be very small when unfolded, rarely exceeding 6 × 6 cm, so the messages would have to be brief (Krzyszowska 2005: 156).

Most flat-based nodules are made of clay local to the site where they are found, indicating they are produced and stored locally (Hallager 1996: 158), but others travelled, between Crete and Thera, or within Crete (Krzyszowska 2005: 158). It is not clear whether the nodules are still intact and sealing their parchment at the time of their deposition; some examples seem intact, while others are clearly fragmentary, but if the message is unopened, does it imply that it had just arrived, or awaits despatch? Or were the parchment documents sealed on site for storage (Krzyszowska 2005: 173, n. 52)?

Direct object sealings, lumps of clay stuck onto objects like jars, wooden or wicker containers, or over the pegs that closed chests or doors, and then impressed with a seal, are very common in the First Palace Period, occurring in all the major sealing deposits, and as part of both LA and CH administrations (Krzyszowska 2005: 99). It is unfortunately not possible to distinguish between sealings from pegs closing doors (indicating control of storerooms) and those sealing chests (control of movable property; Krzyszowska 2005: 28), but the general function of these sealings is to identify, by the seal impression, the individual responsible for the object or its security. These sealings almost entirely cease to be used in the Second Palace Period; singletons have been found at Phaistos, Knossos, Ayia Triadha and Chania, but the peg sealings from chests and doors, which particularly characterise the earlier Phaistos deposit, seem to fall out of use (Krzyszowska 2005: 155).

Trying to recreate the system of information processing from this array of document forms is difficult. Part of the problem is that the conjectured upper layer of parchment or papyrus summary documents (to which the single-hole hanging nodules might be attached) is lost, but we are also unable to identify the primary documents from which the tablets are drawn up. Their format and content suggest they are compiled from both a primary source and some kind of more detailed reference document, which provides the information lacking from the terse tablets, but none of the extant sealing shapes contain the right kind of data (Schoep 2002a: 194–195). It is possible tablets are compiled from documents on perishable materials, or perhaps more likely, from other tablets, but information cannot be tracked through different tablets as it can with some LB examples (Schoep 2002a: 196).

Schoep reconstructs three stages of information processing: gathering, processing and storage, and suggests several possible parallel hierarchies of document shapes working through these stages; for example, information gathered on primary tablets or noduli could be copied onto other tablets for processing, before being transferred onto perishable materials, sealed by a single-hole hanging nodule, for storage: alternatively, roundels or noduli could be the primary documents, with information processed on different roundels as an intermediate stage, before storage on ‘final document’ roundels or perishable materials (Schoep 2002a: 197, fig. 4.4).

It seems likely that the tablets form a more or less autonomous body of information, separate from that contained on the ‘active’ sealed documents and the flat-based nodules; rather than the sealings and tablets forming consecutive stages in a hierarchy of document forms, they are instead complementary or parallel, reflecting different administrative concerns, types of transactions or spheres of control (Schoep 2002a: 197).

Cretan Hieroglyphic Administration

Analysing the CH corpus is the most challenging given our inability to read the script and compounded by the very small number of documents (**Figure 1a–f**); there are, for example, only two cones (**Figure 1f**), and one should ask whether we can say anything meaningful about such a tiny sample. There is also the complication of the use of seals carrying CH signs as part of their design. These are impressed on administrative documents alongside non-hieroglyphic seals, but what they ‘say’ (names or titles are perhaps more plausible than

economic data) and how they differ from seals with decorative or pictorial motifs is unknown (Krzyszowska 2005: 97).

There are only four tablets written in CH (**Figure 1b**), but they, and the bars, carry more text than the other document forms, and it is possible to identify what look like headings, commodities and numerals; it seems reasonable to suggest, by analogy with the LA and LB tablets, that they are recording quantities of more complex data (Hallager 1996: 31; Younger 1996–1997: 386).

The bars (**Figure 1a**) are usually rectangular, inscribed on all four sides, and sometimes pierced with a hole at one end (Hallager 1996: 33). That the bars could be suspended suggests they might be used as labels attached to objects for transport or storage, but the information on them seems to be much like that on the tablets, and, in fact, the unpierced examples are perhaps best understood as variants of the standard tablet format (Hallager 1996: 33). Olivier (1994–1995: 268–269) offers an intriguing alternative explanation, that the bars are not attached by cords to any object, but instead hang together on some sort of horizontal rod to enable them to be sorted and stored, or taken down when additional data are inscribed on them; he envisions the bars operating like the LB ‘palm-leaf’ tablets, for compiling basic data.

Labels (**Figure 1c**) are yet more rectangular pieces of clay, pointed at one end and pierced for suspension, with inscriptions on one or both sides (Hallager 1996: 33). They can record single sign-groups, or string two or more together, but rarely have ideograms or numerals, although the inevitable exception records the surprisingly high number 7000 (Hallager 1996: 33; Younger 1996–1997: 387). There are few labels, making it difficult to define their function, beyond that they hang from something (Hallager 1996: 33). The lack of ideograms could suggest that the object to which the label is attached supplies this information.

Also pierced for hanging are the medallions (**Figure 1e**), which are lentoid-shaped clay disks. Most have a sign-group on one face and an ideogram, or short inscription plus numerals on the other (Hallager 1996: 33–34). The information recorded seems to be numbered quantities of something, so the medallions could be attached to objects as another sort of label; the examples from Quartier Mu do not carry numerals, so presumably this information is supplied by the objects themselves (Hallager 1996: 34). The layout of the medallions, with text on one face and ideograms + numeral on the other, seems significant, although it is hard to say of what; certainly, if they are suspended, it would be very easy to flip the medallions around on their cord to read or display one side or the other.

The crescents (**Figure 1d**) are different in that they bear a seal impression as well as incised text, although the written message, whether incised or impressed with a CH seal, seems to predominate (Hallager 1996: 34). They are three- or four-faced crescent shaped lumps of clay, formed around a knotted cord, and impressed with one or more seals on one face, and with inscriptions on the others (Krzyszowska 2005: 101). The knot in the cord stops the clay from slipping, rather than tying two ends together, suggesting that the crescent does not actually secure anything, although it could hang from an object (Krzyszowska 2005: 101). The inscriptions contain a wide variety of sign-groups and ideograms, among which can be identified grain, olives and wine, but no numerals. It seems reasonable to suggest, by analogy with the LB gable-shaped hanging nodules, that crescents are attached to travelling commodities as primary authenticating documents, with the objects themselves supplying the quantity information (Schoep 2001*b*: 91).

Direct object sealings, noduli and flat-based nodules have the same forms as their LA counterparts, so it seems reasonable to assume they have similar functions. The flat-based nodules, found in the Hieroglyphic Deposit at Knossos, show impressions of parchment on their undersides, but whether there is an upper level of recording on perishable materials, as suggested for LA, is very difficult to say; only one example of a single-hole hanging nodule with a CH inscription has been found (Younger 1996–1997: 386).

A very tentative administrative process can be reconstructed as follows. Commodities could arrive at a central place labelled with crescents, medallions, labels and bars, or be provided with

labels on receipt, or information concerning the delivery might be recorded on cones (Younger 1996–1997: 385–386). Higher level data could then be compiled from these labelling documents onto bars or tablets (Younger 1996–1997: 386). Contextual information from Quartier Mu, which is the only site to provide evidence for CH documents in use, adds weight to this basic hierarchy of documents: tablets, medallions, direct object sealings, crescents and noduli were all found in magazines or storage areas, and some additional medallions came from the Workshop, suggesting that these are working documents, associated with commodities delivered, stored or disbursed to personnel (Poursat 1990: 28–29).

Focussing in on Linear A

Returning now to LA administration, it seems that a link exists between the architectural context of deposits and their composition and function (Schoep 2002*b*: 25). Although few documents have been found in primary contexts, it is nevertheless possible to identify three commonly occurring groupings (Schoep 1995: 57). “Full combination deposits” always contain single-hole hanging nodules, alongside tablets and other sealings; as the single-hole nodules are postulated to hang from the highest-level records, on perishable materials, these deposits may be ‘archives’ (Schoep 1995: 61). This seems to be supported by their location, in central buildings (including Malia Palace, Zakros House A, and the ‘villa’ at Ayia Triada), usually on an upper floor in residential quarters, clearly separated from storage or work areas, and by their association with valuable objects (Schoep 1995: 61, table 3, 62). ‘Single type deposits’ consist of direct object sealings, tablets or noduli, and most seem to be in the location in which they functioned; the direct object sealings are found in magazines suitable for bulk storage, as at Monastiraki, while tablet or noduli deposits can also occur in smaller-scale storage rooms, for example, Houses I, Chania or FG, Gournia (Schoep 1995: 62–63). “Limited combination deposits” fall somewhere in between; deposits from the ‘villa’ at Ayia Triada and Zakros Palace contain tablets and sealed documents, in workshop or storage areas, while other deposits contain only sealings, such as the flat-based nodules and roundels from Phaistos (Schoep 1995: 63). One of the Ayia Triada deposits, tablet HT 24 and 45 uninscribed noduli, found in an area used for storage, points towards these being active, working (and possibly linked) documents. All noduli are nearly identical and impressed with the same seal, their uniformity indicating they had been prepared on the spot for distribution, and as the tablet records 47 units of something, it is tantalising to suppose the noduli are ‘receipts’, prepared in advance of the tablet’s expected delivery (Krzyszowska 2005: 162; Schoep 1995: 63).

The distribution of documents within settlements has been taken to indicate three levels of administration, central, decentralised and private; significantly, roundels and single- and two-hole hanging nodules are not found in private administrative contexts, suggesting their use is a prerogative of central administration (Schoep 1996: 80). The absence of single-hole nodules could suggest that ‘archives’ on perishable materials are not kept in private houses (Schoep 1996: 80).

This prompts the question of how visible each document form would be? Tablets and noduli are the most widespread documents, occurring on their own, in private buildings as well as those connected with the central administration (Schoep 1996: 79), so are potentially more visible than documents kept in central building ‘archives’, which are stored, together with precious objects, upstairs in residential quarters (Schoep 1995: 62). However, all of these are, broadly speaking, ‘elite’ contexts, the central buildings as the seats of some sort of regional power, and the private dwellings marked out by their architectural elaboration and spatial organisation (Schoep 1996: 78–79). As such, it is likely that access to the documents within these buildings is in general restricted to those living or working there, and, as Michailidou suggests, “ordinary people presumably did not come into contact with the typical ‘document’ of a tablet” (Michailidou 2000–2001: 8).

There are two possible exceptions to this, however: the roundel and the ‘active’ nodulus (that is, when it is being used, prior to archiving). According to Weingarten’s (1990a: 19–20) reconstruction, noduli are mobile and transferable documents, being carried by travellers as a form of identification, or to exchange for goods and services, or acting as dockets to claim ‘payment’ for work done. Thus, they would be visible to a wide range of people, including some, such as labourers or those offering lodgings, who are unlikely to be creators of documents themselves; significantly, they use seal impressions rather than script to convey the necessary information. While some roundels, receipts held by the central administration for goods it issues, are created by a seal-user and scribe who are both employed within the administration, others are not (Hallager 1996: 115), suggesting that the seal-user came into the central building from outside. While Hallager (1996: 120) interprets the number of seal impressions on the roundel as a device to protect the individual from fraud on the part of the administrator, an alternative interpretation is that it enables a potentially illiterate seal-user to confirm the quantity of goods received. It does seem likely, then, that ‘ordinary people’, in the course of interacting with the central administration or local elites, would use roundels and noduli rather than other document forms, and moreover, that these two are geared towards use by those who cannot necessarily write, or read much beyond the limited range of ideograms used. Having said that, if the seal-user is impressing a roundel to verify receipt of a certain quantity of goods, this would require some numerical literacy.

Interestingly, given our tendency to focus on administrative documents, it is also possible that some non-administrative inscribed objects might have equal, potentially greater, visibility to the general population. The Inscribed Stone Vessels (ISVs), which have an inscription carved on the top face or sides, are probably the most visible to a wide sector of society, being found amongst the offerings at open-air peak sanctuaries, as well as in domestic contexts (Schoep 1994: 11). There are far fewer ISVs than non-inscribed examples — 4% of the stone vessels in the peak sanctuary of Iouktas have inscriptions (Karetsou et al. 1985: 102) — but they are found mixed together with other votive objects, so are presumably involved in the same rituals (Schoep 1994: 19). Inscriptions occur on crudely carved, simple stone vessels as well as better-made ones, and although a few examples from Iouktas may have been made specifically to be inscribed, on most the inscription is dependent on the shape of the vessel (Schoep 1994: 19, n. 113). The two inscribed hair or dress-pins from tholos tombs at Mavro Spelio and Platanos, on the other hand, may have been shaped deliberately to provide a surface suitable for engraving (Alexiou and Brice 1976: 20; see also Flouda, this volume).

Unlike the text on the administrative documents, which are ‘interrupted’ by ideograms and numerals, most non-administrative inscriptions are continuous and written to be aesthetically pleasing, but their function is uncertain beyond what they contribute to the intrinsic meaning of the object, either in the context of elite conspicuous consumption, and / or ritual activity (Michailidou 2000–2001: 18; Schoep 2002a: 14, 17). This could be another example, as with the ISJs above, of adding writing to make an artefact into a textual document (Knappett 2008a: 152), in the case of the inscribed pins or ring, a text perhaps to be ‘read’ with the fingers as you put the object on, or, if the support is the significant component, of giving an otherwise ephemeral prayer or dedication a solid and permanent form.

The extent to which these patterns of administration map onto political organisation is uncertain. The appearance of matching impressions from a small number of metal signet rings on flat-based nodules at Thera in Late Minoan IA and various Cretan sites in Late Minoan IB has been taken as evidence that Knossos is the paramount centre at this time, issuing official documents to subordinate centres, sealed by precious-metal seals engraved with propagandistic imagery (Hallager 1996: 207–209; Krzyszkowska 2005: 189–191). Several of the assumptions underpinning this can be questioned though: that high-quality gold rings could only be made at Knossos, for example, or that the iconography is exclusively Knossian, and these documents and their

sealings are perhaps better regarded as evidence for a particular sort of communication between elite groups within and beyond Crete (Krzyszowska 2005: 189–191).

The lack of standardisation visible in LA use, with different shapes and formats of document type, suggests, rather, that local administrators are acting independently, and this could reasonably be a reflection of regional centres managing their own affairs, whilst communicating inter-regionally using the flat-based nodules (Schoep 1999b: 220). Political or ideological control does not always imply economic or administrative control, of course, but if a single centre is controlling most of Crete at this point, its power is insufficiently centralised to influence local administration procedures (Schoep 1999b: 220).

In reviewing the evidence for LA use in the Second Palace Period, one gets an impression of a widespread use of writing on several media, and for several purposes, with either the writing support being manipulated to add meaning to the text (as with the clay administrative documents) or the other way around (as might be the case with some of the non-administrative objects). Although examples of writing are relatively widespread in the landscape, this need not necessarily equate to widespread literacy, not least because it seems likely that writing is principally an elite activity, and furthermore, that restricted contexts of use possibly mean that ordinary, non-writing, people might well interact with only a single kind, or a small range, of documents, creating a sort of sub-category of literacy, where understanding part of a text's meaning derives largely from the form of its support and context of use.

Discussion

The two basic components of Bronze Age administration are seals and script (Hallager 1996: 31), and a distinction can be made between recording documents, whose primary function is to accommodate writing, and sealed documents, which authenticate something by their seal impression (Schoep 2002a: 9). This functional division is reflected in the document forms, most clearly seen in the CH, LA and LB tablets, and CH bars, which are recording documents, shaped to carry quantities of written data. The sealed documents are more complex: the variety of shapes suggests that the form itself identifies a role in addition to that of authenticating (Schoep 2002a: 9). Where text appears on hanging sealings, the frequent absence of numerals, and occasionally ideograms, suggests these data are derived from the items to which the sealings are attached, creating, in effect, a larger document composed of object + sealing.

Clearly, for some of the sealed document forms, the loss of whatever they were associated with means our understanding of their use cannot, without speculation, extend much beyond inferring that they hung from or were affixed to something. Generally, the taphonomy of writing in the Aegean is problematic, as we depend on it being applied to materials that are preserved archaeologically; in the case of clay documents that were not deliberately fired, this means accidental preservation in a wider burnt context (Bennet 2008: 6). There is then an inevitable risk that, in an effort to make up for the gaps in the evidence, particularly with CH and LA where we cannot read the texts, we rely too heavily on aspects like differences in form, which might be a reflection of our own 'etic' analyses rather than of different ancient practices (Bennet 2005: 269). "*Classer, c'est interpréter*" (Godart and Olivier 1979: xxiv) is a crucial principle for understanding a large and complex database at the macro scale, but runs the risk of misrepresenting, at the micro scale, differences in form that result from regional peculiarities of use, or are a function of the way different individuals form and seal or inscribe each shape, as seems likely, for example, for some of the variation amongst LA single-hole hanging nodules (Krzyszowska 2005: 159–160). Because the LB documents are relatively well understood, the temptation is, of course, to project their usage back onto those LA and CH documents with similar forms. This is one aspect of a broader

tendency to retroject our models of the social, political and economic structures of the Mycenaean palaces onto the First and Second Palace Periods, which has rightly been challenged (Cherry 1984: 33; Schoep 2006: 38).

While these points must be borne in mind, it is nevertheless reasonable to suggest that the observable changes in document forms point to alterations in the methods of data gathering, processing and storing (Palaima 1984: 305). I would pick out two as particularly significant. The first is the bundle of changes in sealing practices between the First and Second Palace periods (i.e. between CH / limited LA use, and widespread LA use): direct object sealing is abandoned, suggesting, on the one hand, that the security of storerooms and their contents is managed differently, in a less physical way (Weingarten 1990*b*: 107–108), and, on the other, that direct control of commodities, by means of attaching sealings to them, is replaced by more indirect methods of controlling commodity information with hanging nodules and tablets (Knappett 2001: 86, n. 26). Furthermore, writing, with one exception, no longer appears on seals themselves, but from this point on is incised or painted rather than formed by stamping (Bennet 2008: 9–10).

Secondly, the transition to LB sees a dramatic reduction in the number of different sealed documents, and an increase in the number and use of recording documents, with the development of ‘palm-leaf’ tablets and labels for baskets (Palaima 1984: 305). The hierarchy of document forms suggests a more systematic approach to recording fuller and more specialised kinds of information than before, while at the same time the loss of the roundel, a document form key to LA administration, could point to a distancing from those to whom the administration issues goods (Bennet 2008: 18; Palaima 1984: 305).

What drives these changes is difficult to evaluate, not least because we assume that changes in sealing systems are necessarily tied to changes in writing systems (and possibly language; Bennet 2005: 270). Palaima’s suggestion that LA replaces CH because the latter script is inadequate to record increasingly complex economic activities (1990: 94) is a case in point, and this sort of utilitarian motivation underestimates the potential for writing to be used for ideological reasons. The transition from CH to LA, and from LA to LB, can arguably be seen as part of a deliberate construction of new identities, through the manipulation of knowledge resources or material culture, by elite groups, seeking to differentiate themselves from their predecessors, or exclude others from participating in political or economic life (Bennet 2008: 20; Schoep 2007: 59). Knappett’s observation that, in seeking to look through artefacts to see “the people behind them”, and their motivations or choices, there is a tendency for the objects themselves to be reduced to mere ciphers or emblems of human activity (Knappett 2008*b*: 122), is also pertinent here. He suggests that more attention be paid to the agency of artefacts, to the possibility that things can “take on a life of their own, entangling humans and pushing them along new, previously unrecognised paths” (Knappett 2008*b*: 122); while ascribing agency to objects is problematic (Morphy 2009: 6), Knappett is nevertheless right to stress the complexity of the relationship between artefacts and their users.

Finally, what does seem significant is a conceptual shift between CH / LA and LB administrations: the reduction of document shapes in LB suggests that writing now predominates over both the physical aspects of document forms (Schoep 1996–1997: 403), and the image, with signs superscribed over seal impressions, while in LA practice impressions are generally kept clear (Palaima 1990: 96). Furthermore, CH is “messy” (Younger and Rehak 2008: 174), and LA tablets generally poorly organised, unstandardised, and sometimes too large or small for their text (Schoep 2002*a*: 73), suggesting that the text and its support are considered to be separate entities, yet both contributing information to the overall message. In contrast, the LB tablets, with their neat, standardised layouts, and text which usually fits the tablet well, seem to be conceived of as a unit, with text and support integrated into a coherent and well-defined document. Form may ever follow function, but these changes bespeak a fundamentally different view on the part of those creating and consuming writing in the Bronze Age Aegean of how writing and its support ought to interact.

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